Prevention and Control of Ebola Virus Disease in Health Care Facilities with Limited Resources

Reference Manual
February 2015

Authors
Chandrakant Ruparelia
Melanie Curless
Polly T rexler
Meredith Black
Prevention and Control of Ebola Virus Disease in Health Care Facilities with Limited Resources

Reference Manual
February 2015

Authors
Chandrakant Ruparelia
Melanie Curless
Polly Trexler
Meredith Black
Jhpiego is an international, non-profit health organization affiliated with The Johns Hopkins University. For more than 40 years, Jhpiego has empowered frontline health workers by designing and implementing effective, low-cost, hands-on solutions to strengthen the delivery of health care services for women and their families. By putting evidence-based health innovations into everyday practice, Jhpiego works to break down barriers to high-quality health care for the world’s most vulnerable populations.

Published by:
Jhpiego Corporation
Brown’s Wharf
1615 Thames Street
Baltimore, Maryland 21231-3492, USA
www.jhpiego.org

© Jhpiego Corporation, 2015. All rights reserved.

Authors: Chandrakant Ruparelia, MD, MPH, Senior Technical Advisor, Jhpiego
         Melanie Curless, RN, MPH, Infection Control Epidemiologist, Department of Hospital Epidemiology and Infection Control, The Johns Hopkins Hospital
         Polly Trexler, MS, CIC, Associate Director, Department of Hospital Epidemiology and Infection Control, The Johns Hopkins Hospital
         Meredith Black, MPH, Infection Control Epidemiologist, Department of Hospital Epidemiology and Infection Control, The Johns Hopkins Hospital

In the development of these materials, the authors referred to the latest World Health Organization (WHO) and U.S. Centers for Disease Control and Prevention (CDC) recommendations for health care workers on preventing the transmission of Ebola Virus Disease in health care facilities. All WHO and CDC resources are listed at the end of this manual.

www.who.int/csr/disease/ebola/en/
www.cdc.gov/vhf/ebola/
CHAPTER 5: GUIDANCE FOR THE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR MANAGING SUSPECTED/CONFIRMED CASES OF EBOLA VIRUS DISEASE

Definition of Key Terms ................................................................. 5-1
Introduction .................................................................................... 5-1
Essential Messages about Effective PPE to Prevent Transmission of EVD .................................. 5-2
PPE Recommendations .................................................................. 5-3
PPE Rationale and Use .................................................................. 5-4
Principles of Effective PPE Use ...................................................... 5-4
Gloves .......................................................................................... 5-5
Do's and Don'ts about Gloves When Caring for EVD Patients .......... 5-5
Respirators .................................................................................... 5-6
Step-by-Step Instructions for Putting on PPE for EVD ...................... 5-7
Key Points for Safe Practice Workflow .......................................... 5-9
Step-by-Step-Instructions for Removing PPE for EVD .................... 5-10
Tips for PPE Use if Supplies Are Limited ...................................... 5-13
PPE and Heat-Related Illness .......................................................... 5-13

CHAPTER 6: INFECTION PREVENTION AND CONTROL PRACTICES FOR MANAGING EBOLA VIRUS DISEASE IN PREGNANT AND BREASTFEEDING WOMEN AND THEIR BABIES

Key Messages .................................................................................. 6-1
Introduction .................................................................................... 6-1
Recommended Infection Prevention and Control Practices .......... 6-2
Recommended Obstetric Practices for Managing Pregnant Women and Their Babies Infected with Ebola ......................................................... 6-4
Breastfeeding during Ebola Infection ............................................. 6-5
Key Messages on Breastfeeding ...................................................... 6-5

CHAPTER 7: ENVIRONMENTAL CLEANING, PROCESSING LINEN, AND WASTE MANAGEMENT PRACTICES TO PREVENT TRANSMISSION OF EBOLA VIRUS DISEASE

ENVIRONMENTAL CLEANING ................................................................ 7-1
Definition of Key Terms .................................................................. 7-1
Introduction .................................................................................... 7-1
Recommended PPE ......................................................................... 7-2
Recommended Cleaning Products for Ebola Virus .......................... 7-2
Prevention and Control of Ebola Virus Disease in Health Care Facilities with Limited Resources

CHAPTER 8: SUPPORT ACTIVITIES DURING EBOLA VIRUS DISEASE OUTBREAKS

Introduction ............................................................................................................................. 8-1
Safe and Dignified Burial of People Who Die of EVD ............................................................. 8-1
Post-Mortem Examination (Not Recommended) ................................................................. 8-3
Diagnostic Laboratory Activities ......................................................................................... 8-3
Infection Prevention and Control Guidelines for Protecting Visitors .................................... 8-5
Managing Exposure to Ebola Virus among Health Facility Staff during Patient Care .......... 8-6
Managing Stress and Preventing Burnout in a High-Stress Environment ........................... 8-11

CHAPTER 9: PLANNING AND PREPAREDNESS FOR EBOLA VIRUS DISEASE OUTBREAKS

Coordination ........................................................................................................................... 9-2
Surveillance in the Health Care Facility ............................................................................... 9-3
Communication .................................................................................................................... 9-5
Case Identification, Management, and Treatment ............................................................. 9-8
Infection Prevention and Control in Health Care Settings ................................................... 9-9
Maintaining Essential Health Services ................................................................................ 9-10
Information Dissemination and Communication in the Community ................................. 9-13

APPENDICES

APPENDIX A: EBOLA VIRUS DISEASE CASE DEFINITIONS

APPENDIX B: COLLECTING AND SHIPPING BLOOD SAMPLES

APPENDIX C: COMPONENTS OF CLINICAL MANAGEMENT OF EBOLA VIRUS DISEASE
APPENDIX D: WORLD HEALTH ORGANIZATION TECHNICAL SPECIFICATION FOR PPE IN THE CONTEXT OF FILOVIRUS DISEASE OUTBREAK RESPONSE

APPENDIX E: INCINERATORS AND BURIAL SITES FOR WASTE DISPOSAL

APPENDIX F: HOW TO CONDUCT SAFE AND DIGNIFIED BURIAL OF A PATIENT WHO HAS DIED FROM SUSPECTED OR CONFIRMED EBOLA VIRUS DISEASE

APPENDIX G: CHECKLIST FOR PLANNING AND PREPAREDNESS FOR AN EBOLA VIRUS DISEASE OUTBREAK

REFERENCES
### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABHR</td>
<td>Alcohol-Based Handrub</td>
</tr>
<tr>
<td>AIIR</td>
<td>Airborne Infection Isolation Room</td>
</tr>
<tr>
<td>CDC</td>
<td>U.S. Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>DRC</td>
<td>Democratic Republic of Congo</td>
</tr>
<tr>
<td>ELISA</td>
<td>Enzyme-Linked Immunosorbent Assay</td>
</tr>
<tr>
<td>EVD</td>
<td>Ebola Virus Disease</td>
</tr>
<tr>
<td>HCW</td>
<td>Health Care Worker</td>
</tr>
<tr>
<td>IPC</td>
<td>Infection Prevention and Control</td>
</tr>
<tr>
<td>MSF</td>
<td>Médecins Sans Frontières</td>
</tr>
<tr>
<td>NIOSH</td>
<td>National Institute for Occupational Safety and Health</td>
</tr>
<tr>
<td>PAPR</td>
<td>Powered Air Purifying Respirator</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase Chain Reaction</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>RT-PCR</td>
<td>Reverse Transcriptase Polymerase Chain Reaction</td>
</tr>
<tr>
<td>RUIF</td>
<td>Ready to Use Infant Formula</td>
</tr>
<tr>
<td>VHF</td>
<td>Viral Hemorrhagic Fever</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

The authors would like to acknowledge the valuable assistance of The Johns Hopkins Hospital, Department of Hospital Epidemiology and Infection Control, in particular Dr. Lisa Maragakis, Director of Hospital Epidemiology and Infection Control, in the development of this learning resource package. The authors would also like to thank the following individuals who provided support in the preparation of these materials: Dr. Ron Magarick, Marion Subah, Kelly Curran, Dr. Emmanuel Otolorin, Dr. Blami Dao, and Dr. Oniyire Adetiloye, for reviewing and providing technical input on drafts of the materials; Dr. Harshad Sanghvi, Dr. Alain Damiba, and Nancy Caiola, for their overall guidance; Young Kim, for general publications support; Rebecca Elliott, for help in developing supporting materials, including the PowerPoint presentations; Dana Lewison, for editorial assistance; and Courtney Weber and Bekah Walsh, for desktop publishing support.
CHAPTER 1: OVERVIEW OF EBOLA VIRUS DISEASE (EVD)

KEY FACTS ABOUT EBOLA VIRUS DISEASE

- The Ebola virus is the cause of Ebola Virus Disease (EVD), formerly known as Ebola Hemorrhagic Fever.
- Symptoms appear from 2–21 days after exposure to the virus, with an average of 10 days.
- The main symptoms of EVD include: fever, severe headache, muscle pain, vomiting, diarrhea, stomach pain, and unexplained bleeding or bruising.
- A person infected with Ebola virus can infect others only after she/he develops signs and symptoms.
- Human-to-human transmission of Ebola virus occurs through direct or indirect contact of mucous membranes or broken skin with blood and other body fluids including urine, feces, saliva, breast milk, semen, and other secretions from infected persons.
- The Ebola virus does not spread through the air or by water.
- During the 2014 outbreak, the case fatality is greater than 50%.
- Bodies of patients who have died of Ebola Virus Disease continue to remain infectious. Handling dead bodies for traditional/religious rituals is a major cause of the spread of infection among relatives and community members.
- Only persons trained and wearing recommended personal protective equipment (PPE) should handle dead bodies and human remains.
- Currently there is no specific treatment or vaccine for Ebola. Some experimental drugs and treatments are being evaluated.
- Ebola Virus Disease enters the human population through close contact with the blood, secretions, organs, or other body fluids of infected wild animals and then can spread from person to person.
- Among cases suspected of having EVD, clinical diagnosis is confirmed through laboratory tests using ELISA or Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) assays.
- Key measures that health care workers can take to protect themselves and other non-infected patients in the health facility include:
  - Implementing screening for all patients entering the facility
  - Following Standard Precautions for all patients
  - Implementing isolation precautions and procedures for all suspected Ebola patients
  - Practicing hand hygiene
  - Correctly using personal protective equipment (PPE)—Adequate foot covering, impermeable gown, mask, goggles or face shield, head cover, and double gloving
  - Meticulously removing PPE to avoid the risk of exposure to contaminated PPE
  - Using safe injection practices and sharps disposal
  - Thoroughly cleaning the environment and equipment using 0.5% chlorine solution with 10 minutes contact time
  - Carefully handling waste, linen, and human remains
  - Ensuring that staff are educated on Ebola and Ebola prevention techniques
BACKGROUND

Ebola Virus Disease is one of numerous Viral Hemorrhagic Fevers (VHF) including Lassa fever, Rift Valley fever, Marburg Hemorrhagic Fever, Crimean-Congo Hemorrhagic fever, and yellow fever. Ebola Virus Disease is caused by the Ebola virus. It is endemic throughout sub-Saharan Africa. The virus belongs to the Filoviridae family and comprises five different species: Bundibugyo, Tai Forest (formerly Côte d’Ivoire), Reston, Sudan, and Zaire.

The disease was named after the Ebola River in the Democratic Republic of Congo (DRC), where the first case was recorded in a 44-year-old schoolteacher in 1976. Sporadic outbreaks have occurred since 1976 in DRC, Sudan, Gabon, Uganda, and Republic of the Congo (see Figure 1-1). The most recent outbreaks in 2014 are occurring mainly in Guinea, Liberia, and Sierra Leone. Outbreaks in Nigeria and Senegal were contained within weeks and both countries were declared Ebola-free by the World Health Organization.

Figure 1-1. Geographical Distribution of Ebola Outbreak in Africa (1976–2014)

LIFE CYCLE OF EBOLA VIRUS

On the basis of available evidence, fruits bats of the family Pteropidae are considered to be the natural reservoir of filoviruses including Ebola. The figure below describes the life cycle of Ebola virus in the environment. The mechanism through which the virus survives in bats remains unknown. From bats the virus is transmitted to wild animals or directly to human beings. Once it enters human beings, human-to-human transmission via direct contact with infected blood or body fluids results in outbreaks (see Figure 1-2).

Figure 1-2. Life Cycle of Ebola Virus

Ebola virus Ecology

<table>
<thead>
<tr>
<th>Enzootic Cycle</th>
<th>Epizootic Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>New evidence strongly implicates bats as the reservoir hosts for ebolaviruses, though the means of local enzootic maintenance and transmission of the virus within bat populations remain unknown.</td>
<td>Epizootics caused by ebolaviruses appear sporadically, producing high mortality among non-human primates and dukers and may precede human outbreaks. Epidemics caused by ebolaviruses produce acute disease among humans, with the exception of Reston virus which does not produce detectable disease in humans. Little is known about how the virus first passes to humans, triggering waves of human-to-human transmission, and an epidemic.</td>
</tr>
</tbody>
</table>

Ebola viruses:
- Ebola virus (formerly Zaire virus)
- Sudan virus
- Tai Forest virus
- Bundibugyo virus
- Reston virus (non-human)

Following initial human infection through contact with an infected bat or other wild animal, human-to-human transmission often occurs.

Human-to-human transmission is a predominant feature of epidemics.

Source: Centers for Disease Control and Prevention, at: http://www.cdc.gov/vhf/ebola/resources/virus-ecology.html

TRANSMISSION

Body fluids, including blood, sweat, saliva, urine, stool/feces, breast milk, semen, and vaginal fluid, contain Ebola virus. Across several combined studies, Ebola virus RNA has been detected up to 101 days after symptoms onset in semen, 33 days in vaginal secretions, 29 days in feces, 23 days in urine, 22 days in conjunctival secretion (tears), 21 days in blood, 15 days in breast milk, 8 days in saliva, and 6 days on skin.

**Animal-to-human transmission:** Animal-to-human transmission occurs either through direct contact with infected bats (very rare) or through handling infected, dead, or sick animals found in the forest (more frequent), including hunting and slaughtering wild animals. It was observed during experimental studies in the Philippines that pigs inoculated with the Reston strain of Ebola virus, which does not infect humans, developed symptoms. Care should be taken when dealing with the blood and body fluids of all animals.

**Human-to-human transmission:** Human-to-human transmission occurs via direct contact (through broken skin or mucous membranes) with the blood, secretions, organs, or other body fluids of infected people, and with surfaces and material (e.g., bedding, clothing) contaminated with the virus. This puts family members caring for sick patients and health care providers at higher risk of infection.

Prompt isolation and adherence to strict infection control practices are imperative in reducing the risk of human-to-human transmission of Ebola. Appropriate personal protective equipment (PPE) should be worn when taking care of ill patients at home and in the health care facility. Health care workers should wear PPE that provides full coverage to prevent exposure to blood or body fluids of infected individuals. For more details on appropriate PPE, refer to Chapter 5: Guidance for the Use of Personal Protective Equipment (PPE) for Managing Suspected/Confirmed Cases of Ebola Virus Disease.

By virtue of being in close contact with patients with EVD, health care workers have an increased risk of being infected with Ebola virus. Infection can result in health care workers who treat patients with Ebola when infection control practices are not strictly followed. The main reasons for transmission among health care workers and patients are overall low compliance with Standard Precautions and Transmission-Based Precautions, non-availability of personal protective equipment, and inadequate training in appropriately wearing and removing PPE. During the 2014 outbreak, it was observed that the risk of accidental exposure to Ebola virus was high during removal of the PPE.

Burial ceremonies in which relatives and friends have direct contact with the body of the deceased person also play a significant role in transmission of the virus to the community members.

**Incubation period:** The time interval from exposure to the virus to onset of symptoms can range from 2–21 days but the average incubation period is 8–10 days for EVD.

**Infectivity:** Persons are contagious from the time of the first symptoms for as long as their blood and secretions contain the virus. Once someone recovers from EVD, the person’s blood and secretions, except semen and breast milk, no longer contain the virus. Concentration of virus increases logarithmically as the disease progresses and reaches its highest level in the blood at the time of death.
**HOW DOES THE VIRUS CAUSE THE DISEASE?**

Ebola virus infects many cell types once it enters the human body via mucous membrane or non-intact skin. Lymphocyte counts decrease as a result of infection with Ebola virus. From the initial infection site, the virus migrates to lymph nodes and subsequently to the liver, spleen, and adrenal glands. Damage to the liver and impairment of regulation of clotting factors result in failure of blood to coagulate. This also causes prolonged and excessive internal or external bleeding. Damage to adrenal glands is associated with low blood pressure and impaired steroid hormone production. The virus also results in vascular leak and impairment of clotting, ultimately resulting in multi-organ failure, shock, and death.

**CLINICAL FEATURES OF EBOLA VIRUS DISEASE**

Patients with EVD generally have abrupt onset of fever, and symptoms typically begin 8–12 days after exposure, depending on the nature of the exposure. Initial signs and symptoms are typically nonspecific, and may include elevated body temperature, chills, myalgia, and malaise. Due to these nonspecific symptoms, EVD can often be confused with other, more common, infectious diseases (e.g., malaria, typhoid fever, meningococcemia).2

**Table 1-1. Early and Late Clinical Features of EVD**

<table>
<thead>
<tr>
<th>Early Clinical Features</th>
<th>Late Clinical Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Intense weakness</td>
<td>• Confusion</td>
</tr>
<tr>
<td>• Sudden onset of fever (greater than 38.6°C or 101.5°F)</td>
<td>• Seizures</td>
</tr>
<tr>
<td>• Muscle pain</td>
<td>• Chest pain</td>
</tr>
<tr>
<td>• Severe headache</td>
<td>• Diarrhea</td>
</tr>
<tr>
<td>• Joint pain</td>
<td>• Vomiting</td>
</tr>
<tr>
<td>• Abdominal pain</td>
<td>• Skin rash</td>
</tr>
<tr>
<td>• Diarrhea (with or without blood)</td>
<td>• Internal and/or external bleeding including:</td>
</tr>
<tr>
<td>• Hiccups</td>
<td>– Oozing from puncture sites</td>
</tr>
<tr>
<td>• Conjunctivitis</td>
<td>– Rashes suggestive of easy bleeding, ecchymoses, petechiae</td>
</tr>
<tr>
<td>• Nausea</td>
<td>– Bleeding from the gums</td>
</tr>
<tr>
<td>• Loss of appetite</td>
<td>– Conjunctival hemorrhage</td>
</tr>
<tr>
<td>• Throat pain and difficulty swallowing</td>
<td>– Miscarriage in pregnant woman</td>
</tr>
<tr>
<td></td>
<td>– Respiratory distress</td>
</tr>
<tr>
<td></td>
<td>– Bleeding from the nose</td>
</tr>
<tr>
<td></td>
<td>– Hematuria</td>
</tr>
<tr>
<td></td>
<td>– Shock</td>
</tr>
</tbody>
</table>

**Note:** There is often an overlap of early and late symptoms. Patients do not develop all the signs and symptoms.

During the outbreak in 2014 in West Africa, it was found that fever, fatigue, diarrhea, headache, vomiting, and loss of appetite were more frequently reported symptoms, whereas bleeding was reported in less than half of the patients.3

---


EVD CASE DEFINITIONS
During outbreaks, cases of EVD are classified as suspected, probable, or confirmed.

Given below are the World Health Organization recommended categories to classify EVD cases at health facilities during the Ebola outbreak.

**Suspected case:** Any person, alive or dead, who has (or had) sudden onset of high fever and had contact with a suspected, probable, or confirmed EVD case, or a dead or sick animal, OR any person with sudden onset of high fever and at least three of the following symptoms: headache, vomiting, loss of appetite, diarrhea, lethargy, stomach pain, aching muscles or joints, difficulty swallowing, breathing difficulties, or hiccups, OR any person with unexplained bleeding, OR any sudden, unexplained death.

**Probable case:** Any suspected case evaluated by a clinician OR any person who died from “suspected” EVD.

**Confirmed case:** A probable or suspected case is classified as confirmed when a sample from that person tests positive for EVD in the laboratory.

Please refer to Appendix A: Ebola Virus Disease Case Definitions for detailed definitions of a suspected/probable/confirmed case of Ebola Virus Disease as well as definitions for the purpose of surveillance both within the community and at health facilities.

DIAGNOSIS OF EVD
Clinical diagnosis of EVD, especially in the early stages of the disease, can be very challenging. Many common conditions have early signs and symptoms similar to EVD, for example, malaria, typhoid fever, shigellosis, cholera, leptospirosis, plague, rickettsiosis, relapsing fever, meningitis, hepatitis, and other viral hemorrhagic fevers.

Ebola virus is detected in the blood only after the onset of symptoms, most notably fever, which accompany the rise in circulating virus within the patient’s body. It may take up to 3 days after symptoms start for the virus to reach detectable levels.
### Table 1-2. Infection Timeline and Diagnostic Tests Available

<table>
<thead>
<tr>
<th>Timeline of Infection</th>
<th>Diagnostic Tests Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within a few days after symptoms begin</td>
<td>• Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing</td>
</tr>
<tr>
<td></td>
<td>• IgM ELISA</td>
</tr>
<tr>
<td></td>
<td>• Polymerase chain reaction (PCR)</td>
</tr>
<tr>
<td></td>
<td>• Virus isolation</td>
</tr>
<tr>
<td>Later in the disease course or after recovery</td>
<td>• IgM and IgG antibodies</td>
</tr>
<tr>
<td>Retrospectively in deceased patients</td>
<td>• Immunohistochemistry testing</td>
</tr>
<tr>
<td></td>
<td>• PCR</td>
</tr>
<tr>
<td></td>
<td>• Virus isolation</td>
</tr>
</tbody>
</table>


Whole blood, serum, or plasma is used for ELISA, whereas whole blood or clotted blood, serum/plasma of tissue is used for RT-PCR. Samples collected from suspected patients are an extreme biohazard risk.

Detailed steps of preparation, sample collection, packaging, and shipping are described in Appendix B.

### MANAGEMENT OF EVD PATIENTS

Currently, there is no specific treatment or vaccine for Ebola Virus Disease. Some experimental drugs and treatments are being evaluated. Given below are the basic interventions that can significantly improve the chances of survival. It is critical that patients be treated as early as possible after the symptoms and signs appear. Activate the health care facility plan for isolating suspected EVD, notify the health authorities, organize for sample collection, and/or refer patients as appropriate.

**■ Manage symptoms:**

- **Pain:** Paracetamol, tramadol, and morphine. Avoid non-steroidal anti-inflammatory drugs like ibuprofen.
- **Fever:** Paracetamol. Avoid non-steroidal anti-inflammatory drugs like ibuprofen.
- **Stomach discomfort:** Omeprazole, magnesium trisilicate, and ranitidine. Avoid cimetidine.
- **Confusion or aggression:** Diazepam, Haldol, or chlorpromazine.
- **Hiccups:** Chlorpromazine.
- **Diarrhea:** Fluid replacement, electrolyte replacement to manage hypokelamia, hyponatremia, and hypocalcemia. Zinc and antibiotics. There is no proven role for loperamide.
- **Vomiting:** Ondansetron, metoclopramide, chlorpromazine, and promethazine.
- **Dysphagia/ulcers:** Saline mouth wash, lidocaine rinse. Nystatin if thrush.

**■ Manage coinfection like malaria. Consider empiric therapy for all patients in resource-limited settings. Use artesunate, amodiaquine, or artemether and lumefantrine.**
Although routine use of antibiotic therapy is not recommended, empiric therapy with cefixime or ceftriaxone is recommended in case of the risk of infection. Antibiotics should be continued for 5 days after the symptoms disappear.

Manage bleeding: Fresh whole blood transfusion can be considered to manage a large volume of blood loss.

Manage HIV/AIDS: Continue to provide antiretroviral therapy and other related medications. Keep in mind the renal and hepatotoxicity of antiretroviral therapy and manage accordingly.

Management of pregnant women with Ebola Virus Disease is described in Chapter 6: Infection Prevention and Control Practices for Managing Ebola Virus Disease in Pregnant and Breastfeeding Women and Their Babies.

Recovery from Ebola Virus Disease depends on good supportive care and the patient’s immune response.

Please see Appendix C: Components of Clinical Management of Ebola Virus Disease for details on managing patients with EVD.
CHAPTER 2: INFECTION PREVENTION AND
CONTROL PRACTICES FOR PREVENTING EBOLA
VIRUS DISEASE IN HEALTH CARE FACILITIES

DEFINITION OF KEY TERMS

**Standard Precautions**: Basic minimum infection control practices used in care of ALL patients to prevent the spread of potential infections; *essential to prevent the spread of Ebola Virus Disease before a patient is identified and isolated.*

**Personal protective equipment (PPE)**: Protective barriers and respirators, used alone or in combination by the health care worker, to protect mucous membranes, airways, skin, and clothing from contact with infectious agents.

**Respiratory etiquette/cough etiquette**: Maintaining a distance of at least 3 feet from others in common waiting areas, covering mouth/nose when sneezing/coughing, and performing hand hygiene after soiling hands with respiratory secretions.

**Sharps and needle safety**: Measures to handle needles and other sharp devices in a manner that will prevent injury and exposure to infection during routine patient care.

**Point of care**: The place where three elements come together: the patient, the health care worker, and care or treatment involving contact with the patient or his/her surroundings. The concept embraces the need to dispose of the sharps exactly where they are used.

**Injection safety**: A set of measures to perform injections in an optimally safe manner for patients, health care workers, and others.

**Cohorting**: The practice of placing patients with the same active infectious disease (e.g., Ebola), but no other infection, in the same room or ward. This includes allowing patients with epidemiological and clinical information suggestive of a similar diagnosis to share rooms where beds are spaced more than 1 meter apart from edge to edge. Suspected cases are cohorted separately from confirmed cases.

**Contact transmission**: Infectious agent transmitted directly or indirectly from one infected person to a susceptible host by physical contact with the infected person or contaminated equipment/environmental surfaces. Often, the contaminated hands of a health care worker or contaminated equipment/environmental surfaces are involved. *To prevent transmission of Ebola, protection from patients, equipment, and environmental surfaces contaminated or potentially contaminated with blood or body fluids is recommended.*

**Droplet transmission**: Infectious agent is spread by landing directly on or coming in contact with the mucous membranes of the nose, mouth, or conjunctivae of the eye with infectious particles larger than 5 µm in size. Due to their size, particles remain in the air briefly and travel only about 3 feet to 6 feet (1 to 2 meters) or less. *There is no evidence that Ebola is spread by coughing or sneezing and Ebola is not transmitted through the air.* However, large droplets of respiratory or other secretions from a person who is sick with Ebola could be infectious, and therefore certain Transmission-Based Precautions (Standard, contact, and droplet precautions) are recommended.

**Airborne transmission**: Infectious agent is spread by transfer of particles 5 µm or less in size into the air, either as airborne droplets or dust particles containing the infectious microorganism. Particles can remain in the air for up to several hours, and can be spread widely within a room or over longer distances on air currents. *Ebola Virus Disease is not a respiratory disease and is not spread through the airborne route.* However, for patients with Ebola Virus Disease, droplet nuclei can be produced by aerosol-generating procedures (including aerosolized or nebulized medication administration, diagnostic sputum induction, endotracheal intubation, bronchoscopy or airway suctioning, or positive pressure ventilation via face mask). *To prevent transmission of Ebola, it is recommended that health care workers wear an N-95 respirator when performing any aerosol-generating procedures.*
As shown in the figure above, all infectious agents need certain conditions in order to be transmitted.

**THE CHAIN OF INFECTION FOR EBOLA VIRUS DISEASE**

- The **agent** in the case of EVD is Ebola virus.

- The **reservoir** of a disease organism could be primary or secondary. In the case of Ebola virus, the primary reservoir is the fruit bat. The secondary host is often wild animals. If a human is infected by contact with an infected animal, the human then becomes a reservoir.

- The disease-causing agent must **exit** from the infected reservoir. The infectious agent must be able to survive until it finds another susceptible host. In the case of Ebola virus, both in animals and humans, the virus is found in blood and body fluids, excretions, and secretions including, but not limited to, urine, saliva, feces, vomit, and semen.

- The **methods of transmission** for Ebola virus includes direct contact with infected blood and body fluids or indirect contact with objects that have been contaminated with infective blood and body fluids (such as equipment or linens).
The Ebola virus enters the susceptible host by **direct contact** with infected blood or body fluids to mucous membranes, non-intact skin, a percutaneous injury, or theoretically via aerosols generated during aerosol-generating procedures such as intubation or bronchoscopy.

A **susceptible host** does not have any natural or acquired protection against the disease, and therefore the virus can successfully cause disease in the host. Poor health, poor nutrition, and co-existing diseases further reduce the host immune defenses.

Chronological steps in transmission of Ebola from animal to human and from human to human are explained in the figure below.

**Figure 2-2. Steps in Transmission of Ebola Virus Disease**

- Large number of deaths among gorillas and chimpanzees
- Hunters kill infected animals and handle infected animals’ dead bodies
- A member of the group develops symptoms of disease after several days
- Friends, relatives, health care personnel, religious leaders, etc. who are caring for the sick person come in contact with other people
- Caregivers become infected through direct contact with blood or body fluids or through indirect exposure to contaminated items
- The infection spreads to health care workers and/or other patients in health care settings as a result of poor infection control
- Individuals responsible for washing bodies or people touching the dead body as a part of the funeral ritual become infected
PRECAUTIONS REQUIRED FOR CARE AND TREATMENT OF SUSPECTED OR CONFIRMED EBOLA VIRUS DISEASE PATIENTS

Currently it is not known precisely how long Ebola virus survives in fluids under real-world conditions. It could be from a few hours to a few days. In one study, virus was recovered from a doctor’s blood-stained gloves and from a blood-stained intravenous site. However, the virus was not found in patient care areas like the bathroom or high-touch surfaces like bed rails.

Infection prevention and control measures, including contact and droplet precautions, are designed to break the cycle of EVD transmission and protect the health care worker, the patient, and the community.

Standard Precautions

Standard Precautions are the basic infection control practices that should be used in the care of all patients, regardless of suspected or confirmed infectious diseases. The basic concept of Standard Precautions is to prevent exposure to all blood, secretions and excretions, and non-intact skin and mucous membranes.

Implementation of Standard Precautions is aimed at reducing the risk of transmitting microorganisms from known or unknown sources of infection (e.g., patients, respiratory secretions, contaminated objects, used needles and syringes, multi-dose vials, etc.) within health care settings.

The components of Standard Precautions create protective barriers for preventing infections in health care workers, patients, and visitors, by considering the blood and body fluids of every person (patient or staff) as potentially infectious.

Standard Precautions include:

- Hand hygiene (see Chapter 4: Hand Hygiene)
- Appropriate use of PPE:
  - To protect skin and mucous membranes of providers from blood and other body fluids (stool, amniotic fluid, urine, respiratory secretions, vomit, etc.)
- Conducting point of care risk assessment prior to each encounter and wearing appropriate PPE to protect from potential exposures
- Respiratory etiquette to prevent transmission from respiratory secretions
- Safe injection practices
- Safe handling of potentially contaminated equipment or surfaces in the patient environment
- Cleaning, disinfection, and sterilization of patient care equipment and linen
- Cleaning and disinfection of the environment
It is critical to use Standard Precautions at all times for all patients in health care facilities. This is particularly relevant during EVD outbreaks to prevent inadvertent exposure to blood and body fluids of patients not yet identified as having EVD.

Applying Standard Precautions during patient care is based on the anticipated interactions health care workers will have with the blood, body fluid, or potential pathogen exposure from patients (Siegel et al. 2007).

Key Components of Standard Precautions and Their Use

**Hand hygiene**

Hand hygiene is the single most important intervention for preventing cross-contamination (person to person or contaminated object to person) and must be performed at the recommended moments and using the correct technique. Hand hygiene includes washing hands with soap and water or use of alcohol-based handrub (ABHR). Alcohol-based handrub is the preferred method for hand hygiene except when hands are visibly soiled.

The World Health Organization’s *Guideline on Hand Hygiene in Health Care in the Context of Filovirus Disease Outbreak Response: Rapid Advice Guideline*, issued in November 2014, includes the following recommendations:

- Perform hand hygiene using either an alcohol-based handrub or soap and running water, applying correct technique recommended by WHO. When hands are visibly soiled, hand hygiene should always be performed with soap and running water.

- In settings where bleach/chlorine solutions are currently used for hand hygiene, WHO recommends implementing a strategy to change to an alcohol-based handrub or soap and water.

- Bleach/chlorine solutions currently in use for hand hygiene (500 ppm or 0.05% concentration) and disinfection of gloved hands (5,000 ppm or 0.5% concentration) may be used in the interim period in an emergency situation until an alcohol-based handrub or soap and water becomes available.

Hand hygiene is modified in EVD isolation areas to maintain full skin coverage with PPE while still protecting patients from the transmission of pathogens on the hands of health care workers. The modified process involves cleaning gloves rather than bare hands in some instances.

For further details on hand hygiene, please refer to Chapter 4.

**Personal protective equipment**

The goal of personal protective equipment is to prevent exposure of any skin or mucous membrane to potentially infectious blood and body fluids from the EVD patients. All health care workers should use recommended PPE prior to working with suspected or confirmed Ebola patients. While working with patients with suspected or confirmed EVD, health care workers should wear PPE in such a way that no skin area is exposed and so that full body coverage is achieved. There should be
separate areas for putting on (donning) and removing (doffing) PPE. Having a trained assistant to monitor the correct use of PPE and adherence to recommended practices using a checklist has been found to be critical in avoiding accidental exposure to infectious blood and body fluids, as well as for promptly identifying any potential breaches in protocol or exposures.

For further details on recommended PPE as well as the steps for putting on and removing PPE, please refer to Chapter 5: Guidance for the Use of Personal Protective Equipment (PPE) for Managing Suspected/Confirmed Cases of Ebola Virus Disease.

**Respiratory hygiene and cough etiquette**

Respiratory and cough etiquette includes:

- Techniques to cover coughs and sneezes,
- Maintaining an appropriate distance from and between symptomatic patients,
- Encouraging patients and visitors to disclose respiratory symptoms on arrival to the health care facility, and
- Use of a procedure mask on a symptomatic patient to contain secretions at the source (source control).

EVD is not spread by respiratory droplets like influenza but the virus may be present in respiratory secretions, so respiratory etiquette should always be applied as part of Standard Precautions.

**Safe injection practices**

Health care workers caring for suspected/confirmed cases of EVD should be extremely careful in using syringes and needles as well as other sharp items used for patient care.

- Each patient should have exclusively dedicated injection and parenteral medication equipment, which should be disposed of at the point of care. This equipment should never be reused.
- Limit the use of needles and other sharp objects to the minimum necessary for essential diagnostic evaluation and patient care.
- Limit the use of phlebotomy and laboratory testing to the minimum necessary for essential diagnostic evaluation and patient care.
- If the use of sharp objects cannot be avoided, ensure that the following precautions are observed:
  - DO NOT replace the cap on a used needle.
  - NEVER direct the point of a used needle toward any part of your body.
  - DO NOT remove used needles from disposable syringes by hand, and do not bend, break, or otherwise manipulate used needles by hand.
  - DO dispose of syringes, needles, scalpel blades, and other sharp objects in appropriate, puncture-resistant containers at point of use.
- Ensure that puncture-resistant containers for sharp objects are placed as close as possible to the immediate area where the objects are being used, preferably at every bed and areas where sharps are used.

- If the sharps container is far away, never carry sharps in your hand but place them all in a kidney dish or similar receptacle to carry them to the sharps container.

- Ensure that the puncture-resistant containers are securely sealed with a lid and replaced when three-quarters full. Never shake the container in an attempt to add additional sharps.

**Safe handling and processing of potentially contaminated equipment**

- Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents the risk of skin and mucous membrane exposure by wearing recommended PPE.

- Dispose of needles, syringes, and any sharp instruments in a safety box.

- Clean, disinfect, and reprocess reusable equipment as per the disinfection and sterilization guidelines.

**Environmental cleaning**

- Wear PPE including heavy-duty rubber gloves, impermeable gown, boots, and appropriate facial protection while performing environmental cleaning.

- Follow guidelines for environmental cleaning.

- Do not spray occupied or unoccupied clinical areas with disinfectant.

Please refer to Chapter 7: Environmental Cleaning, Processing Linen, and Waste Management Practices to Prevent Transmission of Ebola Virus Disease for detailed information on environmental cleaning procedures.

**Processing linen**

- Do not sort linen at point of care.

- All linen from a suspected or confirmed EVD patient is considered contaminated.

- Washing contaminated linen by hand should be discouraged.

- All heavily soiled linen from EVD patient care areas should be disposed of by burning.

Please refer to Chapter 7 for detailed information on environmental cleaning procedures.

Standard Precautions are the cornerstone of infection prevention. They provide the first line of defense in preventing transmission of pathogens, including Ebola, in health care. These guidelines serve as the minimum requirements that should be enforced in all health care settings to protect patients, visitors, and health care workers. Even with challenges in resource-limited settings,
appropriate resources should be allocated and staff trained to implement these guidelines for every patient seeking care in a health care facility, especially in locations in and close to EVD outbreaks.

**Transmission-Based Isolation Precautions**

Transmission-Based Isolation Precautions are primary infection prevention and control measures for ensuring a safe environment for patients and health care personnel in relation to infectious agents. The rationale is that for transmission within the health care setting to occur, the elements of the chain of infection shown in Figure 2-1 must be present. Using Transmission-Based Precautions to break the chain of infection is an important means of preventing transmission.

The three main modes of infection transmission are contact, droplet, and airborne. An infecting microorganism can be transmitted by more than one route. Ebola virus is transmitted by contact with blood or body fluids. Droplet precautions are used to prevent contamination and splashes to the mucous membranes of the face. In addition, if aerosol-generating procedures are performed on an Ebola-infected patient, there is the potential for transmission via the airborne route.

While Standard Precautions should be routinely applied to all patients coming to the health care facility, including clinic patients and outpatients, Transmission-Based Precautions apply primarily to hospitalized patients. Patients suspected of having EVD in any setting should be cared for using the appropriate Transmission-Based Precautions. It is important to identify potential EVD patients quickly so that additional Transmission-Based Precautions can be implemented immediately.

**Transmission-Based Precautions for Ebola Virus Disease**

Transmission-Based Precautions include isolation of suspected or confirmed EVD patients, use of recommended PPE, and proper hand hygiene.

**Patient placement**

- Place the patient in a single, private room, preferably with doors that can be closed.
- If individual isolation rooms are not available, place patients with EVD in the same room. Separate cohorting is recommended for suspected (based on exposure and symptoms) patients and patients with laboratory-confirmed diagnosis. Do not place suspected and confirmed patients in the same room. Place suspected patients in single rooms, if available. If cohorting suspected cases, keep at least 1 meter (3 feet) apart and provide physical barriers, if possible, between patients to prevent transmission (in case some patients do not actually have EVD). Always care for suspected patients before caring for confirmed patients. Appropriate PPE should be worn when caring for both suspected and confirmed patients.
- Provide an adequately ventilated room.
**Patient transport**

- Limit transport of patients with EVD to essential purposes only.
- Disinfect the transport trolley with 0.5% chlorine solution while wearing PPE, immediately after it is used for EVD patients.

**PPE**

- Wear PPE as described in *Chapter 5: Guidance for the Use of Personal Protective Equipment (PPE) for Managing Suspected/Confirmed Cases of Ebola Virus Disease.*

**Gloving**

- Wear clean examination/sterile examination or sterile surgical gloves as indicated when entering an EVD isolation room. Double gloving is routinely practiced for care of EVD patients.
- Remove gloves with other PPE upon leaving the patient room.

**Hand hygiene**

- Perform hand hygiene following instructions in *Chapter 4: Hand Hygiene.*

**Patient care equipment**

- See *Chapter 7.*

**Airborne Precautions for Ebola**

Ebola virus is not routinely transmitted by the airborne route, but there is potential for the virus to become aerosolized if aerosol-generating procedures are performed in an EVD patient (e.g., bronchoscopy, airway suctioning, endotracheal intubation, nebulized medication administration, positive pressure ventilation via face mask). Moreover, if aerosol-generating procedures are performed on an Ebola patient, additional precautions are needed. Of note, aerosol-generating procedures should be avoided for patients with Ebola whenever possible.

**Patient Placement**

- Preferably place the patient in an airborne infection isolation room (AIIR) when performing aerosol-generating procedures:
  - Negative pressure (air is sucked into the room when door is opened)
  - At least six air exchanges per hour
  - Air is exhausted to the outside using a fan or filtration system
- Ensure that the room has negative airflow pressure monitored. The door should remain closed at all times.
If AIIR is not available, perform aerosol-generating procedures away from other patients in a well-ventilated room (for example, with windows on two sides of the room).

Visitors should not be present during aerosol-generating procedures.

Respiratory Protection

- Wear a particulate respirator at minimum (FFP2 or EN-certified equivalent) or US National Institute for Occupational Safety and Health (NIOSH)-certified N-95 respirator or a powered air purifying respirator (PAPR).
CHAPTER 3: SCREENING AND ISOLATION FOR EBOLA VIRUS DISEASE AT THE HEALTH FACILITY

DEFINITION OF KEY TERMS

**Isolation:** Isolation for control of infections like Ebola virus is used to prevent infected patients from infecting others, and/or prevent susceptible patients from being infected. It includes physically separating infectious patients from people who are not infected.

**Cohorting:** This is the practice of placing patients with the same active infectious disease (e.g., Ebola), but no other infection, in the same room or ward. This includes allowing patients with epidemiological and clinical information suggestive of a similar diagnosis to share rooms where beds are spaced more than 1 meter apart from edge to edge. Suspected cases are cohorted separately from confirmed cases.

**Screening:** Screening refers to the application of a medical procedure or test, including asking targeted question(s) to people to identify if they have disease. The screening procedure itself does not diagnose the illness. Those who have a positive test will need further evaluation with subsequent diagnostic test or procedures.

**Triage:** When used in the health care setting, the term triage means sorting out of sick or injured people according to their need for medical attention. Triage is used when the health facilities are overloaded and some patients may need services on a higher priority basis than other patients.

INTRODUCTION

One of the most critical approaches for prevention and control of an Ebola virus outbreak is to identify cases of Ebola Virus Disease and separate those individuals from others who are not infected. Screening, triage, and isolation of suspected cases allow achieving the goal of promptly identifying and separating suspected cases among patients and other community members visiting health facilities. Standard Precautions and Transmission-Based Isolation Precautions are the fundamental principles of screening and isolation.

SCREENING FOR EBOLA VIRUS DISEASE

To prevent disease transmission within health care settings, all patients and other persons entering the facility must be quickly screened. If screening reveals a suspicion of EVD, isolation for further evaluation is required. Screening questions are designed to assist in identifying a suspected case of EVD and placing her or him in appropriate areas away from other patients for further management by staff wearing PPE. Lab and other diagnostic tests that may endanger staff should be limited. This protects the safety of the staff and others using the facility. The only way to confirm the diagnosis of EVD is to perform recommended laboratory tests.

Purpose of Screening

The purpose of screening is to identify all possible cases of EVD entering the health care facility and further assess them without risk to staff and other patients. For this reason, screening questions should be broad so that no case is missed. Further evaluation by trained clinical staff wearing PPE is necessary to determine if the patient meets the criteria of case definition of a suspected case of Ebola Virus Disease or has an alternative diagnosis. During a screening process, many patients will be identified as suspected cases but may not meet the criteria of the case definition, and once this is determined they can be released. Testing should be arranged for patients meeting the suspected case definition.
Ebola Case Definitions (World Health Organization) for Health Facilities during an Outbreak

**Suspected case:** Any person, alive or dead, suffering or having suffered from a sudden onset of high fever and having had contact with:
- A suspected, probable, or confirmed case of Ebola or Marburg Virus Disease
- A dead or sick animal (for Ebola)
- A mine (for Marburg)

**OR:** Any person with sudden onset of high fever and at least three of the following symptoms:
- Headaches
- Lethargy
- Breathing difficulties
- Diarrhea
- Difficulty in swallowing
- Loss of appetite
- Aching muscles or joints
- Vomiting
- Stomach pain
- Hiccups

**OR:** Any person with inexplicable bleeding

**OR:** Any sudden, inexplicable death

**How to Select Screening Questions**
- Use a screening form approved in your country. If specific forms are not available, use the flow chart given in **Figure 3-1** for guidance in screening patients.
Screening criteria should be broad enough to be sure to catch all cases. For example, it is better to ask for “fever or reported fever” than to specify an exact temperature measurement at the time of screening.

Selection of questions will depend on the type of facility and the location of the health facility in relation to the outbreak. For health care facilities located in non-outbreak areas, screening for travel history may be an adequate starting point. For facilities in outbreak-affected areas, screening for fever/symptoms may be the most effective way to identify potentially infected patients.

The screening tool should include questions to assess:

- History of exposure to Ebola virus within previous 21 days
- Presence of key signs and symptoms of EVD

Precautions for Screening Staff

Screening staff should take the following precautions:

- Perform hand hygiene (see Chapter 4: Hand Hygiene) as per the guidelines.
- Wear gloves.
- Wear an impermeable gown.
- Wear a face mask, and face shield for eye protection.
- Maintain a 1-meter (3-foot) distance from the person being screened.
Principles to Guide Screening Process

- Keep the screening process simple because those screening may not be the health facility staff.
- Have clear guidance on next steps if a patient screens positive (pre-arranged isolation room stocked with personal protective equipment [PPE]).
- Train clinical staff to conduct further assessment in a designated area and wear PPE for those identified positive at initial screening to determine if they meet the case definition.

Characteristics of Effective Screening for EVD

- There is only one entry point to the health care facility. Or if there are more entry points, there are extra staff to perform screening at each entry point.
- All patients, visitors, and staff must go through the screening station before entering the facility.
- The screening station should be open all the time when the facility, including the emergency departments, is open.

Managing Those Who Test Positive at Screening

- Once identified as positive by screening, rapidly move the patient to a single room or separate room/holding area for further evaluation.
- A trained clinician wearing full PPE will gather more information about potential exposures, symptoms, and possible alternative diagnoses and determine if the patient meets the definition for a suspected case of EVD. Local authorities may be involved in this decision.
- If the patient does not meet the definition for a suspected case of EVD, release the patient with information on prevention and instructions to monitor for signs and symptoms suggestive of EVD.
- Suspected cases should be kept in an isolation room. The isolation room should be well-ventilated, allow for more than 1 meter (3 feet) between patients, be away from crowded areas, and be known to everyone in the facility.
- Educate the patient and relatives about monitoring themselves for symptoms, expectations for care, and keeping distance from the patient.
- Meticulously use recommended personal protective equipment (PPE) and a trained assistant to help with putting on and taking off PPE and caring for EVD patients (see Chapter 5: Guidance for the Use of Personal Protective Equipment (PPE) for Managing Suspected/Confirmed Cases of Ebola Virus Disease).
- If the patient has active vomiting, diarrhea, or bleeding, secure the soiled area so it is separate from any other patients or staff until it can be disinfected appropriately (see Chapter 7: Environmental Cleaning, Processing Linen, and Waste Management Practices to Prevent Transmission of Ebola Virus Disease).
- Notify appropriate authorities.
Refer the patient to the Ebola Treatment Unit/Center or Community Care Center. It may be difficult to secure a bed in a treatment center and/or transport, so be prepared to care for suspected cases for an extended period (have enough PPE and a staffing plan to cope with this).

**ISOLATION**

Isolating suspected, probable, and confirmed cases of Ebola Virus Disease is a key prevention strategy for EVD. Health care facilities should prepare in advance for isolating suspected and confirmed cases of Ebola. Even though most health facilities in affected countries have Ebola Treatment Centers or Community Care Centers, many facilities have closed down because there was no dedicated isolation area where suspected/confirmed cases could wait until transfer to the Ebola Treatment Center.

- Ideally, there should be a dedicated isolation room for every patient, but in resource-limited settings that is impossible.
- All suspected/probable and confirmed cases will need isolation. If single rooms are not available, patients should be kept in a separate area. Suspected, probable, and confirmed cases should be kept separately. The distance between two beds should be at least 1 meter.
- The isolation area should have dedicated:
  - Toilets and latrines
  - Showers
  - Sinks and running water
  - Soap and single-use disposable towels
  - Alcohol-based handrub
  - PPE cabinet
  - Medication trays
  - Laundry area
  - Waste collection, storage, and disposal area
- The isolation area should also have:
  - Appropriate ventilation
  - Screened windows
  - Restricted entry
  - A distance of at least 1 meter between beds
- Care providers should put on full PPE before entering the isolation area.

---

There should be a dedicated area in which to remove the PPE upon exit.

There should be a well-designed flow of movement for patients and providers.

Doctors Without Borders/Médecins Sans Frontières recommends designating three different risk areas according to their level of risk:

- The high-risk zone: This is the area where patient care, preparation of deceased patients’ bodies, and waste management activities are carried out. This zone is highly contaminated and providers should wear full PPE when entering this area. Entry to this area is restricted to designated staff and authorized visitors. Over and above the isolation rooms/wards/tents, patients’ and deceased patients’ house, morgues, medical laboratories and other service delivery rooms, and traditional health services are considered high-risk zones.

- The low-risk zone: This is the area where supporting activities including dressing, laundry, and storage are carried out. No infectious materials should remain in this zone, however, because there is real potential for contamination to occur due to uncontrolled movement of contaminated people or materials. The low-risk zone also includes doctors’ rooms (offices and resting areas), pharmacy store, and changing rooms at entry and exit.

- Outside the isolation area: This area is outside and away from the isolation area. Remember, there is no “no-risk zone” during an Ebola outbreak. This area includes all other facilities including the kitchen for patients, latrine for staff, and psychological debriefing room for staff and patients’ families.

Wherever possible, the isolation area should have fencing to control people’s movements.

For both low-risk and high-risk areas, there should be one dedicated entry and a separate exit point.

Screening and isolation of suspected cases of Ebola following the guidance given in this chapter are key strategies for prevention and control of Ebola Virus Disease outbreaks. Health facilities should make all efforts to establish screening and isolation at their facilities.

**SETTING UP THE SCREENING AND ISOLATION AREAS**

The Centers for Disease Control and Prevention has recommended the following for setting up a screening and isolation area in a health care facility:

- There should be the following designated areas in the health facility:
  - Screening area
  - Area for non-suspected patients and staff (“cold” or “low-risk” area)
  - Area for isolation of suspected Ebola cases (“hot” or “high-risk” area)
  - Area to put on PPE outside the isolation area

---

- Area to remove PPE outside the isolation area
- Separate commode buckets or latrine pots for suspected Ebola patients
- Area for disposing burnable waste

**Setting Up the Screening Area**
- The screening area should be outside but near the entrance of the health care facility where screening will take place.
- There should be a single entry to the health facility and all other entries should be blocked.
- The screening area could be in a makeshift tent with a table and two chairs. Chairs should be more than 1.5 meters apart.
- Set up the required items at the screening site. These include:
  - Hand hygiene stations that have weak (0.05%) chlorinated water, soap, or alcohol-based handrub
  - A handwashing poster
  - Two or more working thermometers (infrared, digital, or mercury)
  - Chlorine solution (0.05%) to clean the thermometers
  - A small waste bin
  - A box of gloves
  - A face shield (if not available, face masks and goggles can replace face shield)
  - A laminated screening flow chart on the table
- All patients should wash their hands thoroughly with the weak (0.05%) chlorine solution or soap and water on arrival at the screening site.

**Setting Up the Isolation Area**
The isolation area or high-risk or “hot” area must be physically separated from the regular clinic (“cold area”) and should be used only for suspected cases of EVD. The isolation area should never be used for other non-suspected cases. In low-resource settings, an isolation area can be set up in tents. The area should be guarded at all times.

The furniture should be without any upholstery. Simple beds are best, and if there is room, a chair and table can be placed in the area. There should be a mattress covered with plastic or one provided by the patient’s relatives. There should be buckets with 0.05% and 0.5% chlorine solution in the room. Patients should use their own utensils.

Only persons trained and assigned to work inside the isolation area should be allowed to enter it. Full PPE must be worn at all times.
A designated area for putting on PPE should have a poster about putting on PPE, handwashing station, gowns or coverall suits, gloves, face shields or goggles, surgical masks, head covers, aprons, and thick reusable gloves.

Given below is a schematic diagram to help set up a screening and isolation area in a health care facility.

Figure 3-2. Set-Up of a Screening and Isolation Area

---

CHAPTER 4: HAND HYGIENE

Hand hygiene is the single most important measure to prevent transmission of infection. In settings with potential or actual Ebola Virus Disease (EVD), hand hygiene removes pathogens, including Ebola virus, from hands and thus protects both health care providers and patients. In addition to understanding the guidelines and recommendations for hand hygiene, knowing the value, and especially the limitations, of glove use is essential.

<table>
<thead>
<tr>
<th>DEFINITION OF KEY TERMS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clean water:</strong> Natural or chemically treated and filtered water that is safe to drink and use for other purposes (e.g., handwashing and general medical use) because it meets national public health standards and WHO Guidelines for Drinking-water Quality.</td>
</tr>
<tr>
<td><strong>Hand hygiene:</strong> Process of removing soil, debris, and microbes by cleansing hands using either soap and water or ABHR or antiseptic handwash for surgical asepsis.</td>
</tr>
<tr>
<td><strong>Handwashing:</strong> Process of mechanically removing soil, debris, and transient flora from the skin of hands using soap and clean water.</td>
</tr>
<tr>
<td><strong>Alcohol-based handrub (ABHR):</strong> Fast-acting antiseptic handrub that does not require use of water to kill transient flora and reduce resident microorganisms. ABHR may protect the skin, depending on the ingredients.</td>
</tr>
<tr>
<td><strong>Soaps:</strong> Cleaning products (bar, liquid, leaflet, or powder) that lower surface tension, thereby helping remove dirt, debris, and transient microorganisms from hands. Plain soaps require friction (scrubbing) to mechanically remove microorganisms, while antiseptic (antimicrobial) soaps also kill or inhibit growth of most microorganisms.</td>
</tr>
<tr>
<td><strong>Visibly soiled hands:</strong> Hands that show noticeable dirt or are visibly contaminated with blood or body fluids (e.g., urine, feces, sputum, or vomit).</td>
</tr>
<tr>
<td><strong>Point of care:</strong> The place where three elements come together: the patient, the health care worker, and care or treatment involving contact with the patient or his/her surroundings. The concept embraces the need to perform hand hygiene at recommended moments exactly where care delivery takes place. This requires that a hand hygiene product (e.g., ABHR, if available) be easily accessible and as close as possible—within arm’s reach of where patient care or treatment is taking place.</td>
</tr>
</tbody>
</table>
HAND HYGIENE KEY MESSAGES

- Hand hygiene should be performed:
  - Before putting on PPE and when taking off PPE
  - At point of care, following the World Health Organization’s “5 Moments”
  - After removing gloves
  - Using the appropriate technique and time duration
  - With an alcohol-based formulation if available
  - With soap and water when hands are visibly soiled

- Hand hygiene is modified in EVD isolation areas to maintain full skin coverage with PPE while still protecting patients from the transmission of pathogens on the hands of health care workers. The modified process involves cleaning gloves rather than bare hands.

- Staff with any lesions on their hands or forearms should not be allowed to work in patient care areas unless they have waterproof dressings covering the lesions.

- Use of hand lotions helps minimize the risk of contact dermatitis due to frequent hand hygiene or handwashing.

HAND HYGIENE MOMENTS

WHO has five recommended time points for hand hygiene to increase patient safety and prevent transmission of health care-associated infections. Hand hygiene supplies at the point of care are key for increasing health care worker compliance with hand hygiene.

Figure 4-1. World Health Organization 5 Moments for Hand Hygiene

Based on: The “My 5 Moments for Hand Hygiene,” URL: www.who.int/gpsc/5may/background/5moments/en/index.html © World Health Organization 2009. All rights reserved.
These five crucial time points are:

- Before making contact with the patient,
- Before performing a clean/aseptic task including touching invasive devices,
- After performing a task involving the risk of exposure to a body fluid including after touching invasive devices,
- After patient contact, and
- After having touched equipment in the patient surroundings.

HAND HYGIENE IN THE CONTEXT OF EBOLA OUTBREAKS

While infection prevention and control practices dictate that gloves be removed and hand hygiene performed at each of the five moments recommended above, in the context of care of patients with EVD, cleaning of gloves at any of the five moments occurring within the Ebola isolation area is allowed for the purpose of maintaining full skin coverage. Bare hands would result in high risk of contamination of the health care worker’s hands with blood and/or body fluids.

The use of double gloves as part of PPE for entering the EVD isolation area is recommend by both the U.S. Centers for Disease Control and Prevention (CDC) and WHO. Hand hygiene is performed before putting on PPE.

The WHO Guideline on Hand Hygiene in Health Care in the Context of Filovirus Disease Outbreak Response: Rapid Advice Guideline, issued in November 2014, includes the following recommendations for cleaning gloves at any of the five moments or when there is visible contamination to gloves occurring within the isolation area:

1. Clean outer gloves with alcohol-based handrub (or chlorine solution if ABHR is not available).
2. Remove outer gloves.
3. Clean inner gloves with ABHR (or chlorine solution if ABHR is not available).

In settings where ABHR or soap and water are not available, chlorine solution may be used for performing hand hygiene and cleaning gloves as an interim measure until supplies can be obtained. Although very limited evidence is available on the efficacy of chlorine solutions in preventing transmission of Ebola virus or other similar viruses, compared with other agents in this setting for either hand hygiene or cleaning gloves, expert consensus considers the following effective against the Ebola virus and safe for use as an interim measure:

- For performing hand hygiene: A concentration of 500 ppm of 0.05% chlorine solution
- For cleaning gloved hands: A concentration of 5,000 ppm of 0.5% chlorine solution
The WHO Guideline on Hand Hygiene in Health Care in the Context of Filovirus Disease Outbreak Response: Rapid Advice Guideline (November 2014), provides details of the review of evidence for these practices.

**HAND HYGIENE METHODS**

**Hand Hygiene with Alcohol-Based Handrub**

ABHRs containing 60–80% alcohol are effective for removing microorganisms, including Ebola virus, from hands. Because ABHR does not remove soil or organic matter, if hands are visibly soiled or contaminated with blood or body fluids, they must be washed with soap and water. To reduce the “build up” of emollients on hands after repeated use of handrubs, periodic handwashing with soap and water is recommended.

To be effective, a teaspoonful of ABHR (approximately 3–5 ml) solution should be used. The solution should be rubbed following the steps given for about 20–30 seconds or until the solutions fully dries (see Figure 4-2). The procedure is the same when performing hand hygiene or cleaning gloved hands.

**Figure 4-2. Steps of Performing Hand Hygiene Using ABHR**

![Steps of Performing Hand Hygiene Using ABHR](https://www.who.int/gpsc/5may/How_To_HandRub_Poster.pdf)

Based on: The “How to Handrub,” URL: [http://www.who.int/gpsc/5may/How_To_HandRub_Poster.pdf](http://www.who.int/gpsc/5may/How_To_HandRub_Poster.pdf) © World Health Organization 2009. All rights reserved.
Health facilities can prepare their own ABHR solution in the hospital pharmacy using procedures and ingredients recommended by WHO. See section on “Formulations for Preparing Alcohol-Based Handrub” later in this chapter.

Handwashing with Soap and Water

Wash hands when visibly soiled; otherwise, use alcohol-based handrub. The purpose of routine handwashing in health care is to remove dirt and organic material as well microbial contamination, including Ebola virus, from hands. Clean water must be used to prevent organisms from the water contaminating hands. To remove fats and oils from hands, proper handwashing also requires soap rubbed on all surfaces of both hands, followed by thorough rinsing and drying.

The entire procedure as recommended by WHO and described in Figure 4-3 will take 40–60 seconds. The procedure is the same when performing hand hygiene or cleaning gloved hands.

Figure 4-3. Steps of Handwashing Using Soap and Water

Based on: The “How to Handwash,” URL: http://www.who.int/gpsc/5may/How_To_HandWash_Poster.pdf © World Health Organization 2009. All rights reserved.
Notes:

- If bar soap is used, provide small bars and soap racks that drain. Cut a large bar of soap into small, matchbox-size pieces. Liquid soap is preferred.
- Never perform hand hygiene by dipping hands into basins containing standing water. Even with the addition of an antiseptic agent, such as Bleach, Dettol®, or Savlon®, microorganisms can survive and multiply in these solutions.
- Do not add soap to a partially empty liquid soap dispenser. This practice of “topping off” dispensers may lead to bacterial contamination of the soap.
- When no running water is available, ABHR is preferred if hands are not visibly soiled. For handwashing, use a bucket with a tap that can be turned off to lather hands and turned on again for rinsing, and then turned off with a paper towel after rinsing. Alternatively, use a bucket and pitcher, or just pour water over hands and have an extra bucket to collect used water.

IMPROVING HAND HYGIENE

Hand hygiene is a key component of Standard Precautions (described in Chapter 2: Infection Prevention and Control Practices for Preventing Ebola Virus Disease in Health Care Facilities) and should be the basic minimum infection control practice used in care of ALL patients to prevent the spread of infection. With the outbreak of EVD in West Africa, now is an important time to improve the hand hygiene at your facility. There is heightened awareness and hand hygiene is essential for preventing Ebola Virus Disease as well other infections. Meticulous hand hygiene practices need to be in place in EVD patient care, which presents clear risks to health care workers from hands contaminated with blood and body fluids. Improvement requires ongoing education, communication, perseverance, dedication, engagement, leadership support, creativity, and adaptability. Changing the culture to make hand hygiene a routine part of care takes time and ideally should be started before a patient with suspected or confirmed EVD enters the health care facility.

Remember: A multimodal strategy offers the most reliable method for delivering long-term improvements in hand hygiene in health care facilities.

The WHO Multimodal Hand Hygiene Improvement Strategy identifies five key steps in the process of implementing a hand hygiene improvement strategy.\(^1\) The five critical elements are:

1. System change:
   - Provide ABHR at point of care.
   - Provide refillable ABHR bottles to individual staff.
   - Prepare ABHR locally at the facility.
   - Ensure continuous supply of soap and water.
   - Reposition washbasins to improve access.

2. Training and education of health care workers:
   - Provide training in hand hygiene to all staff members.
   - Provide refresher training at regular intervals.
   - Use technology to offer training.
3. Monitoring of hand hygiene practices and feedback:
   - Monitor hand hygiene practices, infrastructure, perceptions, and knowledge, while providing results feedback to health care workers.
4. Reminders in the workplace:
   - Remind staff periodically about hand hygiene using approaches such as text messages, posters, and job aids.
5. The creation of a safety culture:
   - Create teams and involve individuals.
   - Encourage patient participation.
   - Provide institutional support.
   - Organize campaigns on safety.


**FORMULATIONS FOR PREPARING ALCOHOL-BASED HANDBRUB**

Pour into a 1,000 ml graduated flask:

<table>
<thead>
<tr>
<th>Formulation 1:</th>
<th>Formulation 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ethanol 96% v/v 833.3 ml</td>
<td>• Isopropyl alcohol 99.8% v/v 751.5 ml</td>
</tr>
<tr>
<td>• Hydrogen peroxide 3% 41.7 ml</td>
<td>• Hydrogen peroxide 3% 41.7 ml</td>
</tr>
<tr>
<td>• Glycerol 98% 14.5 ml</td>
<td>• Glycerol 98% 14.5 ml</td>
</tr>
</tbody>
</table>

Top up the flask to 1,000 ml with distilled or boiled and cooled water and shake the flask gently to mix the content. This will give you the final product.

<table>
<thead>
<tr>
<th>Formulation 1: Final Concentrations:</th>
<th>Formulation 2: Final Concentrations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ethanol 80% (v/v)</td>
<td>• Isopropyl alcohol 75% (v/v)</td>
</tr>
<tr>
<td>• Glycerol 1.45% (v/v)</td>
<td>• Glycerol 1.45% (v/v)</td>
</tr>
<tr>
<td>• Hydrogen peroxide 0.125% (v/v)</td>
<td>• Hydrogen peroxide 0.125% (v/v)</td>
</tr>
</tbody>
</table>

- The above formula can be applied to produce 10 liters and 5 liters of solution.
- For larger health facilities, the following equipment may be used: stainless steel tanks with up to 100-liter capacity, paddles for mixing (wooden, plastic, or metal), measuring cylinders and jugs, plastic funnels, 100-ml plastic bottles with leakproof tops for dispensing ABHR, and an alcoholometer if available.
Note the following:

- Glycerol has emollient properties, but other emollients may be used for skin care, provided they are inexpensive, widely available, and miscible in water and alcohol, and do not add to toxicity or promote allergy.
- Hydrogen peroxide is used to inhibit contamination of the ABHR solution.
- Any further additive to both formulations should be clearly labeled and be non-toxic in case of accidental ingestion.

Quality control:
- A pre-product analysis should be made every time an analysis certificate is not available to guarantee the titration of alcohol. Verify alcohol concentration with the alcoholmeter and make the necessary adjustments in volume in the preparation formulation to obtain the final recommended concentration. The pharmacy technician/staff should be trained in the use of the alcoholmeter. The price of an alcoholmeter ranges from USD$10–40.
- Post-product analysis is mandatory if either ethanol or an isopropanol solution is used. Use the alcoholmeter to control alcohol concentration of the final used solution. The accepted limits should be fixed to ± 5% of the target concentration.
- Do not add ABHR to a partially empty dispenser. This practice of “topping off” dispensers may lead to bacterial contamination; they should be thoroughly cleaned and dried before filling (WHO 2009).

FORMULATIONS FOR PREPARING CHLORINE SOLUTION FOR HAND HYGIENE AND CLEANING GLOVED HANDS

For detailed guidance on making a desired concentration of chlorine solution from an available concentration, please refer to Chapter 7: Environmental Cleaning, Processing Linen, and Waste Management Practices to Prevent Transmission of Ebola Virus Disease.
CHAPTER 5: GUIDANCE FOR THE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR MANAGING SUSPECTED/CONFIRMED CASES OF EBOLA VIRUS DISEASE

DEFINITION OF KEY TERMS

**Personal protective equipment (PPE):** Protective barriers and respirators, used alone or in combination by the health care worker, to protect mucous membranes, airways, skin, and clothing from contact with infectious agents.

**Contact transmission:** Infectious agent transmitted directly or indirectly from one infected person to a susceptible host by physical contact with the infected person or contaminated equipment/environmental surfaces. Often, the contaminated hands of a health care worker or contaminated equipment/environmental surfaces are involved. In caring for patients with Ebola, protection from patient, equipment, and environmental surfaces contaminated or potentially contaminated with blood or body fluids is recommended.

**Droplet transmission:** Infectious agent is spread by landing directly on or coming in contact with the mucous membranes of the nose, mouth, or conjunctivae of the eye with infectious particles larger than 5 µm in size. Due to their size, particles remain airborne briefly and travel only about 3 feet to 6 feet (1 to 2 meters) or less. There is no evidence that Ebola is spread by coughing or sneezing and Ebola is not transmitted through the air. However, large droplets of respiratory or other secretions from a person who is sick with Ebola could be infectious, and therefore certain Transmission-Based Precautions (Standard, contact, and droplet precautions) are recommended.

**Airborne transmission:** Infectious agent is spread by transfer of particles 5 µm or less in size into the air, either as airborne droplets or dust particles containing the infectious microorganism. For patients with Ebola, these can be produced by aerosolized or nebulized medication administration, diagnostic sputum induction, endotracheal intubation, bronchoscopy or airway suctioning, and positive pressure ventilation via face mask. Particles can remain in the air for up to several hours, and can be spread widely within a room or over longer distances on air currents. Ebola Virus Disease is not a respiratory disease and is not spread through the airborne route. However, for patients with Ebola Virus Disease, droplet nuclei can be produced by aerosol-generating procedures (including aerosolized or nebulized medication administration, diagnostic sputum induction, endotracheal intubation, bronchoscopy or airway suctioning, and positive pressure ventilation via face mask). To prevent transmission of Ebola, it is recommended that health care workers wear an N-95 respirator when performing any aerosol-generating procedures.

**N-95 mask fit test:** Uses a test agent, which can either be detected by the wearer’s sense of taste (saccharine), smell, or involuntary cough (irritant smoke), or measured by an instrument, to verify the respirator’s tight fit to the face without gaps.

**N-95 mask seal check:** A procedure conducted by the wearer of a particulate respirator each time it is worn to determine if the respirator is properly sealed to the face. It includes a positive pressure check (breathing out to check for leak on exhalation) and negative pressure check (breathing in to check for leak on inhalation).

INTRODUCTION

The EVD outbreak that started in 2014 in West Africa has taken a heavy toll on the health workforce. Health care workers are at high risk of contracting EVD while caring for patients because the tasks they perform potentially expose them to the blood and body fluids of patients with EVD. Personal protective barriers are a key method for protecting health care workers from exposure to blood and body fluids from patients infected with Ebola virus. That health care workers in West...
Africa, Spain, and the U.S. contracted EVD while caring for patients despite wearing PPE without reported breaches has spurred a formal review of PPE practices and recommendations. A meeting in Geneva in early October 2014 brought together key stakeholders (WHO, CDC, and MSF ([Médecins Sans Frontières]) for formal review of PPE, and from this meeting strengthened guidance on PPE use has emerged. This chapter provides detailed guidance on the types of PPE recommended, the process for putting it on and taking it off without contamination, and other considerations, such as heat-related illness, associated with the use of PPE.

ESSENTIAL MESSAGES ABOUT EFFECTIVE PPE TO PREVENT TRANSMISSION OF EVD

Many aspects of Ebola infection control, treatment, and care are evolving as a result of the 2014 outbreak, and future changes and updates are expected. Examples are the key messages regarding PPE that have emerged from WHO and CDC as a result of the formal review in October 2014. These recommendations are based on the available scientific evidence, lessons learned from review of the specific instances of transmission to staff, and expert opinions:

- Although PPE is the most visible control used to prevent transmission, it does not stand alone. Focusing only on PPE provides a false sense of safety. PPE must be used in conjunction with administrative and engineering controls, such as isolation facilities, workflow organization, hand hygiene, waste management, and adequate facilities for hygiene, sanitation, and ventilation.

- In a similar way, focusing on PPE without considering training provides a false sense of safety. The role of mandatory and rigorous training, practice with actual PPE, and mentoring to achieve competence in PPE use prior to engaging in any care of a patient with EVD is vital. PPE must be made available for practice and training, even when resources are scarce.

- PPE must protect the mucosa of the eyes, nose, and mouth from contaminated droplets and fluids. Hand hygiene and gloves are recommended to prevent transmission from hands. Face covers, protective footwear, head covers, and gowns or coveralls are also essential for protection. The terminology “full skin coverage” is used by the CDC in the context of intensive and invasive care (such as in U.S. hospitals) and is also practiced in Ebola Treatment Units in Ebola outbreak settings in West Africa.

- Resource management including stock management, availability of appropriate sizes of PPE, convenient placement of items, quality of items purchased, and management of stock to eliminate shortages are essential components of PPE use.

- Having a trained assistant or monitor available to observe, supervise, and assist with PPE use (especially removal) is recommended. This is to ensure that the worker using PPE follows each step meticulously and any breach is recognized immediately.

- It is not always possible to immediately identify patients with EVD. Therefore, it is essential that all health care workers use Standard Precautions consistently for all patients, regardless of their

---


- A balance must be sought between the best possible protection from PPE and preserving the ability of workers to do their duties with maximum ease, comfort, and dexterity and minimum risk of heat-related illness. In addition, available PPE varies among settings. Recommendations provide options for different combinations of PPE and techniques for removing them without contamination, and each facility must adopt protocols according to the guiding principles and available PPE.

**PPE RECOMMENDATIONS**

PPE recommended by WHO for health care workers who provide care and treatment to EVD patients includes:

- Fluid-resistant, disposable gown or coverall with thumb holes or loops
- Waterproof apron
- Waterproof boots
- Fluid-resistant isolation mask with a design that does not collapse against the mouth
- Face shield or goggles
- Respirator: required only when performing aerosol-generating procedures
- Head cover that covers head and neck
- Double gloves with cuffs to mid-forearm (nitrile preferred over latex)

Detailed technical specifications for PPE to be used by health care workers providing clinical care to patients with EVD should be carefully considered by those selecting and procuring PPE. Please see Appendix D: World Health Organization Technical Specifications for PPE in the Context of Filovirus Disease Outbreak Response for the technical specification for PPE to be used by health care workers providing clinical care for patients.

**Additional PPE for Specific Activities**

Wear the PPE listed above, along with the extra item listed beside the activities below:

- Aerosol-generating procedures: Particulate respirator
- Environmental cleaning: Heavy-duty gloves
- Handling infectious waste: Heavy-duty gloves
- Examining remains and performing post-mortem (not recommended): Particulate respirator
- Movement and burial of human remains: Heavy-duty gloves

---

PPE RATIONALE AND USE
A systematic review by the WHO Guideline Review Committee found sufficient information to make strong recommendations on the use of PPE and its specifications as barriers to transmission. These recommendations are available from WHO along with supporting information. Key recommendations have been incorporated in this chapter in the section below.

During the 2014 outbreak, patients with EVD tend to have profuse vomiting and diarrhea. While the viral load is highest in blood, bleeding is seen in only a minority of patients. Other body fluids such as vomit, feces, sweat, saliva, urine, amniotic fluid, and semen may also contain virus (on occasion, high levels of virus can be found) and be involved in transmission.

The main route for acquisition of EVD is through contact of infected blood or other body fluids with the mucous membranes of the mouth, nose, and eyes. Transmission can occur through direct contact with these body fluids, or through contact with fomites (i.e., touching inanimate objects), such as the floor, utensils, and bed linens that have recently been contaminated with infected body fluids. Transmission through intact skin has not been documented, but infection can be transmitted through non-intact skin and through penetrating injuries of the skin, such as needle-stick injuries.

PRINCIPLES OF EFFECTIVE PPE USE
1. Achieve competence:
   - Rigorous and repeated training
   - Ongoing practice

2. Clear, standardized method to put on and remove PPE:
   - Putting on and taking off in a systematic manner
   - Easy to understand instructions provided and if possible pictorially represented on the wall of the designated room
   - Cleaning of PPE before removing each piece

3. Oversight:
   - Mentoring for all users before engaging in any clinical care
   - Trained assistant
   - Optional addition: Trainer/monitor
   - Ebola site manager

4. Type:
   - Correct size for the user
   - Covers all exposed skin
   - Complies with WHO standards (e.g., fluid resistance, type, shape)

---


GLOVES

Figure 5-1. How to Take Off Examination Gloves (Correct technique is very important to prevent contamination.)

Based on: Glove Use Information Leaflet, World Health Organization. 2009. All rights reserved, at: www.who.int/gpsc/5may/Glove_Use_Information_Leaflet.pdf.

DO’S AND DON’TS ABOUT GLOVES WHEN CARING FOR EVD PATIENTS

- Do wear double gloves.²
- Do choose gloves with longer cuffs, ideally reaching to mid-forearm² or above elbow for gynecological procedures.
- Do choose nitrile gloves over latex gloves if possible.²
- Do keep fingernails trimmed moderately short (less than 3 mm or 1/8 inch beyond the fingertip) and do not wear rings with protrusions to reduce the risk of tears.
- Do wear the correct size glove, to maintain dexterity. A poorly fitting glove can limit your ability to perform the task and may be damaged (torn or cut) more easily. Wear your normal size glove under the cuff of the gown/coverall and the same size or next size up over the cuff of the gown/coverall.
- Do wear the glove with the shorter cuff under the cuff of the gown/coverall and the glove with the longer cuff over the cuff of the gown/coverall.²
- Do prevent developing a gap between the cuff and the inner glove during care by using a gown/coverall with thumb holes or loops. It is recommended especially for tall people or those undertaking strenuous activities (such as carrying patients). Thumb holes may be carefully created in the sleeve with scissors.
- Don’t use tape to attach gloves to gowns/coveralls because of the need for additional manipulation during removal and the risk of tearing, potentially resulting in contamination.²
- Do change outer gloves between patients or if gloves become heavily soiled with blood or any body fluids while providing care to the same patient; use the WHO recommended two-step procedure to prevent skin exposure in the isolation area.⁷

RESPIRATORS

- Masks should not be confused with particulate respirators, which are used to prevent inhalation of small particles that may contain infectious agents transmitted via the airborne route.

- Respirators are used to prevent inhalation of tiny particles (5 μm or less in size) that may contain infectious agents transmitted via the airborne route.

- Although EVD is not usually transmitted by the airborne route, it is possible that the virus may become airborne during aerosol-generating procedures. Aerosol-generating procedures include:
  - Aerosolized or nebulized medication administration
  - Diagnostic sputum induction
  - Bronchoscopy
  - Airway suctioning
  - Intubation
  - Positive pressure ventilation via face mask

- When caring for a patient with EVD, avoid aerosol-generating procedures as much as possible because of the potential for the virus to become aerosolized. Respirators form a tight seal against the skin and filter small airborne pathogens passing through the material or around the edges during inhalation as well as block large particle droplets, splashes, sprays, or splatter.

- Respirators must be worn correctly to be effective:
  - **Fit test** evaluates the existence of any leaks at the moment it is performed for the model being tested and is done if more than one type/size of mask is available to determine the best fit for each person.
  - **Seal check** is done each time the respirator is worn to be sure that the respirator is adjusted well to the face.

- Users should be fit-tested if possible.

- Each user should be trained on how to use the respirator, and should perform a seal check before each use.

To put on a particulate respirator:

1. Cup the respirator in your hand, with the nosepiece at your fingertips, allowing the headbands to hang freely below your hand.

2. Position the respirator under your chin with the nosepiece up. Pull the top strap over your head, resting it high at the top of the back of your head. Pull the bottom strap over your head and position it around the neck below the ears.

3. Perform a “user seal check” as shown in the figure below. **Figure 5-2** shows how to put on and seal check a particulate respirator.
Figure 5-2. Fitting Instructors for Respirators

**Fitting Instructions (Must be followed each time respirator is worn)**

Perform a seal check before each use:

- Cover the front of the respirator with both hands, being careful not to disturb the position of respirator.

  **Positive seal check:**
  - Exhale sharply. A positive pressure inside the respirator = no leakage. If leakage, adjust position and/or tension straps.

  - Retest the seal and repeat the steps until the respirator is sealed properly.

  **Negative seal check:**
  - Inhale deeply. If no leakage, negative pressure will make the respirator cling to your face. Leakage will result in loss of negative pressure in the respirator due to air entering through gaps in the seal.

  - Respirators should be discarded after every use.

Respirators are part of the PPE used for care of patients with suspected or confirmed EVD during aerosol-generating procedures.

**STEP-BY-STEP INSTRUCTIONS FOR PUTTING ON PPE FOR EVD**

**Step 1:** Make sure all supplies are available:

- Scrub suit, rubber boots, hand hygiene supplies (soap and running water, alcohol-based hand rub [ABHR], or 0.05% chlorine solution).

- Recommended PPE: Gloves (three pairs with at least one long cuff), plastic apron, gown/coverall suit, mask or particulate respirator, goggles or face shield, head cover, and shoe covers (not when wearing rubber boots). *Note: It is vital that PPE is of appropriate size for safe removal.*

**Step 2:** Find a trained assistant to assist you in putting on and removing PPE; if not, use a mirror. *Note: The trained assistant does not need PPE for assisting the health care worker to put on PPE.*

**Step 3:** Tie back hair; for eyeglasses, use anti-fog spray and have a band to hold glasses in place. Remove jewelry/tie/ID badge/cell phone, etc.
Steps 4: Use the bathroom.

Step 5: Wash hands with soap and water or use ABHR.

Step 6: Put on scrub suit and rubber boots in the changing room. If rubber boots are not available, wear closed, puncture- and fluid-resistant shoes with no laces or opening at the top of the foot.

Step 7: Perform a BRIEFING to review plan for time in isolation area and ensure all needed equipment is prepared.

The trained assistant reads the following to the health care workers, step-by-step:

Step 8: Perform hand hygiene with sanitizer or soap and water, ensuring that all surfaces of the hands are cleaned.

Step 9: If NOT wearing rubber boots, put on shoe covers.

Step 10: Put on first pair of gloves (if you have a short cuff pair, put them on now).

Step 11: Coverall suit: Put on suit and ensure it is large enough.
Gown: Put on gown and ensure it fully covers torso from neck to knees, arms to end of wrists, and wraps around the back.

Step 12: Coverall suit: Zip up and fasten the zip and neck tabs of the suit.
Gown: Fasten the gown at the back of the neck and waist.

Step 13: Tuck cuffs of inner gloves under the sleeves of coverall or gown.

Step 14: Cut thumb holes at the border of cuff or sleeves and insert thumbs.

Step 15: Medical mask: Put on, tie securely, and pinch the bridge of the nose to ensure that the mask is correctly positioned.
N-95 respirator:
- Cup the respirator in the hand, with the nosepiece at fingertips.
- Allow the headbands to hang freely below the hand.
- Position the respirator under the chin with the nosepiece up.
- Pull the top strap over the head and rest it high at the back of the head.
- Pull the bottom strap over the head and position it around the neck below the ears.
- Place fingertips of both hands at the top of the metal nosepiece (USING TWO FINGERS OF EACH HAND) and mold the nosepiece to the shape of your nose. (Note: Pinching the nosepiece using one hand may result in less effective respiratory performance.)
Perform seal check.

**Exhale sharply:** If positive pressure builds inside, there is no leakage. If pressure does not build, adjust the respirator.

**Inhale deeply:** If there is no leakage, the respirator will cling to the face. If not, adjust the mask.

**Step 16:** Put on **head cover**, ensuring face, neck, and head to eyebrows are fully covered.

**Step 17:** Spray face shield or goggles with anti-fog spray and wipe with clean cloth.

**Step 18:** Put on **face shield or goggles** and tighten to fit head securely and hold head cover in place.

**Step 19:** Put on a **second pair of gloves**. (These are the long cuff gloves pulled over the sleeves of the gown or suit.)

**Step 20:** Put on the **apron** and tie at the back.

**Step 21:** Have the **trained assistant** check:

- That all skin is covered.

- That the health care worker is comfortable enough to extend the arms, bend at the waist, and do range of motions and no skin shows during movements.

- For anything that is not in place, and correct it. If using a mirror, check all PPE and correct as needed.

**Step 22:** Enter the isolation room or patient care area after **clearance from the trained assistant**.

**Step 23:** **DO NOT TOUCH OR ADJUST PPE** once in the isolation area; any movement of PPE is considered a breach.

**KEY POINTS FOR SAFE PRACTICE WORKFLOW**

- Work in pairs; you must always have at least one trained assistant with you when are entering the EVD treatment area. BREACHES may occur; your trained assistant can provide immediate, informal feedback on performance.

- Have a detailed plan for your duties while inside the EVD treatment area.

- Always see suspected cases first, then move to confirmed. Never, for any reason, go backwards (i.e., from confirmed to suspected cases).

- Try to ensure cleanliness and orderliness of the worksite.

- Heat-related illness is a real danger.
STEP-BY-STEP-INSTRUCTIONS FOR REMOVING PPE FOR EVD

Step 1: The area for removing PPE should be separate from the area for putting it on. The location of the area for removing PPE should allow the health care worker (HCW) to move into a low-risk area when PPE is removed.

Step 2: Have a container with 0.5% chlorine solution ready in which to place re-useable PPE to be reprocessed.

Step 3: Prepare a container with 0.05% chlorine solution for hand hygiene if ABHR and/or soap and water are not available.

Step 4: Have ready a waste bag in a rigid waste container (no lid) in which to safely place used disposable PPE (depending on workflow, two may be needed).

Step 5: Ensure that there is a trained assistant available to help in removing PPE.

Step 6: The trained assistant completes the following:

- Puts on PPE: Gown, shoe covers, goggles or face shield, mask, double gloves (one long cuff).
- Reminds the HCW to avoid automatic actions that may put the HCW at risk (e.g., touching the face).
- Reads aloud each step of the procedure.
- Ensures that the HCW repeats back the step the HCW is about perform (talk-back). Confirms visually that the PPE has been removed properly.

Step 7: Minimize touching. Disinfect gloves after any contact.

Step 8: Inspect the PPE to assess for visible contamination, cuts, or tears before starting to remove. Have the trained assistant spray the front and the back of the PPE with 0.5% chlorine solution, pointing the spray nozzle downward. Alternative: The trained assistant hands 0.5% chlorine wipes to the HCW to wipe the front of PPE and gloves.

Step 9: Decontaminate outer gloves with ABHR or 0.5% chlorine solution, ensuring that all surfaces of the hands are cleaned.

Step 10: Remove apron by rolling contaminated front inward and place it in the waste bag. DO NOT TOUCH THE FRONT OF THE APRON. If reprocessing apron, put it in the container with 0.5% chlorine solution.

Step 11: Inspect the PPE under the apron to assess for visible contamination, cuts, or tears. If any breach, spray or wipe the area with 0.5% chlorine solution. If no breach, move to next step.
Step 12: Disinfect outer gloves with ABHR or 0.5% chlorine solution, ensuring that all surfaces of the hands are cleaned.

Step 13: Remove outer gloves and place them in the waste bag.

Step 14: Inspect inner gloves to assess for cuts or tears. If any breach, spray or wipe the area with 0.5% chlorine solution, release thumb from the hole in the coverall suit, remove gloves, perform hand hygiene on hands, and put on clean gloves up to the edge of the coverall suit. If no breach, move to next step.

Step 15: Remove face shield: by tilting the head slightly forward, grabbing the rear strap, and pulling it over the head, gently allowing the face shield to fall forward.

OR

Remove goggles: by lifting the back of strap over the head, and pulling out and away. Place them in the waste bag or, if reprocessing, put them in the container with disinfectant.

Note: Avoid touching the front surface of the shield or goggles.

Step 16: Disinfect inner gloves with ABHR or 0.5% chlorine solution, ensuring that all surfaces of the hands are cleaned.

Step 17: Remove head cover by grasping it from the back and pulling it away from the head (not touching face or skin).

Step 18: Disinfect inner gloves with ABHR or 0.5% chlorine solution, ensuring that all surfaces of the hands are cleaned.

Step 19: Remove gown: Grasp shoulders of gown and pull forward to break ties (or have trained assistant undo ties at back). Roll gown so contaminated inside surface is contained.

OR

Remove coverall suit:

- Undo sticky tabs or ties (a mirror is useful).
- Lift chin.
- Find the zip at the level of your belly and carefully trace your fingers of one hand up to find the zip tab and fasteners.
- Hold outside of top of suit with the other hand (do not let it go).
- Unzip or unfasten suit completely (still holding top near the zip).
- Gently pull the side of the suit you are holding partially over the shoulder.
- Perform rotating movement of the shoulders (one by one) to remove coverall and carefully move coverall down the body, turning it inside out.
- Do a “moon-walk” to remove the legs of the suit over your boots.
- Carefully place in the waste bag, touching only the inside.
Avoid contact of scrubs with outer surface of gown or suit.

**Step 20:** Disinfect inner gloves with ABHR or 0.5% chlorine solution, ensuring that all surfaces of the hands are cleaned.

**Step 21:** If wearing shoe covers, remove them using hands-free technique, if possible, and place them in waste bag, touching only the inside of the shoe covers.

**Step 22:** Disinfect outer gloves with ABHR or 0.5% chlorine solution, ensuring that all surfaces of the hands are cleaned.

**Step 23:** Remove inner gloves.

**Step 24:** Perform hand hygiene with ABHR or 0.05% chlorine, ensuring all surfaces of the hands are cleaned.

**Step 25:** Put on a new pair of gloves.

**Step 26:** Remove mask: Undo bottom tie first, then top tie. Holding by top tie, lift away from the face.

OR

Remove N-95 respirator:

- Tilt the head slightly forward.

- Grasp first the **bottom** elastic strap at back of the head and pull away from head and up and over.

- Then grasp the **top** elastic strap and pull away from the head and up and over.

Discard mask or respirator by holding the strap/tie without touching the front.

**Step 27:** Disinfect new inner gloves with ABHR or 0.5% chlorine solution, ensuring that all surfaces of the hands are cleaned.

**Step 28:** Clean first boot/shoe by:

Spraying: Trained assistant sprays front, back, and bottoms with 0.5% chlorine solution. Step clean boot/shoe into low-risk area while other foot remains in isolation area.

OR

Wipes: While keeping feet in isolation area, sit on a clean chair positioned in the low-risk area. Use 0.5% chlorine solution to clean first boot/shoe top, sides, and lastly bottom before stepping first boot into low-risk area.

**Step 29:** Clean second boot/shoe by:

Spraying: Trained assistant sprays front, back, and bottoms with 0.5% chlorine solution. Step clean boot/shoe into low-risk area. **You are now standing in the low-risk area.**
Wipes: Lift second foot that is in isolation area. Use 0.5% chlorine solution to clean second boot/shoe top, sides, and lastly bottom before stepping into low-risk area. **You now have both feet in the low-risk area.**

In addition: A 0.5% chlorine foot bath may be positioned at exit of isolation area (but tops of boots should still be wiped down).

**Step 30:** Disinfect gloves with ABHR or 0.5% chlorine solution, ensuring that all surfaces of the hands are cleaned.

**Step 31:** Remove gloves and place in the waste bag.

**Step 32:** Perform hand hygiene on bare hands with ABHR or soap and water, ensuring that all surfaces of the hands are cleaned.

**TIPS FOR PPE USE IF SUPPLIES ARE LIMITED**

- If resources are limited and disposable PPE items are not available:
  - Properly disinfect reusable items after each use.
- Avoid wastage:
  - Critically evaluate situations in which PPE is indicated.
  - Batch clinical care during each entry to the patient’s room.
  - Work from suspected to confirmed cases.
  - Work from clean to dirty procedures.
  - Prioritize for scenarios that have been consistently associated with increased risk of pathogen transmission.
- Avoid unnecessary use of PPE:
  - Training is **not** unnecessary use.
  - Wearing PPE in situations where there is little or no risk, or wearing more PPE than needed (such as three pairs of gloves), is unnecessary use.

**PPE AND HEAT-RELATED ILLNESS**

Heat illness is a very real risk while wearing PPE in tropical climates. PPE is a micro-climate of high temperature (40–50°C), and 100% humidity and heat storage occur. Normal heat control mechanisms such as sweating do not help to cool the person wearing PPE. Core temperatures of over 41°C can be reached in 30 minutes if the health care worker is very active while wearing occlusive PPE.

Symptoms of heat-related illness are a continuum of mild to moderate to severe and even life-threatening.
Table 5-1 describes the severity of heat-related illnesses from heat cramps and heat exhaustion to a very serious complication, heat stroke. It uses signs and symptoms specific to various systems of the body. It includes body temperature, sweating rates, urine output, and gastrointestinal, cardiovascular, and central nervous systems, for example. Under each column under heat-related conditions, the effects on the body systems are described to aid clinical diagnosis and manage the condition accordingly.

Table 5-1. Heat-Related Illness Spectrum

<table>
<thead>
<tr>
<th>System of the Body</th>
<th>Heat Cramps</th>
<th>Heat Exhaustion</th>
<th>Heat Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core temperature</td>
<td>&gt; 38°C</td>
<td>&gt;40.5°C or 104.9°F</td>
<td></td>
</tr>
<tr>
<td>Skin temperature</td>
<td>Normal</td>
<td>Normal or cool and clammy</td>
<td>Hot and dry (50% cases)</td>
</tr>
<tr>
<td>Sweat rate</td>
<td>Increased</td>
<td>Increased or decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Urine output</td>
<td>Normal</td>
<td>Oliguria</td>
<td>Anuria</td>
</tr>
<tr>
<td>GI</td>
<td>Thirst</td>
<td>Nausea +/- vomiting</td>
<td>Nausea and vomiting</td>
</tr>
<tr>
<td>CVS</td>
<td>Tachycardia</td>
<td>Hypotension</td>
<td>+/- Circulatory collapse</td>
</tr>
<tr>
<td>CNS</td>
<td>Nil</td>
<td>Uncoordinated, irritable or confused</td>
<td>Delirium/seizure/coma</td>
</tr>
<tr>
<td>Other</td>
<td>Thirst</td>
<td>Renal failure</td>
<td>Liver failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DIC (Disseminated Intravascular Coagulation)</td>
<td></td>
</tr>
</tbody>
</table>

Heat-related illness is preventable. People wearing PPE must pace themselves and not over-exert themselves or core temperatures will rise rapidly and reach critical levels in under 1 hour. Hydration is important but will not prevent heat-related illness caused by wearing PPE. Team protocols are required for:

- Prevention, such as limiting time in PPE, using a trained assistant
- Monitoring of heat illness
- Treatment of heat illness
CHAPTER 6: INFECTION PREVENTION AND CONTROL PRACTICES FOR MANAGING EBOLA VIRUS DISEASE IN PREGNANT AND BREASTFEEDING WOMEN AND THEIR BABIES

KEY MESSAGES

- Pregnant women infected with Ebola are at a very high risk of mortality due to miscarriage and increased bleeding tendencies.
- Full-term deliveries are rare in Ebola Virus Disease complicated with hemorrhage.
- Every pregnant woman coming to the health facility should be screened for signs and symptoms of Ebola Virus Disease.
- Pregnant women suspected of having Ebola Virus Disease should be triaged, isolated, and managed by separate staff who do not care for other patients (as described in Chapter 3: Screening and Isolation for Ebola Virus Disease at the Health Facility).
- All Ebola Treatment Units/Community Care Centers should have a skilled birth attendant on call to manage pregnant women with EVD.
- Staff involved in care of pregnant women should strictly comply with recommended infection prevention and control practices including in their management of pregnant women infected with Ebola.
- Having a trained assistant to supervise the health care workers’ compliance with wearing and removing PPE and other IPC practices is key to protecting health facility staff.

INTRODUCTION

The countries currently affected by the 2014 Ebola outbreak have high baseline maternal and child mortality. In 2010, the maternal mortality ratios in Liberia, Guinea, and Sierra Leone were estimated to be 770, 240, and 890 respectively (WHO, UNICEF, UNFPA, and The World Bank 2012). The outbreaks of Ebola Virus Disease in these countries have severely affected routine health care services including very crucial maternal and child health services, with expected further increases in maternal mortality ratios. In resource-limited settings, Ebola Virus Disease outbreaks can devastate already fragile health systems. During the 2014 outbreak, a large number of health care providers have succumbed to Ebola infection. In many facilities, the fear among health care providers has resulted in abandonment of patients, further limiting access to emergency obstetric care services.

In addition to disrupting already fragile health systems, Ebola Virus Disease has a direct impact on maternal and child mortality:

- Hospitals without enough adequately trained staff and lacking PPE and implementation of infection control procedures, and their obstetric wards in particular, may serve as “amplification points” for Ebola virus transmission to health care personnel and other patients.¹
- During the 1976 outbreak in Yambuku, Demographic Republic of Congo (DRC), the overall mortality was 88% and mortality among pregnant women was 89%. Among 82 pregnant

women, 23% had a spontaneous abortion. All 11 newborns died within 19 days after birth. In one hospital in the DRC during the 1995 outbreak, the mortality rates were 77% for all cases, 70% for non-pregnant women, and 95.5% for pregnant women.

- Pregnant women infected with Ebola are more likely to have bleeding complications than pregnant women who are not infected with Ebola.
- The signs and symptoms of pregnancy, such as nausea, vomiting, anorexia, fatigue, abdominal pain, and bleeding, are also common in pregnant women infected with Ebola. Therefore, it is critical that the health facility staff screen, triage, and isolate all pregnant women entering the facility and appropriately manage those suspected of having EVD. Full compliance with infection prevention and control recommendations in managing all pregnant women is critical to protect health care workers and other non-infected patients in the facility. (These IPC recommendations include hand hygiene, Standard Precautions to prevent transmission of and protect the health care worker from blood-borne pathogens, adequate environmental cleaning, thorough disinfection and sterilization of instruments and sharps, injection safety, etc.).

RECOMMENDED INFECTION PREVENTION AND CONTROL PRACTICES

Recommended infection prevention and control practices for managing pregnant women with Ebola infections during the antenatal period, labor and childbirth, and postpartum period are as described in this manual for all patients infected with Ebola Virus Disease. The goal is to provide optimal comfort and care to the patients while protecting staff and other patients. Below is the summary of recommended IPC practices.

Infection Prevention and Control Practices for Care of Pregnant Patients with Suspected or Confirmed EVD

- Hand hygiene: Strictly performing hand hygiene as recommended (see Chapter 4: Hand Hygiene).
- Use of personal protective equipment (PPE): 100% compliance in the correct use of PPE as described in Chapter 5: Guidance for the Use of Personal Protective Equipment for Managing Suspected/Confirmed Cases of Ebola Virus Disease. Given the high risk of splashes of blood and body fluids, including amniotic fluid, in the care of pregnant women, it is recommended that health care workers wear face shields that cover the entire surface area of the face. Both CDC and WHO have recently updated the guidelines for putting on and removing PPE for health care workers caring for patients with EVD, with an emphasis on rigorous and repeated training and strict oversight to identify contamination. These guidelines should be followed meticulously to avoid any exposure to blood and body fluids.
- Gloves: Double gloving with extended cuff gloves is recommended in caring for all pregnant women, as described in Chapter 5 on PPE.
- Waste management: All waste from the Ebola isolation area is considered infectious as described in Chapter 7: Environmental Cleaning, Processing Linen, and Waste Management Practices to Prevent Transmission of Ebola Virus Disease. Large amounts of waste will be generated. Considerations include:
- Placentas: While still wearing PPE, health care workers should place placentas in leakproof containers with lids and dispose of them in a placenta pit or bury them.

- Linen: Put on PPE as recommended in Chapter 5 when handling soiled linen. Heavily soiled linen should be disposed of as contaminated waste if at all possible. If disposal is not possible, handle linens as described in Chapter 7.

- Sharps: Should be immediately placed into a leakproof, puncture-proof sharps container at point of use as described in Chapter 2: Infection Prevention and Control Practices for Preventing Ebola Virus Disease in Health Care Facilities and Chapter 7.

- Environmental cleaning: Ebola virus has been isolated from items in the patient environment and has been implicated in EVD transmission. Therefore, cleaning of patient care areas and surfaces as described in Chapter 7 is an important part of prevention. Given the high concentrations of Ebola virus in blood and other body fluids, spills of blood and body fluids on environmental surfaces or equipment should be cleaned as soon as possible as described in Chapter 7. PPE as recommended in Chapters 5 and 7 should be worn for all cleaning.

- Non-critical equipment: Medical equipment (e.g., stethoscopes and blood pressure cuffs) that touches only intact skin should be rigorously dedicated for each patient. However, if this is not possible, meticulously clean as described in Chapter 7.

- Critical equipment and semi-critical equipment: Equipment that comes into contact with mucous membranes, non-intact skin, or sterile parts of the body should be meticulously processed per usual recommendations.

---


Recommended obstetric practices for managing pregnant women infected with Ebola and their babies are summarized in the following box.

### RECOMMENDED OBSTETRIC PRACTICES FOR MANAGING PREGNANT WOMEN AND THEIR BABIES INFECTED WITH EBOLA

**Remember:** Mortality among pregnant women infected with Ebola is as high as 95%.

The overall purpose is to maximize the safety of all staff who are working within high-risk areas. The guidance provided below is based on limited experience of several organizations currently involved in Ebola response in West Africa.

Women who are suspected or confirmed to have Ebola Virus Disease and are pregnant, are in labor, are delivering, or are in the postpartum period should be managed in an isolation room/area (as described in Chapter 3). The staff must strictly comply with hand hygiene and PPE recommendations (as described in Chapter 4 on hand hygiene and Chapter 5 on PPE) while managing these women.

#### During pregnancy:
- Wear PPE as described in Chapter 5.
- Counsel the woman and her relatives about the high mortality and morbidity risk associated with Ebola Virus Disease during pregnancy. Communicate with the woman and her relatives the importance of taking the woman to the health care facility immediately if she develops a high fever of sudden onset with severe body aches.
- Avoid any invasive diagnostic procedure to the extent possible.
- Avoid vaginal examinations in case of vaginal bleeding.
- Treat symptomatically, including blood transfusion as indicated.
- Provide prophylaxis for malaria.
- Ensure availability of processed blood for management of excessive bleeding.
- Do not induce labor.

#### During labor and delivery:
- Wear PPE as described in Chapter 5.
- Birth companions should not be allowed in the labor and delivery area.
- Every Ebola Treatment Center should have the capability to perform deliveries.
- Every health facility should have an isolation area for pregnant woman suspected of having Ebola infection.
- At least two teams of skilled birth attendants (two in each team) who are trained in PPE use and care of women with EVD should be available per 60–90 minute shift.
- Providers should use double gloves and disinfect their gloved hands between each and every procedure.
- Vaginal examinations should be avoided or limited to the absolute minimum.
- Start an IV line early in labor to avoid putting the line in later when the woman could be agitated during active labor, and continue to use oral routes as much as possible.
  - DO NOT perform invasive procedures including episiotomy, vacuum, any destructive procedure, or cesarean section.
  - DO NOT perform fetal monitoring as it is advised not to undertake any surgical or invasive procedures because the risk to the health care worker is greater than the benefits to the mother and baby.
  - DO NOT clamp or cut the cord when the baby is stillborn. Clamp and cut the cord in case of live birth or retained placenta.
  - DO NOT suture any kind of tears.
  - DO NOT perform manual removal of placenta for retained placenta.
  - DO NOT perform any surgical procedures. Provide compassionate care and morphine for pain management to allow death in a dignified manner.
  - DO NOT perform newborn resuscitation in the newborn for birth asphyxia.

Decisions about surgical and invasive procedures should be made by the team of clinicians managing the woman with EVD, considering individual cases for risk to the providers, benefits to the mother and fetus, and other ethical issues.
During postpartum care:
- Care of the woman:
  - Wear PPE.
  - Follow recommended breastfeeding practices outlined below if the woman is physically able to breastfeed. Monitor the mother’s signs and symptoms and offer supportive management and manage any obstetric complications following the national guidelines for managing obstetric complications.
  - Do not allow the family members to care for or to visit the woman or baby except as described in Chapter 8: Support Activities during Ebola Virus Disease Outbreaks.
- Care of the newborn:
  - Wear recommended PPE as described in Chapter 5 for suspected Ebola Virus Disease while managing the newborn.
  - Isolate the baby from other patients as described in Chapter 3: Screening and Isolation for Ebola Virus Disease at the Health Facility.
  - Support the mother in breastfeeding the baby if she is able to do so. Make decisions following Figure 6.1.
  - If the mother is not able to breastfeed, start replacement feeding.
  - Monitor the baby for signs and symptoms of EVD for 21 days.
  - Arrange for safe and dignified burial for all stillborn and newborn deaths as described in Chapter 8.

BREASTFEEDING DURING EBOLA INFECTION
The Ebola virus has been found in breast milk. However, there is not enough information to provide guidance about the length of time after illness onset at which it is safe for infants to resume breastfeeding. While the mechanism of transmission from mother to baby is not clear, the following key messages should be applied.

KEY MESSAGES ON BREASTFEEDING

- Do not send home any breastfed infants from an infected mother. Given the potential risk of transmission to an infant through breastfeeding, a woman who has been admitted as a suspected case may have already infected her breastfed infant. The baby also should be admitted, isolated, and treated as a suspected case.
- In West Africa, the mortality risk of Ebola infection in infants far outweighs the risk of morbidity and mortality associated with not breastfeeding. Replacement feeding using Ready to Use Infant Formula (RUIF) is a safer option for replacement feeding in West Africa.
- Mothers who recover from Ebola Virus Disease should get their breast milk tested for presence of the virus before reinitiating breastfeeding to their babies.
- Discourage wet nursing. If the baby is breastfed from another woman, there is a theoretical risk of the woman getting infected from the baby.

Use the following flowcharts (Figure 6-1 and Figure 6-2) to make decisions about advising infant feeding in different situations.

---

Abbreviations: IMAM: integrated management of acute malnutrition; RUIF: Ready to Use Infant Formula; OTP: outpatient therapeutic program. Note that terms used for cadres like social workers and social welfare department personnel need to be adapted to each setting.

---

7 Figure 6-1 adapted from a figure developed by the Ministry of Health and Social Welfare of Liberia with support from UNICEF, September 19, 2014. “Infant Feeding in the Context of Ebola.” Use in conjunction with guidance note dated September 19, 2014; at: http://www.ennonline.net/infantfeedinginthecontextofebola2014
Breastfeeding Summary

Ebola virus is secreted in breast milk and can be transmitted to infants via breast milk. In previous Ebola Virus Disease outbreaks, newborns of mothers infected with Ebola have not survived beyond 19 days. Following the guidance above will allow you to make an appropriate decision about advising a patient about breastfeeding.

---

* For infants 6–11 months: infant formula, whole pasteurized/UHT milk. For children 12–23 months: whole pasteurized/UHT milk.

8 Figure 6-2 adapted from a figure developed by the Ministry of Health and Social Welfare of Liberia with support from UNICEF, September 19, 2014. “Infant Feeding in the Context of Ebola.” Use in conjunction with guidance note dated September 19, 2014; at: http://www.ennonline.net/infantfeedinginthecontextofebola2014
CHAPTER 7: ENVIRONMENTAL CLEANING, PROCESSING LINEN, AND WASTE MANAGEMENT PRACTICES TO PREVENT TRANSMISSION OF EBOLA VIRUS DISEASE

ENVIRONMENTAL CLEANING

DEFINITION OF KEY TERMS

- **Cleaning**: The removal of visible soil from objects and surfaces normally accomplished manually or mechanically, using water with detergents or enzymatic products. Cleaning is required before disinfection because dirt and debris reduce the effectiveness of chemical disinfectants.

- **Cleaning solution**: Any combination of soap (detergent) and water, with or without a chemical disinfectant, used to remove visible soil from objects and surfaces.

- **Contact time**: The length of time a cleaning product must remain wet on the surface being cleaned for the disinfectant to kill target microorganisms if present on surfaces. Bacteria, viruses, TB, and spores require differing contact times.

- **Soaps and detergents**: Cleaning products (bar, liquid, leaflet, or powder) that lower surface tension, thereby helping remove dirt and debris.

- **Disinfectant**: Chemical that destroys or inactivates microorganisms on inanimate objects. Disinfectants are classified as low-, intermediate-, or high-level depending on their ability to kill or inactivate some (low- or intermediate-level) or all (high-level) microorganisms. Disinfectants do not kill all spores.

- **Environmental cleaning**: Process of maintaining a clean, healthy, and pleasing patient and work environment including high-touch surfaces. Regular and thorough environmental cleaning helps to reduce the spread of microorganisms from surfaces to the hands of health care workers and ultimately to the patients.

- **High-touch surfaces**: High-touch surfaces are those surfaces in the patient environment with frequent hand contact. These include door handles, light switches, countertops, over-bed table tops, bedrails, bed-ends, patient charts, patient medical records, computer keyboards, mouse devices, handrails, chairs, patient locker tops and handles, IV poles, buttons on monitors, toilet seats, toilet flush handles, faucet handles, etc.

- **Non-critical items**: Items that come into contact with intact skin but not mucous membranes. Most can be decontaminated and cleaned at the point of use. Examples include blood pressure cuffs, stethoscopes, and crutches.

- **Scrubbing (frictional cleaning)**: Vigorous rubbing of the surface with a brush or other tool. The best way to physically remove dirt, debris, and microorganisms.

INTRODUCTION

During outbreaks of Ebola Virus Disease, environmental cleaning is one of the key strategies to prevent transmission of the virus. Environmental cleaning refers to the general cleaning of surfaces and non-critical equipment used during care and treatment of patients in the health care setting (that is, items that come into contact with the patient’s intact skin but not mucous membranes). The purpose of general environmental cleaning is to:

- Reduce the number of microorganisms that may come in contact with patients, visitors, staff, and the community, thus preventing the likelihood of infection; and

- Provide a clean and pleasant atmosphere for patients and staff.
Contamination of surfaces in the health care environment plays an important role in the transmission of many pathogens including Ebola virus. Ebola virus has been isolated from items in the patient environment\(^1\) and has been implicated in EVD transmission.\(^2\) **Given the high concentrations of Ebola virus in blood and other body fluids,**\(^3\) spills of blood and body fluids on environmental surfaces or equipment should be cleaned as soon as possible. Ebola virus can survive in the environment, especially in blood and body fluids. In one study, Ebola virus remained active for up to 6 days.\(^4\) Therefore, it is extremely important that the patient environment and the objects used for patient care be cleaned appropriately to prevent transmission of EVD via indirect contact with infected materials from patients.

**RECOMMENDED PPE**

Staff responsible for environmental cleaning of areas with a suspected or confirmed EVD patient should wear PPE as described in *Chapter 5: Guidance for the Use of Personal Protective Equipment (PPE) for Managing Suspected/Confirmed Cases of Ebola Virus Disease*, with the addition of heavy utility gloves for cleaning the patient care area, handling soiled linen, soiled items, and instruments, and disposing of waste.

**RECOMMENDED CLEANING PRODUCTS FOR EBOLA VIRUS**

In general, cleaning solutions are either detergents (soaps) or disinfectants. Within these categories, different sub-categories, chemicals, and brands of cleaning solutions are available. While soaps (detergents) remove visible soil and organic matter from objects and surfaces, disinfectants destroy or inactivate microorganisms on inanimate objects. Dirt, debris, and organic matter reduce the ability of chemical disinfectants to destroy or inactivate microorganisms, so cleaning with soap is an important step in the process.

There are several disinfectants approved for general use in health care facilities. They include quaternary ammonium compounds, iodophors, phenolitics, improved hydrogen peroxide, alcohol (70%), and sodium hypochlorite (0.5%, 1%, or 2%). During Ebola Virus Disease outbreaks, a 0.5% chlorine solution (5,000 ppm available chlorine) is commonly used and among those recommended by the World Health Organization for the purpose of disinfecting environmental surfaces and contaminated objects. Contact time for 0.5% chlorine solution is 10 minutes, so the surface of the objects must remain wet with the solution for 10 minutes.

---


Preparation and Storage of Chlorine Solution
Facilities caring for patients with suspected or confirmed EVD will need large quantities of 0.5% chlorine solution for cleaning and disinfection of the environmental surfaces and patient care items. It is important that the correct concentration be prepared and stored appropriately.

Household bleach may contain 3.5%, 5.25–6.15%, or another concentration of sodium hypochlorite. It is important to check carefully for the concentration of the solution you have. It is easily available and is comparatively inexpensive. The formula in Figure 7-1 describes how to dilute bleach correctly. Prepare a fresh amount for use daily.

Figure 7-1. Formula for Diluting Bleach

- Check concentration (% concentrate) of the chlorine product you are using.
- Determine total parts water needed using the formula below.

\[
Total \text{ Parts (TP) water} = \left( \frac{\text{% Concentrate}}{\text{% Dilute}} \right) - 1
\]

- Mix 1 part concentrated bleach with the total parts water required.

Example: Make a dilute solution (0.5%) from 5% concentrated solution

STEP 1: Calculate TP water: \(\left( \frac{5.0\%}{0.5\%} \right) - 1 = 10 - 1 = 9\)

STEP 2: Take 1 part concentrated solution and add to 9 parts water.

Table 7-1 is a ready reckoner for preparing 1%, 0.5%, and 0.05% chlorine bleach solution from concentrated chlorine solution.

### Table 7-1. Ready Reckoner for Preparing Chlorine Solution of Desired Concentration

<table>
<thead>
<tr>
<th>Available Concentration</th>
<th>Preparing 1% solution (10,000 ppm)</th>
<th>Preparing 0.5% solution (5,000 ppm)</th>
<th>Preparing 0.1% solution (100 ppm)</th>
<th>Preparing 0.05% solution (500 ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5%</td>
<td>2.5</td>
<td>6</td>
<td>34</td>
<td>69</td>
</tr>
<tr>
<td>5%</td>
<td>4</td>
<td>9</td>
<td>49</td>
<td>99</td>
</tr>
<tr>
<td>6%</td>
<td>5</td>
<td>11</td>
<td>59</td>
<td>119</td>
</tr>
<tr>
<td>8%</td>
<td>7</td>
<td>15</td>
<td>79</td>
<td>159</td>
</tr>
<tr>
<td>10%</td>
<td>9</td>
<td>19</td>
<td>99</td>
<td>199</td>
</tr>
</tbody>
</table>

*ppm is parts of chlorine per million parts of water.

Chlorine solution loses effectiveness if exposed to air or light. Prepared solution should be stored in a labeled, plastic container with a tight-fitting lid. To avoid accidental ingestion or exposure, store chemicals out of the reach of children.

---

5 0.05% chlorine solution may be used for hand hygiene until supplies of ABHR and/or soap and water can be secured, as described in Chapter 4: Hand Hygiene.
General Cleaning Principles
All general cleaning principles apply in cleaning areas contaminated or potentially contaminated with blood and body fluids from EVD patients:

- **Damp dusting** is used to clean horizontal surfaces. Start working from higher surfaces to lower ones. Never high dust when patients are present in the room.

- **Wet wiping** is the preferred process for cleaning and disinfecting high-touch surfaces in patient rooms and procedures areas. Use a cloth or wipe wet with disinfectant solution. Keep surfaces moist for the contact time.

- **Wet mopping** is the most common and preferred method to clean floors. Cleaning solution must be changed regularly, when dirty, or after cleaning an isolation room:
  - Clean mop is wetted with detergent (soap) solution contained in a bucket, and floors are cleaned first, followed by repeating with a mop wetted with disinfectant solution.
  - Mop the area in a systematic way (e.g., front of room to back) so that there is no need to walk over a clean, wet surface until it is dry. Keep surfaces moist for a contact time of 10 minutes.
  - Mop the room before the bathroom.
  - Mopping should be done last as dust/dirt/drips from surfaces will fall to the floor during room cleaning.

- **Flooding:** A contained area with a floor drain (such as a bathroom or operating room) is flooded with disinfectant solution and then, as the cleaning solution drains away, the excess fluid is removed using a squeegee. Keep surfaces moist for the contact time.

Cleaning should:
- Be performed in the following order: high damp dusting and cleaning visible soil from walls, wet-wiping high-touch surfaces with detergent and disinfectant, and mopping floors.
- Always progress from the least soiled areas to the most soiled areas. For example, clean the area for suspected patients before the area with confirmed patients, clean areas for putting on PPE before areas for taking off PPE.
- Always progress from high to low areas, so that the dirtiest areas and debris that fall on the floor will be cleaned up last.
- NEVER USE dry sweeping, mopping, and dusting.
- **DO NOT spray or fog** any area (with or without a patient present) with disinfectant. This is potentially dangerous and not effective at removing infectious material, including the Ebola virus.

Cleaning equipment must be kept in good repair and cleaned:
- At least daily
- When soiled
- Upon leaving the isolation area
- After patient discharge
CONSIDERATIONS FOR AREAS POTENTIALLY CONTAMINATED WITH EVD

Areas considered contaminated include (but are not limited to) isolation rooms, screening rooms after a symptomatic suspected patient has been moved to the isolation area, areas where PPE is removed, areas where waste and used linens are stored, and areas where suspected or confirmed EVD patients or staff caring for these patients are entering or leaving. When cleaning these areas:

- Wear appropriate PPE and remove it with extreme care in designated areas as described in Chapter 5.
- Any surfaces visibly contaminated with blood or body fluids should be cleaned as described below for cleaning blood and body fluid spills.
- Discard cleaning cloths as contaminated waste after cleaning an area potentially contaminated with blood and body fluids from EVD patients.
- Use disposable cleaning equipment where possible.
- If not using disposable equipment, strictly dedicate cleaning equipment to EVD patient areas and meticulously decontaminate it after each use. Do not use the same equipment for patients with Ebola Virus Disease that is used for those without EVD.
- Dedicate cleaning staff to areas with Ebola Virus Disease patients so they are not cleaning areas both with and without EVD patients. The disease can be spread in this way.

The following describes specific cleaning for these areas:

- **Isolation rooms** with patients who have suspected or confirmed Ebola Virus Disease and any areas potentially contaminated with blood and body fluids from EVD patients (described above) should be cleaned at least once daily with detergent followed by 0.5% chlorine solution as a disinfectant.
- All **high-touch surfaces** and toilet areas and should be cleaned once daily and when visibly soiled with detergent followed by 0.5% chlorine solution as a disinfectant.
- **Floors** should be cleaned at least daily with detergent followed by 0.5% chlorine solution as a disinfectant.
- **Walls, windows, and high surfaces** that do not regularly come into contact with hands of patients and health care workers or splashes of blood or body fluids may be cleaned with detergent (soap) daily but should be cleaned with 0.5% chlorine solution if visibly soiled and on discharge of the patient. If visibly soiled with blood or body fluids, clean as described below for cleaning blood and body fluid spills.
- **Curtains:** Avoid the use of curtains or any other textiles in EVD isolation areas.
- **Sinks:** Wearing recommended PPE, scrub daily or more often as needed with a separate cloth or brush and soap and water followed by 0.5% chlorine solution. Avoid splashing. Keep surfaces moist for a contact time of 10 minutes. Rinse with water. Clean up spills of blood and body fluids immediately as described in this chapter.
- **Toilets and latrines:** Wear PPE as described above. Scrub daily and more often as needed with a separate mop, cloth, or brush and soap and water followed by 0.5% chlorine solution. Avoid
splashing. Keep surfaces moist for a contact time of 10 minutes. Rinse with water. Clean up spills of blood and body fluids immediately as described in this chapter.

- **Soiled linen**: See section on “Processing Linen” later in this chapter.
- **Waste**: See section on “Waste Management” later in this chapter.

### CLEANING OF PERSONAL PROTECTIVE EQUIPMENT

- It is recommended that health care workers use single-use, disposable PPE during an Ebola Virus Disease outbreak as described in **Chapter 5** because the performance of PPE is not assured after re-processing and errors in reprocessing pose an infection risk to the next wearer.
- If necessary, visors, goggles, and boots may be reprocessed using the following WHO guidelines:6
  - Prepare 0.5% chlorine solution.
  - Wear PPE as described in **Chapter 5** while cleaning face shields, goggles, and boots.
  - Clean first with soap and water to remove any organic matter.
  - Dispose of these initial cleaning materials as infectious waste. Immerse PPE fully in chlorine solution for a minimum of 30 minutes (preferred overnight).
  - After at least 30 minutes, rinse thoroughly with water and dry.
  - Dispose of used chlorine solution by pouring down drain.

Other PPE should **not** be reprocessed.

### CLEANING SPECIFIC EQUIPMENT AND ITEMS IN HOSPITAL ENVIRONMENTS

The non-critical equipment (stethoscopes, blood pressure cuffs, personal utensils, bedpans, for example) commonly found in patient rooms and patient care areas should be strictly dedicated to each patient. However, if this is not possible, WHO recommends the following unless contaminated with blood and body fluids6 (in this case, clean as described below for spills of blood and body fluids):

- Wear PPE as described in **Chapter 5**.
- Clean with soap and water.
- Prepare appropriate disinfectant (e.g., 0.5% available chlorine solution for large items, alcohol for smaller items like stethoscopes).
- Thoroughly wipe all surfaces of the equipment including cords.
- Keep surfaces moist for a contact time of 10 minutes. Allow to air dry.
- Classify all waste generated as a result of cleaning as infectious waste.

---

6 World Health Organization. 2014. *Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Haemorrhagic Fever in in Health-Care Settings, with Focus on Ebola* (December), at: [http://apps.who.int/iris/bitstream/10665/130596/1/WHO_HIS_SDS_2014.4_eng.pdf?ua=1&ua=1&ua=1](http://apps.who.int/iris/bitstream/10665/130596/1/WHO_HIS_SDS_2014.4_eng.pdf?ua=1&ua=1&ua=1)
HOW TO CLEAN SPILLS OF BLOOD AND OTHER BODY FLUIDS FROM PATIENTS WITH SUSPECTED OR CONFIRMED EBOLA VIRUS DISEASE

- Wear PPE as described in Chapter 5.
- Cover fluids with 0.5% chlorine solution.
- AVOID SPLASHING!!
- Let stand for at least 15 minutes.
- Carefully clean with a towel or rag:
  - AVOID SPLASHING!!
- Carefully dispose of towel in receptacle for contaminated waste.
- Clean surface again with 0.5% bleach with 10-minute contact time.
- Finally, clean with soap and water.

PROCESSING LINEN

OVERVIEW OF PROCESSING LINEN
Processing linen in health care facilities consists of the steps below:

- Collect soiled linen.
- Transport soiled linen.
- Sort soiled linen.
- Launder linen (wash, dry, iron, and fold or pack).
- Store clean linen.
- Distribute clean linen.

KEY RECOMMENDATIONS FOR MANAGEMENT OF LINEN IN AN EBOLA VIRUS DISEASE OUTBREAK
Linen that has been used for patients can be heavily contaminated with body fluids (e.g., blood, vomit) and splashes may result during handling. Wear PPE as described in Chapter 5, with the addition of heavy-duty utility gloves when collecting, handling, transporting, sorting, and washing soiled linen from EVD patients.

If safe cleaning and disinfection of heavily soiled linen is not possible or reliable, it may be prudent to dispose of the linen as contaminated waste to avoid any unnecessary risks to individuals handling

DEFINITION OF KEY TERMS

- Linens: Cloth items used in health care facilities by staff and patients. They include bed sheets, towels, cleaning cloths, etc.
- Soiled or contaminated linen: Linen that has been collected and brought to laundry services for processing.
these items. If destroying linen is not possible and linen must be reused, the following steps describe WHO recommendations for handling contaminated linen.6

**Step 1: Collecting Linen from Ebola Virus Disease Patients**
- Wear PPE as described in Chapter 5, with the addition of heavy-duty utility gloves.
- Collect used linen in clearly labeled, leakproof bags or containers at point of use.
- For heavily soiled linen, scrape off any solid waste using a flat, firm object and flush down the toilet or sluice before linen is placed in the container. If linen has to be transported outside the room for this procedure, discarding the linen is recommended.
- Handle soiled linen as little as possible and with minimum contact to avoid accidental exposure and spreading of microorganisms.
- Handle linens with minimum agitation to avoid contamination of air, surfaces, and persons.
- Any cloth items from an EVD patient should be identified and regarded as infectious, even if there are no visible signs of contamination.

**Step 2: Transporting Linen from Ebola Virus Disease Patients outside of the Isolation Area**
- Wear PPE as described in Chapter 5 with the addition of heavy-duty utility gloves until linen is double bagged as described below.
- Linen should be washed as close as possible to the isolation area.
- Disinfect the outside surfaces of the primary linen container (tied bag or bucket with lid) with 0.5% chlorine solution (spray or wipe) before removal from the isolation room/area and place it into a second closed, leakproof container.
- Transport the linen directly to the laundry room in its container (tied bag or bucket with lid) on a cart.
- Always carry linen by the neck of the bag or handles of the container and away from the body.

**Step 3: Laundering Linen from Ebola Virus Disease Patients**
- Wear PPE as described in Chapter 5, with the addition of heavy-duty utility gloves for the laundering process.
- Do not mix with other laundry, and do not pre-sort.
- Launder promptly.
- It may be prudent to place laundry immediately in 0.5% chlorine solution to pre-soak to decrease the risk to laundry handlers.
- Because organic matter (blood and body fluids, excretions, and secretions) can prevent disinfection from fully occurring, linen is still considered contaminated after pre-soaking.
Laundering should follow.

Use machines if available:

- For low-temperature laundering:
  - Wash linen with detergent and water.
  - Rinse.
  - Soak in 0.05% chlorine for approximately 30 minutes.
  - Wash with detergent and water, rinse, and then dry.

Steps in **bold** apply to linen that is contaminated.

If washing machines are not available or power is not ensured:

- Empty into a large container of hot water and soap.
- Soak, being sure that it is totally covered with water.
- Use a stick to stir/agitate. Avoid splashing.
- Drain the water.
- Refill with 0.1% chlorine solution.
- Soak for 10–15 minutes.
- Remove linen.
- Rinse in clean water.
- Remove excess water and dry.

Steps in **bold** apply to linen that is contaminated.

Note the higher concentration of chlorine solution used for handwashing compared to machine washing.

**Step 4: Clean Linen**

- Clean linen is considered no longer infectious. Clean linen must be protected to prevent contamination from dust and dirt during storage and transport.
OVERVIEW OF WASTE MANAGEMENT

Under normal circumstances, proper handling of contaminated waste minimizes the spread of infection to health care personnel and to the local community. Following the principles of waste segregation, collection, storage, and transportation helps minimize risk of transmitting infection from waste generation to disposal. During outbreak situations, additional care with waste processing may be required to protect staff and the community. For example, sharps injuries often occur as a result of unsafe disposal of needles and other sharps in waste. Studies have shown that the case fatality rate associated with percutaneous injury from sharps contaminated with Ebola virus was much higher (100%) than other routes of exposure (80%). In addition, increased generation of contaminated waste may occur during outbreaks because of increased use of disposable supplies and PPE, and classification of additional items as contaminated. Existing waste handling procedures may be inadequate, overwhelmed, or people may refuse to perform waste management for infectious waste.

PPE FOR WASTE HANDLING IN AN EBOLA VIRUS DISEASE OUTBREAK

Staff responsible for management of waste from suspected or confirmed EVD patients should wear PPE as described in Chapter 5, with the addition of heavy-duty gloves for collecting, handling, and disposing of waste.

KEY RECOMMENDATIONS FOR WASTE MANAGEMENT DURING AN EBOLA VIRUS DISEASE OUTBREAK

All waste from an Ebola Virus Disease isolation room/area should be treated as contaminated waste.

Point of Generation

- Wear PPE as described in Chapter 5.
- Avoid splashing with any liquid waste.

---

Segregate waste at the point of generation to enable appropriate and safe handling:
- Sharps and tubing that have been in contact with blood or body fluids should be placed directly into puncture-resistant containers as close as possible to the point of care. Never remove needles from the syringes.
- Place solid, non-sharp, infectious waste into leakproof waste bags in covered bins.
- Containers should be used along with the plastic bags. Containers should have well-fitting lids and should have a foot pedal to operate the lid.
- Place waste collection containers (especially sharps):
  - Close to where the waste is generated
  - Where convenient for users

Collection/Transportation/Storage
- Wear PPE as described in Chapter 5.
- All waste from an Ebola Virus Disease isolation room/area should be treated as contaminated waste:
  - Deposit in leakproof, puncture-resistant, plastic bag-lined containers (yellow bags are used for infectious waste).
  - Use solid containers with tight-fitting covers and sturdy, tear-resistant bags.
- Plastic waste bags should never be stapled but should be tied securely to provide a barrier between the waste and the worker. When three-quarters full, the bags should be immediately replaced with new bags.
- Disinfect the outside surfaces of the waste container before removal from the isolation room/area and place into another yellow bag for transport.
- Never compress, shake, or squeeze waste in an attempt to reduce volume.
- Carry sealed bags by their necks to the transportation trolley/cart/bin.
- Do not lift or hold bags by the bottom or sides.
- Carry bags away from the body.
- Carrying waste from place to place increases the risk of infection.
- Ensure that bags are not broken, opened, dropped, or thrown.
- Hazardous and non-hazardous waste should never be mixed.
- Do not use equipment used to hold and transport contaminated waste for any other purpose.
- Clean contaminated waste containers each time they are emptied using a 0.5% chlorine solution. Wear PPE as described in Chapter 5, with the addition of heavy-duty utility gloves and scrub to remove soil and organic material.
- Transport directly to the waste storage area.
Do not store waste for more than 24 hours before final disposal.

Control access to the storage area to prevent entry of animals, children, and untrained people.

**Disposal**

- Wear PPE as described in Chapter 5.

**Liquid Waste**

- Dispose of human excreta including vomit, urine, and feces and any other liquid waste from laundry in the sanitary sewer or pit latrine. No further treatment is needed.
- Pumping waste from isolation units and transporting for disposal pose a risk to those pumping and transporting and is not recommended.

**Solid Waste**

- **Do not** transport untreated waste. Treat waste on-site.
- In settings with very low resources and emergency situations, burning within an open barrel or pit could be the only option initially. These options should be viewed as transitional, as burning waste out in the open creates a risk of PPE catching fire as well as creating long-term, chronic health hazards.
- Fuel/electricity-operated incinerators are better options, as they reach the desired temperature and are less harmful to the environment.
- WHO recommends autoclaving as the most environment-friendly treatment of infectious waste at places where the technology is available. However, it also needs supporting technology for shredding, because it only reduces the volume of waste.
- Alternatively, waste can be disposed of in a designated pit:
  - 2 meters (7 feet) filled to depth of 1–1.5 meters (3–5 feet).
  - After each load is deposited, cover with a 10–15 cm layer of soil.
- Placentas should be disposed of in a dedicated placenta pit if it is available. Alternatively, placentas and other body parts could be disposed of by burying in a burial pit.

Health care facilities that do not have the recommended incinerator capability could construct an incinerator from a simple empty oil drum. This should be used as an interim measure while more effective systems are put into place. See Appendix E: Incinerators and Burial Sites for Waste Disposal for instructions on creating and using incinerators and burial sites for waste disposal.
CHAPTER 8: SUPPORT ACTIVITIES DURING EBOLA VIRUS DISEASE OUTBREAKS

INTRODUCTION
Prevention and control of Ebola Virus Disease outbreaks require implementation of comprehensive Infection Prevention and Control interventions comprising the use of Standard Precautions for all patients at all times, along with screening in health care facilities to quickly identify EVD patients and apply appropriate isolation precautions. Prevention and control of EVD outbreaks go beyond health care facilities. They require collaborative efforts among health systems, public health authorities, patients, and communities to help end outbreaks.

SAFE AND DIGNIFIED BURIAL OF PEOPLE WHO DIE OF EVD
EVD transmission may be more likely in severe illness, when Ebola virus levels in blood and body fluids are highest. In addition, the bodies of deceased Ebola-infected persons are highly infectious and remain so for days after death. During an outbreak, unsafe burial practices promote further spread of the disease. However, burial is a very sensitive issue and should always be arranged in consultation with a relative and/or religious leader, if available. No burial should begin until family agreement has been obtained.

Until recently, guidelines for handling human remains were available for health care facilities but not for those who died at home. This guidance did not include details of dignified burial practices. As the outbreak evolved, the World Health Organization issued guidance on safe and dignified burial during EVD outbreaks both for health facilities and for the community level. Safe burial teams are formed and trained using training materials developed by WHO. Below are 12 steps for safe and dignified burial practices in field settings. Please see Appendix F: How to Conduct Safe and Dignified Burial of a Patient Who Has Died from Suspected or Confirmed Ebola Virus Disease for the detailed description of safe and dignified burial as recommended by WHO. These measures should be applied not only by medical personnel but by anyone involved in the management of dead bodies and burial of suspected or confirmed Ebola patients.

Steps in Safe and Dignified Burial in Field Settings
Step 1: Prior to departure: Compose the team and prepare disinfectants.
Step 2: Assemble all necessary equipment.
Step 3: Arrival at the diseased patient’s home: Prepare burial with the family and evaluate risks.
Step 4: Put on all PPE.
Step 5: Place the body in the body bag.
Step 6: Place the body bag in a coffin where it is culturally appropriate.

Step 7: Sanitize the family’s environment.

Step 8: Remove PPE, manage waste, and perform hand hygiene.

Step 9: Wear utility gloves and transport the coffin or the body bag to the cemetery.

Step 10: Burial at the cemetery: Place coffin or body bag into the grave.

Step 11: Burial at the cemetery: Engage the community in prayers as this helps to dissipates tensions and provide a peaceful experience.

Step 12: Return to the hospital or team headquarters.

Safe and Dignified Preparation and Burial for Health Care Facility Settings

General Guidelines

- The human remains should be handled as little as possible.
- Only the members of a trained burial team and trained personnel should handle human remains.
- The team should put on PPE after having a conversation with the family members about their preferences for safe and dignified burial.
- Remains should **not** be sprayed, washed, or preserved. See Appendix F for safe methods to preserve and respect religious and cultural customs.
- The hospital personnel should wear PPE as described in Chapter 5: Guidance for the Use of Personal Protective Equipment (PPE) for Managing Suspected/Confirmed Cases of Ebola Virus Disease.
- Personnel handling human remains should wear recommended PPE as described in Chapter 5, including rubber boots or closed, puncture- or fluid-resistant shoes and overshoes, an impermeable gown, plastic apron, fluid-resistant mask, eye protection, and double gloves.
- PPE should be put on before the collection, preparation, and placement of the body in the body bag or the coffin. The PPE should be removed as described in Chapter 5 only after the body is secured in the coffin.

How to Prepare the Dead Body for Burial at the Health Care Facility

- Plug all natural orifices.
- Prepared the body safely but in accordance with the family’s wishes.
- Place the body in the first body bag and close the bag.
- Wipe the entire surface of the outside of the bag with 0.5% chlorine solution.
- Place the first body bag in the second body bag and close the bag.
- Wipe the entire surface of the outside of the second bag with 0.5% chlorine solution.
- Label the bag with the indication of highly infectious material.
- Place the bag inside a coffin as soon as possible for immediate burial.
PPE is not required once the body is prepared as above and placed in the coffin.

If the body is not placed in the coffin in the room where the death occurred, careful consideration must be given to safe transport to the mortuary.

Always follow the guidelines issued by your local health authorities.

**Note:** If waterproof body bags are not available, use leakproof cloth or a plastic sheet for wrapping and sealing.

### Transfer of the Body

- It is recommended that there be a team of at least four people wearing PPE for handling human remains. One of the team members will perform the administrative procedures.
- Promptly transfer to the cemetery.

### POST-MORTEM EXAMINATION (NOT RECOMMENDED)

- Post-mortem examination of EVD patient remains should be avoided if at all possible. Limit to essential evaluations only and perform only by trained personnel.
- The IPC coordinator should be consulted for any decisions related to performing a post-mortem examination.
- Personnel examining the remains should always wear PPE as described in Chapter 5. In addition, personnel performing autopsies should wear a particulate respirator of good quality (e.g., N-95 mask) to protect from aerosols generated during sawing, etc.
- Once the procedure is over, remove PPE as described in Chapter 5.
- Perform hand hygiene immediately after removing PPE.
- Meticulously follow IPC and other standards for handling, packaging, and labeling any specimens collected during the post-mortem examination. See below for details.
- Prepare the remains for burial following the recommended standards.

### DIAGNOSTIC LABORATORY ACTIVITIES

#### Collecting Specimens

- Only staff who have been trained in collecting blood samples and wearing PPE as described in Chapter 5 should perform blood draws from patients with suspected or confirmed EVD. It is better to wait for a team of trained staff and not put other health care workers at risk.
- Ensure that sharps containers are available exactly where blood is being drawn.
- Place the specimen in a clearly labeled, glass or non-glass, leakproof container and deliver directly to designated specimen handling areas.
Disinfect all external surfaces of specimen containers thoroughly, using 0.5% chlorine solution prior to transport.

WHO’s recommended steps for collecting and shipping blood samples from suspected cases of Ebola Virus Disease are presented in the form of job aids in **Appendix B: Collecting and Shipping Blood Samples**.

### Processing Samples

- All laboratory sample processing of specimens from patients with suspected or confirmed EVD must take place under a safety cabinet or at least a fume cabinet with exhaust ventilation. Never carry out any procedure on the open bench. If a biosafety cabinet is not available, do not perform any tests that require centrifugation or use of automatic equipment.

- Activities such as micro-pipetting and centrifugation can mechanically generate fine aerosols that may pose a risk of transmission of EVD through inhalation or through direct exposure. These activities must not be done with samples from suspected or confirmed EVD patients.

- Automatic equipment cannot be adequately cleaned after processing blood or body fluids from suspected or confirmed EVD.

- Laboratory personnel handling potential clinical specimens should wear PPE as described in **Chapter 5**.

- Any procedure that may generate aerosols (as described above) should be avoided. If there is a risk of aerosols, particulate respirators (N-95 or higher-level masks) must be worn in addition to other PPE.

- Meticulous removal of PPE is required as described in **Chapter 5**. Perform hand hygiene after removal of PPE.

- Do not hang up the apron or gown for reuse; discard immediately.

- Perform hand hygiene before putting on PPE, immediately after removing PPE used during specimen handling, and after any contact with potentially contaminated surfaces as described in **Chapter 4: Hand Hygiene**.

### Transporting Samples

- Strict rules and regulations regarding transporting specimens from patients with suspected or confirmed EVD are in place.

- Testing and transportation of EVD specimens should be organized in close collaboration with local and national public health authorities, which should have detailed plans in place at the country level.

- WHO’s recommended steps for collecting and shipping blood samples from suspected cases of Ebola Virus Disease are presented in the form of job aids in **Appendix B**.
INFECTION PREVENTION AND CONTROL GUIDELINES FOR PROTECTING VISITORS

Visitor Restrictions during an EVD Outbreak\(^2\)

- Stopping all visitor access to the EVD patient is preferred.
- Signage should be used to communicate visitor restrictions. Ensure that signage is clear and simple.
- The facility may need to arrange security to assist with ensuring compliance with visitor restrictions.
- If it is not possible to restrict all visitors, limit visitors to only those necessary for the patient’s well-being and care (e.g., parent visitor of a child patient). Refer to the section below on guidelines for essential visitors.
- All visitors of EVD patients must be screened for signs and symptoms of EVD prior to entering the facility. If fever or other symptoms are present, the visitor should be evaluated for EVD and managed appropriately.
- Do not allow other visitors to enter the isolation area. Setting up the isolation area with a design that facilitates observation by visitors is prudent to generate trust and allow visitors to see their loved ones.
- Ensure that any visitors who want to observe the patient do so from a distance of 3 meters (9 feet).

Visitors of EVD Patients\(^2\)

- A log with contact information for all visitors, including family members of the patient with suspected or confirmed EVD, should be strictly maintained.
- If a visitor is permitted, the visitor must follow the IPC precautions in place in the hospital for the required period. Health care facilities should educate visitors on these measures (including, but not limited to, hand hygiene and the procedures for properly using and removing PPE), and their responsibility for adhering to them, when they visit an EVD patient.
- Visitors are required to wear PPE when in the patient room or isolation area. Staff should check that the visitor has put on the PPE properly and supervise the removal of the PPE.

\(^2\) World Health Organization. 2014. *Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Hemorrhagic Fever in Health Care Settings, with Focus on Ebola* (September), at: http://apps.who.int/iris/bitstream/10665/130596/1/WHO_HIS_SDS_2014.4_eng.pdf?ua=1
MANAGING EXPOSURE TO EBOLA VIRUS AMONG HEALTH FACILITY STAFF DURING PATIENT CARE

The Centers for Disease Control and Prevention issued Interim Guidance for Monitoring and Movement of Persons with Potential Ebola Virus Exposure on November 28, 2014. Given below are the key provisions of the guidance:

- All health care workers who engaged in direct patient care in any health care settings in a country with widespread transmission or cases in urban settings with uncertain control measures are considered to be in the “some risk” category.
- Laboratory workers in Biosafety Level 4 facilities are considered to have “no identifiable risk.”
- Exposure to Ebola virus has been classified as “high risk,” “some risk,” “low risk,” and “no identifiable risk.”

**High risk:**
- Percutaneous or mucous membrane exposure from a symptomatic person with EVD
- Exposure to body fluids from a symptomatic person with EVD without appropriate PPE
- Handling samples from a symptomatic person with EVD in a lab without appropriate biosafety standards
- Direct contact with a dead body of a person who died of EVD
- Providing direct care to a person with EVD in a home setting

**Some risk:**
- Direct contact while using appropriate PPE with a person with EVD while the person was symptomatic, or with the person’s body fluid, in countries having widespread transmission of Ebola
- Any direct patient care in health care settings other than an Ebola Treatment Center
- Close contact is defined as being for a prolonged period of time, while not wearing appropriate PPE, within about 3 feet of a symptomatic person with EVD

**Low risk:**
- Having a brief, direct contact while not wearing appropriate PPE with a person in an early stage of EVD
- Being in the same room for a brief period of time with a symptomatic person with EVD
- Direct contact while using appropriate PPE with a symptomatic person with EVD or the person’s body fluids
- Being in a closed vehicle with a symptomatic person with EVD

---

No identifiable risk:

- Contact with an asymptomatic person who had contact with a person with EVD
- Contact with an asymptomatic person who was infected with Ebola virus

Monitoring of an exposed person with EVD has been defined as active and direct active:

- **Active monitoring** means the local public health staff personally communicate with the exposed person to check and assess for appearance of fever and other symptoms and signs of EVD rather than relying solely on the individual to self-monitor and report. The person should measure his/her temperature twice a day and report to the public health staff during communication.

- **Direct, active monitoring** means the local public health staff directly perform temperature check and assessment of symptoms and signs. This can be once a day in person and once a day via phone call.

Any health care workers/persons exposed to Ebola virus should limit their movements and avoid close contacts with any other person during an active and direct active monitoring period of 21 days.

Any health care workers/persons assessed as having fever and other signs and symptoms of EVD during active or direct active monitoring should immediately be transferred to an isolation unit for further evaluation and appropriate management.

Health care workers and other persons who provide clinical and nursing care to suspected/confirmed cases of EVD are at risk of accidental exposure to the virus through percutaneous and mucocutaneous exposure to blood and body fluids.

A person accidentally exposed to blood or body fluids, including secretions and excretions, from a patient with suspected or confirmed EVD should immediately and safely stop any current task, leave the patient care area, and safely remove the PPE, ensuring no accidental exposure to infectious substances.

- Immediately after leaving the patient care area, wash the affected skin surfaces or the percutaneous injury site with soap and water.
- Irrigate mucous membranes with copious amounts of water or an eyewash solution in the case of affected conjunctiva. Never use chlorine or other disinfectant solutions.
- Immediately report the incident to the local coordinator. This is a time-sensitive task and should be performed as soon as possible.
- The exposed person should be medically evaluated including for other potential exposures, such as HIV and hepatitis B and C, and receive appropriate management according to the national guidelines.
- There are no specific post-exposure prophylaxis medicines or other treatment for a person exposed to Ebola virus.
The exposed person should be closely monitored for fever twice daily for 21 days after the incident. All health care workers, irrespective of exposure, should self-monitor for fever and other signs and symptoms of Ebola during the outbreak.

Being exposed to Ebola virus and being monitored for 21 days could be highly stressful. All health care workers exposed to Ebola virus should be offered and provided psychological support as a standard component of care. Any exposed person who develops fever within 21 days of exposure should be isolated immediately as described in Chapter 3: Screening and Isolation for Ebola Virus Disease at the Health Facility. All staff evaluating and caring for the patients should wear recommended PPE as described in Chapter 5. An immediate consultation with an infectious disease expert should be arranged.

Contact tracing and follow-up of family, friends, co-workers, and other patients who may have been exposed to Ebola virus through close contact with the infected health care worker are essential.
<table>
<thead>
<tr>
<th>Exposure Level</th>
<th>Clinical Criteria</th>
<th>Public Health Actions</th>
</tr>
</thead>
</table>
| **High Risk**                        | Fever (more than 38°C OR any of the following: vomiting, diarrhea, unexplained bruising or bleeding) | • Rapid isolation, medical evaluation, and referral to Ebola treatment center in an ambulance  
• Immediate evaluation and discharge with a diagnosis other than Ebola and direct active monitoring for 21 days |
| • Percutaneous (e.g., needle-stick) or mucous membrane exposure to blood or body fluids of EVD patient  
• Direct skin contact with or exposure to blood or body fluids of an EVD patient without appropriate personal protective equipment (PPE)  
• Processing blood or body fluids of a confirmed EVD patient without appropriate PPE or standard biosafety precautions  
• Direct contact with a dead body without appropriate PPE in a country where an EVD outbreak is occurring  
• Having lived in the immediate household and provided direct care to a symptomatic person with EVD | Asymptomatic | • Direct active monitoring  
• Controlled movements  
• Exclusion from workplace for 21 days  
• Maintaining 3-foot distance from others in public place  
• No travel by public transportation |
| **Some Risk of Exposure**            | Fever (more than 38°C OR any of the following: vomiting, diarrhea, unexplained bruising or bleeding) | • Rapid isolation, medical evaluation, and referral to Ebola treatment center in an ambulance  
• Immediate evaluation and discharge with a diagnosis other than Ebola and direct active monitoring for 21 days |
| In areas with widespread transmission and uncertain control measures:  
• Direct contact with a symptomatic person with EVD or the person’s body fluids while wearing appropriate PPE  
• Any direct patient care in other health care settings  
• Close contact with a household, health care setting, or community setting with a symptomatic person with EVD | Asymptomatic or clinical criteria not met | • Direct active monitoring  
• Controlled movements  
• Exclusion from workplace for 21 days  
• Maintaining 3-foot distance from others in public place  
• No travel by public transportation |
| **Low (but not zero) Risk:**         | Fever (more than 38°C OR any of the following: vomiting, diarrhea, unexplained bruising or bleeding) | • Rapid isolation, medical evaluation, and referral to Ebola treatment center in an ambulance  
• Immediate evaluation and discharge with a diagnosis other than Ebola and direct active monitoring for 21 days |
| • Having been in an area with widespread transmission of cases with uncertain control measures and having had no known exposure  
• Having brief, direct contact while not wearing appropriate PPE with a person with EVD while the person was in early stage of disease  
• Briefly being in the same room with a symptomatic person with EVD  
• Direct contact while wearing appropriate PPE with a person with EVD or the person’s body fluid  
• Traveling in a vehicle with a symptomatic person with EVD | Asymptomatic or clinical criteria not met | • Active monitoring  
• No restriction of movements |
<table>
<thead>
<tr>
<th>Exposure Level</th>
<th>Clinical Criteria</th>
<th>Public Health Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No Identifiable Risk:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Contact with an asymptomatic person who had</td>
<td>Symptomatic (any</td>
<td>• Routine medical care as needed</td>
</tr>
<tr>
<td>contact with a person with Ebola</td>
<td>symptoms)</td>
<td></td>
</tr>
<tr>
<td>• Contact with a person with Ebola before the</td>
<td>Asymptomatic</td>
<td>• No actions needed</td>
</tr>
<tr>
<td>person developed symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Having been more than 21 days previously in an</td>
<td></td>
<td></td>
</tr>
<tr>
<td>area with widespread transmission of Ebola with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>uncertain control measures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MANAGING STRESS AND PREVENTING BURNOUT IN A HIGH-STRESS ENVIRONMENT

Limited human resources, an unmanageably high caseload, the high risk of virus transmission during patient care, high mortality among EVD patients, and the highest level of required compliance in the provision of care and treatment can be extremely stressful for health facility staff during Ebola outbreaks. Equally stressful for staff are managing their personal lives, explaining to family members the risk of getting infected while providing services, and the possibility of being stigmatized or discriminated against because of the work they are doing.

Wearing PPE that covers practically the whole body can be extremely uncomfortable in a hot and humid environment. Prolonged hours of work could result in heat exhaustion-related symptoms including heat stroke.

When the stress and discomfort continue to build for a prolonged period of time, a person may feel emotional, mental, and physical exhaustion; that person is said to have burnout.

Burnout results in reduced productivity and the person with burnout may feel helpless, hopeless, and resentful. This could happen to any health care worker who is working at a health care facility in Ebola-affected areas.

What Is the Difference between Stress and Burnout?

Some examples to differentiate stress from burnout are listed in the table below.

<table>
<thead>
<tr>
<th>Stress</th>
<th>Burnout</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is over-involvement</td>
<td>There is disengagement</td>
</tr>
<tr>
<td>Over-reactive emotions</td>
<td>Blunting of emotions</td>
</tr>
<tr>
<td>Loss of energy</td>
<td>Loss of motivation and hopes</td>
</tr>
<tr>
<td>Affects the person’s physical well-being</td>
<td>Affects the person’s mental well-being</td>
</tr>
</tbody>
</table>

How Do You Recognize if You Are Experiencing Burnout?

- When you feel that:
  - You are tired all of the time.
  - You just cannot manage either work or personal life anymore.
  - Nothing is going to make a difference in the situation.

How Should You Deal with Burnout?
The first steps in dealing with burnout are to recognize it by being aware of its signs and symptoms, intervene to reverse burnout, and take care of your physical and mental well-being.

How Can You Prevent Burnout?
Tips for prevention of stress and burnout:

- Meditate for a few minutes as you wake up and before getting out of bed.
- Practice healthy eating, exercising, and sleeping habits.
- Set your limits.
- Take frequent breaks during work hours.
- Talk to your colleagues and friends.
- Talk to your supervisor and actively address your emotional feeling and physical exhaustion.

Consult a professional counselor for further management if it is needed. Profession counselors can help you understand your personal situation and make decisions about how you want to address your stress and burnout.
CHAPTER 9: PLANNING AND PREPAREDNESS FOR EBOLA VIRUS DISEASE OUTBREAKS

Planning for disease outbreaks and epidemics is critical. Proper planning and preparedness activities will enable facilities to quickly take action should the threat of an EVD outbreak occur. However, preparedness consists of much more than a plan on paper or an intention to stockpile supplies. EVD outbreaks constitute a major public health issue, especially in West and Central Africa. Pre-outbreak preparedness plays a critical role in combating EVD outbreaks effectively.

The recommendations in this chapter are based on the WHO Ebola and Marburg Virus Disease Epidemics: Preparedness, Alert, Control, and Evaluation, Interim Guidelines (version 1.2). The WHO Guidelines outline four phases of response that have been implemented successfully in previous EVD outbreaks.

The four phases are:

1. Pre-outbreak preparedness,
2. Alert (identify, investigate, evaluate risks),
3. Outbreak response and containment operations, and
4. Post-outbreak evaluation.

Many of the items addressed in the WHO Guidelines should be implemented at the district level. The guidance in this chapter summarizes the activities necessary in Phase 1 of the WHO guidelines, the pre-outbreak preparedness phase that can be implemented at the facility level. Having proper preparedness activities in place and understanding EVD surveillance will enable a facility to act quickly in the event that EVD is identified. In addition to the items addressed in the WHO guidelines, this chapter also discusses the important role that communication and coordination play in outbreak preparedness and response.

To complement this chapter, Appendix G: Checklist for Planning and Preparedness for an Ebola Virus Disease Outbreak contains a comprehensive checklist, adapted from two U.S. Department of Health and Human Services tools for hospital preparedness. This checklist should be adapted to reflect the local context and resources. The detailed checklist captures the content of this chapter and presents it in an easy-to-use format that managers, providers, and administrators can apply or adapt to the specific situation in their facility.

---

Although many of the steps and activities recommended in this chapter are specific to EVD, many also pertain to any public health emergency that involves the health care facility. These guidelines are not intended to set forth mandatory requirements. It is important to carefully assess the facility’s capacity and identify gaps between the requirements for preventing transmission of EVD and managing an outbreak, and the actual situation at the facility. During EVD outbreaks, strict compliance with biosafety guidelines (including, but not limited to, appropriate laboratory practices, infection prevention and control precautions, barrier nursing procedures, use of PPE, disinfection of contaminated areas and objects, safe burials, etc.) are essential in preventing the outbreak from spreading and in reducing the number of victims.

However, it is also important to develop comprehensive social mobilization campaigns that include feasible, culturally appropriate, and technically sound interventions for the population in order to control the outbreak effectively. The facility management and local health administration will need to assess the cascading consequences of response to an outbreak now: for example, school closures will affect workplaces, movement restrictions will affect provision of food and supplies, and shortages of supplies will mean setting priorities. Health care providers and administrators must work together to develop a preparedness plan for their facility, and to ensure clear communication, consensus, and commitment.

**COORDINATION**

**Rationale**
To be able to make clear and timely decisions, to know how the team will function in an emergency, and to have a uniform policy with which all concerned will comply, it is essential to know who is in charge of the following activities within the facility, and how that situation might change if a limited outbreak becomes a major emergency, as happened during the 2014 outbreaks in the West African nations of Liberia, Guinea, and Sierra Leone:

- Infection prevention and control
- PPE supplies
- Drug supplies
- Communication
- Treatment
- Security
- Contact tracing
- Quarantine

**Remember:** All planning at the facility level must be coordinated with the local government’s plans and preparations.
Questions to Be Addressed
Who is making the decisions in case of an outbreak: the medical director or the head of infection prevention and control? Who is reporting to and coordinating with government planning bodies, local partners, practitioners, government and private health care facilities, and other institutions? What is the status of such coordination? Does everybody know what to do?

Things to Do Now
- Establish a multi-disciplinary coordination committee (or designate individuals) consisting of technical experts, program managers, administrators, and representatives of stakeholders to facilitate quick and adequate response during a crisis. All individuals should know what they are responsible for, what to do, and in what order.
- Advocate for the importance of outbreak planning to relevant decision-makers to secure necessary support and finances.
- Ensure that facility-level planning takes into consideration the planning efforts at regional and national levels, as well as other local health care facilities and entities.
- Work with the local health administration to develop criteria for mandatory closing of schools or other public places based on incoming information from facility surveillance (i.e., clusters of EVD).
- Obtain copies of EVD outbreak plans from other local or regional facilities to use as models and ensure that your plans are consistent with those of the other facilities in your area.
- Develop training plans for health care workers who will come into contact with suspected or confirmed EVD patients.
- Develop job aids for each staff category (e.g., nurses, cleaning staff, and laboratory workers) on important infection prevention and control measures. Make sure that job aids are disseminated and that staff members know how to use them.
- Work in close collaboration with relevant partners, including those providing essential services outside the health sector, such as transportation and food services. Consider development of alternatives for supplying the health care facility with power and drinking water; develop back-up transport and telecommunications plans.
- Regularly update emergency plans, especially those of large hospitals, where personnel and policies may change.

SURVEILLANCE IN THE HEALTH CARE FACILITY
Rationale
Surveillance consists of ongoing collection, interpretation, and dissemination of data to enable the development of evidence-based interventions. The objectives of surveillance may differ according to the seriousness of the disease and the possibilities for intervention. Each surveillance activity should have clear objectives.
It is important to note that the circulation of EVD among bats and monkeys precedes human outbreaks, and thus animal amplification will often occur prior to the human EVD outbreak. It is important that public health officials collaborate with wildlife health services on surveillance results to ensure early detection of animal EVD cases, as well as human EVD cases.

**Questions to Be Addressed**

What type of surveillance is considered to be necessary and feasible in the current situation and would help identify an emerging pandemic at the earliest possible stage? How would that system change once an EVD outbreak is confirmed? Is there a standard system for data collection and analysis? Who will collect and interpret data, and share results? How is the health care facility surveillance system connected with the regional or national surveillance system and with WHO?

**Things to Do Now**

- Ensure that the health care facility has the case definition for EVD. Use the standard case definition for EVD for routine surveillance, while understanding that the case definition may become more specific in an EVD outbreak. All first-line health care workers should be trained to detect cases and identify clusters of cases. Immediately report any case that fits the case definition.

- Establish hospital-wide syndromic surveillance (with initial attention to the emergency room and outpatient department). Job aids (for example, signage) should clearly indicate syndromic definitions of “suspected,” “probable,” and “confirmed” cases of EVD as described in Appendix A: Ebola Virus Disease Case Definitions.

- Community-based surveillance should be ongoing in the community. Maintain communication with designated community resource persons (community health care workers, Red Cross volunteers, religious leaders, midwives, traditional healers, village chiefs, etc.) so your facility is aware of any suspicion or rumors about EVD in the community.

- Develop or ensure a system to report routine and unusual surveillance findings to relevant local health authorities.

- Ensure that sample collection materials and appropriate PPE are available. Make sure adequate boxes and receptacles are available for the proper triple packaging of specimens collected from suspected or confirmed EVD patients.

- Be aware of and apply the guidelines for the collection, packaging, storage, and shipment of specimens collected from suspected or confirmed EVD patients.

- Collaborate with the national reference laboratory, and make sure the exact address for the national reference laboratory is available to facility staff. Be aware of the shipping routes for specimens. The national reference laboratory is responsible for forwarding specimens to international laboratories that are WHO collaborating centers for EVD. Establish a system for monitoring for nosocomial transmission of EVD.

- Ensure that a system for reporting to central/national surveillance authorities is in place and is understood by relevant committee members.
EVD Outbreak Surveillance and Management of Information
The need for surveillance will change during the course of an EVD outbreak. Rigorous systems are needed to identify potential outbreaks early, in order to initiate a timely response. Once an outbreak is confirmed, surveillance needs will diminish and be replaced by the need for the minimal information required to manage the outbreak. Once the brunt of the emergency is past, the need for surveillance may increase again with the need to monitor for possible re-emergence or new outbreaks.

During an EVD outbreak, many services will be overwhelmed. Data collection should be maintained only if it serves a clear objective. One reason could be to support planning of the use of scarce resources, such as health care facilities. It may be possible to adjust data collection to characteristics of the virus and/or the outbreak and make it less labor-intensive. For example: laboratory confirmation may not be needed for cases once the existence of the outbreak is confirmed, since clinical symptoms are sufficient to plan for health care demand.

COMMUNICATION
Rationale
Communication should focus on the health team, as well as communication with the community and public. Communication strategies are an important component in managing any infectious disease outbreak, and are essential in the event of an EVD outbreak. Anxiety and fear often surround EVD, given the high mortality rate and limited treatment options, so clear communication and support are important for EVD patients and their families. Accurate and timely information at all levels is critical in order to minimize unwanted and unforeseen social disruption and economic consequences, and to maximize the positive outcome of the response. The ability to respond quickly and effectively can be greatly influenced by the extent to which the people who will be needed during the response, as well as the general public, are informed before an emergency arises. Leaders have a great impact on how a community—whether a medical community or a geographical community—responds and recovers from a crisis. In a serious crisis, all affected people take in, process, and act on information in different ways. The clarity, timeliness, and sincerity of the messages are important.

According to WHO guidelines on outbreak communication, the five critical best practices for communication are:\(^2\)

1. Build trust
2. Announce early
3. Be transparent
4. Respect public concerns
5. Plan in advance

It is imperative to consider these five best practices when outlining a communications plan.

Questions to Be Addressed
Is there a clear operational plan for communication that addresses all levels, from media debriefings, where applicable, to informing relatives about the patient’s status? What is the chain of responsibility, and who are the designated spokespersons? What kind of community organizations can help provide information and support at each level, and how can they be prepared in advance?

Things to Do Now
■ Develop a communication plan that addresses:
  ■ Various target groups (e.g., press, general public, health care workers, government authorities, specific risk groups)
  ■ Key messages to be communicated
  ■ Possible materials that are needed (websites, leaflets, information in different languages, etc.)
  ■ Distribution mechanisms to reach the target groups
■ Identify a communications/public information officer who:
  ■ Develops appropriate literature and signage for posting within the facility
  ■ Develops targeted public health risk communication messages for use in the event of a suspected or confirmed EVD case in your facility
  ■ Develops internal messages for suspected and confirmed EVD cases, and internal and external messages for confirmed EVD cases
  ■ Contacts local identified EVD subject matter experts
  ■ Requests EVD-appropriate literature for dissemination to health care personnel, patients, and contacts
  ■ Prepares written and verbal messages ahead of time that have been approved, vetted, rehearsed, and tested
  ■ Works with internal department heads and clinicians to prepare and vet internal communications to keep health care personnel and volunteers informed
■ Train subject matter experts to become spokespersons and practice sound media relations techniques
■ Follow the list below when developing a statement:
  ■ Express empathy (acknowledge fears and shared misery)
  ■ Clarify facts including who, what (action and information), where, when, why, and how
  ■ What we don’t know
  ■ Process to get answers
  ■ Statement of commitment
  ■ Referrals: for more information and next scheduled steps
Ensure that your message is honest in tone. When delivering a message, say “we,” not “I,” avoid jargon, avoid humor, avoid judgmental phrases, and avoid extreme speculation.

Keep transparent and open communication with facility staff, the community, and the health administration, and provide regular updates and briefings. These will help to contain fear and hysteria caused by the EVD outbreak. The briefing may be a weekly or monthly meeting before the outbreak, but briefings may be needed daily during the outbreak.

Be the first source for information. Operationalize this by: instituting a weekly meeting; researching information before you communicate it; and calling a meeting or issuing a statement at the earliest moment possible.

Nominate an outbreak spokesperson(s) to represent the health care facility before the community and media in case of an outbreak. A good spokesperson should be respected by the community with whom s/he is communicating, be sincere and trusted, have a good relationship with the media and local officials, and be clear, accurate, and timely.

Ensure that during an EVD outbreak, the materials and messages are regularly reviewed and updated with new (relevant) knowledge that may become available. Review materials regularly to be sure that the facts are correct, and all sources of information are providing the same facts. Use job aids. Be consistent in all messages.

Develop a written procedure and agreement on clearance of messages so that the procedures:
- Take less than 15 minutes to accomplish
- Ensure that accurate information is released
- Have been tested in drills/exercises
- Allow for delegation of authority to speed the response

Identify a system to answer questions and requests from patients’ relatives and to inform them about the visiting policy. Plan to establish telephone hotlines, and identify and train hotline staff. Signage should be created to educate about the visiting policy.

If use of telephones is not feasible, train receptionists, guards/gatekeepers, and local religious leaders to be accessible to patients’ relatives and other key stakeholders.

Avoid communications that prevent operational success:
- Mixed messages from multiple experts
- Information released late—the speed at which information is released may indicate to the public your preparedness
- Paternalistic attitudes—Never tell people “don’t worry”
- Messages that fail to counter myths and rumors in time
- Messages reflecting public power struggles and spreading confusion
**Tips for Effective Communication in an Outbreak Situation**

- Express empathy; acknowledge fears and shared misery.
- Clarify facts: Who, what (action), where, when, why, how.
- Admit what is not known.
- Explain how and where people can get answers to their questions.
- Make statements of commitment.
- Explain to listeners how to get more information and when the next update is scheduled.
- Make sure that the message is honest and open; says "we," not "I"; avoids jargon and humor; avoids judgmental phrases; avoids extreme speculation.

**CASE IDENTIFICATION, MANAGEMENT, AND TREATMENT**

**Things to Do Now**

- Implement a hospital/clinic-wide routine and screening process for identification of new cases. (See Appendix A: Ebola Virus Disease Case Definitions.)

- Identify a specific location for triage of patients with possible EVD and establish designated isolation rooms or a designated isolation ward. This plan should include use of signage to direct and instruct patients with possible EVD on the triage process, and staff should be aware of the designated location. These patients under investigation for EVD should be separated from other patients seeking medical attention.

- Ensure the development or rapid adaptation and implementation of clinical management guidelines for patients with suspected and confirmed EVD. These guidelines should address at least the following aspects:
  - Where patients should be managed—whether in the community (school, gymnasium, village center) or hospital setting—and admission criteria
  - Measures for infection prevention and control (See Chapter 2: Infection Prevention and Control Practices for Preventing Ebola Virus Disease in Health Care Facilities and Chapter 3: Screening and Isolation for Ebola Virus Disease at the Health Facility.)
  - Appropriate specimen collection and the transport of specimens to designated national reference laboratories
  - Standard treatment protocols (supportive and palliative treatments) and plans to provide safe palliative care, adequate respiratory support, ventilator management, safe administration of medication, sharps procedures, and reinforcement of proper biohazard containment and disposal precautions

- Develop a method for tracking the admission and discharge of patients with EVD. This method should be tested with non-EVD patients. Discharged EVD patients must be provided with a medical certificate stating that they are not a risk to their family or neighbors upon release from the hospital. Collaboration with public health authorities should occur.

---

INFECTION PREVENTION AND CONTROL IN HEALTH CARE SETTINGS

Things to Do Now

- Refine existing infection prevention and control guidelines and procedures for use at all levels of health care facilities, including health centers, clinical laboratories, community health clinics, general practice facilities, hospitals, and mortuaries.

- If resources are limited, the following infection prevention and control interventions should be considered priorities:
  - Ensure that handwashing facilities and supplies are present in all patient care areas for health care workers and patients.
  - Ensure that basic infection prevention and control signage, as well as handwashing/handrub supplies, is in place in all patient/visitor waiting areas.
  - Ensure that PPE is available for all staff caring for suspected or confirmed cases of EVD.
  - Adapt infection prevention and control guidelines for use in alternative health care facilities (e.g., schools, community buildings) utilized as part of outbreak emergency measures.
  - Check availability and currency of laboratory biosafety guidelines. Ensure that laboratory staff are educated on these guidelines.
  - Use the protocols for specimen collection and transport of specimens that have been developed by WHO. All specimens should be processed at the designated national reference laboratory.
  - Consider the infection prevention and control training needs of health care workers, laboratory personnel, volunteers, and others who may be working outside their area of competence and training. Ensure that health care workers have the capacity and knowledge to implement barrier nursing techniques.
  - Prepare facilities, as necessary, to ensure that appropriate treatment areas are identified and ready for use, as specified in the guidelines.
  - Ensure availability of equipment needed to implement recommended infection prevention and control and biosafety measures (i.e., PPE).
  - Ensure that contact tracing, confinement, and quarantine, if proposed, can be implemented both legally and practically. Define criteria for implementation and revocation:
    - Active case-finding, including a review of consultation records and interviews with health care workers, using the case definition must be undertaken.
    - Contact tracing for all contacts of each defined EVD case should occur and contacts should be monitored for a time period of 21 days since their last exposure to EVD.
    - Consider designation of places where persons can be held in quarantine.
  - Forced isolation of EVD patients who refuse hospitalization or home treatment must be used only as a last resort and should be coordinated with public health authorities to ensure the appropriateness of instituting these measures.
Ensure medical care, food supply, social support, and psychological assistance for these people. Ensure adequate transport of persons to these places, and from there to hospitals or mortuaries.

MAINTAINING ESSENTIAL HEALTH SERVICES

Things to Do Now

For Health Care Personnel

- Ensure that all health care personnel:
  - Meet all training requirements for PPE and infection prevention and control
  - Are able to use PPE correctly
  - Have proper medical clearance
  - Have been properly fit-tested on their respirator for use in aerosol-generating procedures or more broadly as desired
  - Are trained on management and exposure precautions for suspected or confirmed EVD cases

- Identify key trained staff to be the first to respond.

- Ensure that standard infection prevention and control procedures are robust in the facility. Retrain any health care workers on these concepts if there are gaps in knowledge. Post copies of standard infection prevention and control precautions in the facility.

- Develop a system for screening staff as they report to duty and develop a policy for when they can or cannot work.

- Develop a system that delineates which personnel will be pulled from which (non-essential) departments to cover shortages of staff in more critical areas such as emergency rooms, isolation wards, critical care areas, and obstetrics areas.

- Involve personnel in planning for on-site accommodations for critical personnel who may need to be on duty or on call for long periods.

- Involve personnel, local neighborhoods, and social organizations in identifying accommodations and support for personnel who have child or elder care responsibilities. Volunteers or village health committees may be willing to provide help at a minimal or no fee.

- Identify, brief regularly, and train individuals to be mobilized to replace current key staff in case of illness due to EVD.

- Develop “phone trees” and alternative contact routes for contacting administration and staff. Individuals (volunteers) who have cell phones may be willing to provide contact services to staff and administration. Local taxi or phone companies may be willing to volunteer services to communicate with critical staff.

- Determine sources from which additional health care workers could be recruited, for instance, among those who have retired or who have changed careers, community volunteers or
organizations, or skilled tradespeople. Coordinate with local professional associations (medical, midwifery, nursing) and pre-service training institutions.

- Develop a set of health care roles for which volunteers may be suitable, and discuss these roles with professional organizations and associations. Volunteers may be able to provide some initial triaging and can facilitate communication with family and visitors concerning basic hygiene and visiting policies. They can also provide infection prevention and control instruction and support to staff and families, and comfort measures to hospitalized patients to minimize traffic from families and visitors.

- Identify local organizations (local communities, professional associations, Red Cross/Crescent associations, churches, mosques, or other religious communities, or nongovernmental organizations) that may be able to provide volunteers, and define a protocol for deciding on their suitability for designated roles outside their area of training and competence; develop relationships and plans now.

- Develop protocols for accepting and training volunteers for defined health care roles.

- Ensure that liability, insurance, and temporary licensing issues for retired health care workers and volunteers are addressed. Coordinate with professional associations and local and district health offices. Consult with a legal representative on the coordination committee. (See “Coordination” above.)

- Consider the provision of psychosocial support targeted at health care workers.

- Meet with local community leaders and social or faith-based organizations and determine their willingness and ability to provide counsel to staff and citizens during an EVD outbreak.

For Health Care Facilities

- Protect health care staff by ensuring that all procedures for infection prevention and control in the facility are in place and adhered to.

- Ensure that basic infection prevention and control materials, including PPE and hand hygiene supplies, are available in the facility.

- Identify areas of the health care facility where patients should ideally be treated during an EVD outbreak situation, and assess the availability of these areas (including emergency and intensive care unit capacity). Designated isolation wards should be used. Suspected or confirmed EVD cases should be placed in a single isolation room with an adjoining dedicated toilet or latrine, showers, sink equipped with running water, soap, and single-use towels, alcohol-based handrub dispensers, stocks of PPE and medicines, good ventilation, screened windows, closed doors, and restricted access. If isolation rooms are unavailable, these patients can be cohorted in specific confined areas, with the facility rigorously keeping suspected and confirmed cases separate. There should be at least one meter distance between patient beds.

- Develop a strategy for triage of potential EVD patients (see Appendix A: Ebola Virus Disease Case Definitions).
Identify potential alternative overflow facilities for expansion of medical care. Possible sites could include schools, gymnasiums, nursing homes, daycare centers, or tents on the hospital grounds or at other sites.

Develop triage criteria to manage overflow.

Develop a plan for setting up and staffing overflow facilities.

Develop a policy on when to stop taking new patients. Establish a maximum number of patients who can be cared for in various areas of the facility. Establish a minimum number of staff who must be present to care for a maximum surge of patients.

Develop a mechanism for reviewing services and their utilization, and prioritizing the use of facilities, staff, and resources as the outbreak evolves.

Identify critical health services that should be maintained even in the face of an EVD outbreak (e.g., trauma and emergency care, childbirth, severe illness, etc.), and those that could be closed if it became necessary (e.g., optional and non-emergent medical procedures, wellness clinics, etc.).

Address how essential medical services will be maintained for persons with chronic medical problems served by the facility (e.g., patients on long-term antiretroviral therapy for HIV/AIDS or TB, dialysis).

Coordinate clinical care and health service plans with bordering local authorities to avoid migration to centers where enhanced services are perceived to exist.

Review areas of hospital operations where the demand may increase significantly but continuing operation is critical, such as engineering, sewerage, electricity, water and natural gas supply, air conditioning/air flow, and security. Determine which areas are critical in the facility, and how to keep them operational.

For Health Care Supplies

Evaluate the existing system for tracking available medical supplies in the health care facility to determine whether it can detect rapid consumption, including items that provide personal protection (e.g., gloves, masks). Improve the system as needed to respond to growing demands for resources during an EVD outbreak.

Conduct a detailed inventory of available supply of PPE suitable for standard, contact, and droplet precautions. Ensure an adequate supply of:

- Impermeable gowns (fluid-resistant or impermeable)
- Gloves
- Shoe covers, boots, and booties
- Appropriate combination of the following:
  - Eye protection (face shield or goggles)
  - Facemasks (goggles or face shield must be worn with facemasks)
- N-95 respirators (for use during aerosol-generating procedures)
- Other infection prevention and control supplies (e.g., hand hygiene supplies)
- Build, manage, and maintain, in proper storage conditions, a minimum supply of PPE, disinfectants, and other materials needed to adhere to infection prevention and control procedures. Consider stockpiling enough consumable resources, such as masks and gloves.
- Assess the need and explore the options for stockpiling additional medical supplies, and identify their sources.
- Determine the level of care that might be delivered in alternative health care facilities, and develop a contingency plan for providing these alternative facilities with the equipment and supplies adequate for the level of care that will be provided.
- Develop a strategy for the distribution of stockpiled supplies and medication.
- Consider obtaining two-way radios to ensure communication in case phone lines are damaged or to augment communication by telephone.
- Establish a contingency plan for situations in which primary sources of basic supplies become limited. If you cannot ensure access to the national stockpile, consider development of an appropriate stockpile in the facility, and at least an 8-week supply of potable water.
- Stockpile fuel for health care facility transport and generators.

Excess Mortality
- Ensure that staff understand that any unprotected handling of bodies of EVD-infected patients constitutes an exposure risk. Health care workers, family members, and burial teams must wear PPE and observe Standard Precautions when handling an EVD victim. Burials should occur per WHO guidelines.
- Determine the maximum capacity for the disposal of corpses, using culturally appropriate methods.
- Identify emergency capacity for storage of corpses before burial, where applicable.
- Ensure development and implementation of protocols for the safe handling of corpses, respecting cultural and religious beliefs. Burial practices should follow WHO guidelines.
- Work with community leaders to ensure their support and assistance in a “worst case scenario” in which local practice comes into conflict with necessary public safeguards.

INFORMATION DISSEMINATION AND COMMUNICATION IN THE COMMUNITY

Things to Do Now
- Begin working with community leaders (traditional, religious, and civic) early to ensure that they are well-informed on the critical issues and prepared to help out as necessary.
- Strengthen general knowledge on EVD and on infection prevention and control practices in order to raise awareness in the community.
Promote infection prevention and control measures in all places where people are likely to be in close proximity to each other (i.e., health care waiting rooms, health centers, schools, churches, etc.).

Ensure that personal advice about reducing the risk of transmission is easily available to the public.

Develop health messages for families, visitors, and the community, and ensure that health information is distributed in appropriate languages used in the community; if needed, develop a program to provide information to the community members in their language.

Planning and preparedness for an outbreak of Ebola Virus Disease is a joint responsibility of all public health stakeholders in any country. The process should involve the highest-level political leadership, several ministries, pre-service education systems, and health care providers at all levels of the health system.
APPENDIX A: EBOLA VIRUS DISEASE CASE DEFINITIONS

Surveillance is the ongoing, systematic collection, analysis, and interpretation of health data. It includes the timely dissemination of the resulting information to those who need it for actions. The World Health Organization recommends that every country have an Integrated Disease Surveillance and Response System in place to improve public health response globally.

Viral hemorrhagic fevers including EVD are notifiable conditions under the International Health Regulations.

Given below are case definitions for various levels of health care facilities, from the community to health care institutions. These definitions are based on WHO’s recommendations issued on August 9, 2014, in response to Ebola outbreaks in West Africa.

Ebola Virus Disease definitions are based on the purpose of surveillance, levels where surveillance is carried out, and clinical stages of the disease.

ROUTINE SURVEILLANCE

Suspected Ebola or Marburg cases: Illness with onset of fever and no response to treatment for usual causes of fever in the area and at least one of the following signs:

- Bloody diarrhea
- Bleeding from gums
- Bleeding into skin
- Bleeding into eyes
- Blood in the urine

Confirmed Ebola or Marburg cases: A suspected case with laboratory confirmation (positive IgM antibody, positive PCR or viral isolation).

COMMUNITY-BASED SURVEILLANCE

This definition of “alert cases” for Ebola or Marburg Virus Disease has been developed for use by the community or community-based volunteers. It may be used for community-based surveillance during the pre-outbreak phase and during the outbreak.

Alert case: Illness with onset of fever and no response to treatment of usual causes of fever in the area, OR at least one of the following signs: bleeding, bloody diarrhea, bleeding into urine, OR any sudden death.

---

**During an Ebola Virus Disease or Marburg Outbreak**

During an outbreak, the case definitions are likely to be modified to adapt to new clinical presentations or a different mode of transmission related to the local event.

**Definitions Used by Mobile Teams or Health Stations and Health Centers**

**Suspected case:** Any person, alive or dead, suffering or having suffered from a sudden onset of high fever and having had contact with:

- A suspected, probable, or confirmed case of Ebola or Marburg
- A dead or sick animal (for Ebola)
- A mine (for Marburg)

**OR:** any person with sudden onset of high fever and at least three of the following symptoms:

- Headaches
- Loss of appetite
- Lethargy
- Aching muscles or joints
- Breathing difficulties
- Vomiting
- Diarrhea
- Stomach pain
- Difficulty in swallowing
- Hiccups

**OR:** Any person with inexplicable bleeding

**OR:** Any sudden, inexplicable death

**Case Definition for Exclusive Use by Hospitals and Surveillance Teams**

*A probable case of Ebola or Marburg* for exclusive use by hospitals and surveillance team is defined as any suspected case evaluated by a clinician.

**OR:** Any deceased suspected case (where it has not been possible to collect specimens for laboratory confirmation) who has an epidemiological link with a confirmed case.

**Note:** If laboratory specimens are collected in due time during the illness, the preceding categories are reclassified as “laboratory-confirmed” case and “non-case.”
**Laboratory-confirmed case:** Any suspected or probable cases with a positive laboratory result. A laboratory-confirmed case must test positive for the virus antigen, either by detection of virus RNA by reverse transcriptase-polymerase chain reaction (RT-PCR) or by detection of IgM antibodies directed against Marburg or Ebola.

**Non-case:** Any suspected or probable case with a negative laboratory result. “Non-case” showed no specific antibodies, RNA, or specific detectable antigens.

**STANDARD DEFINITIONS FOR CONTACT PERSONS OF EBOLA OR MARBURG CASES**

**Important:** During an outbreak, the contact definitions are likely to be modified to be adapted to newly reported infection risk factors related to the local event.

**Ebola or Marburg Case Contacts**

Any person having been exposed to a suspected, probable, or confirmed case of Ebola or Marburg 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 during the illness
- Has had direct physical contact with the dead case at the funeral
- Has touched the patient’s blood or body fluids during the illness
- Has touched the patient’s clothes or linens
- Has been breastfed by the patient

*Provided that this exposure had taken place less than 21 days before the identification as a contact by surveillance teams.

**Contact with Dead or Sick Animals**

Any person having been exposed to a sick or dead animal in at least one of the following ways*:

- Has had direct physical contact with the animal
- Has had direct contact with the animal’s blood or body fluids
- Has carved up the animal
- Has eaten raw bush meat

*Provided that this exposure has taken place less than 21 days before the identification as a contact by surveillance teams.
**Laboratory Contacts**

Any person having been exposed to biological materials in a laboratory in at least one of the following ways*:

- Has had direct contact with specimens collected from suspected Ebola or Marburg patients or animal cases

*Provided that this exposure has taken place less than 21 days before identification as a contact by surveillance teams.

*Other infection risk factors include:* contact with a hospital where Ebola or Marburg cases are being treated, or vaccination in the 21 days preceding the onset of symptoms.

The contact person should be followed for 21 days after exposure.

During the outbreak, the case definitions may be further modified based on local events.
**APPENDIX B: COLLECTING AND SHIPPING BLOOD SAMPLES**

**HOW TO SAFELY COLLECT BLOOD SAMPLES FROM PERSONS SUSPECTED TO BE INFECTED WITH HIGHLY InfectIOUS BLOOD-BORNE PATHOGENS LIKE EBOLA**

How to safely collect blood samples from persons suspected to be infected with highly infectious blood-borne pathogens (e.g. Ebola)

**Step 1: Before entering patient room, assemble all equipment (1st part)**

**Step 1a : Assemble equipment for collecting blood:**
- Laboratory sample tubes for blood collection (sterile glass or plastic tubes with rubber caps, vacuum-extraction blood tubes, or glass tubes with screw caps). EDTA tubes are preferred.
- Blood sampling systems (Needle and syringe system, vacuum extraction system with holder, winged butterfly system [vacuum extraction] or winged butterfly system)
- Tourniquet (single-use)
- Skin antiseptic solution: 70% isopropyl alcohol
- Gauze pads
- Adhesive bandage
- Tray for assembling blood collection tools
- Rack for holding blood tubes
- Durable marker for writing on laboratory sample

**Step 1b : Assemble equipment for preventing infection:**

**For Hand Hygiene:** use Alcohol-based handrub OR
- Clean, running water
- Soap
- Disposable (paper) towel

**Personal Protective Equipment (PPE):**
- Several pairs of disposable gloves (non-sterile, ambidextrous, single layer)
- One pair of gloves for blood collection
- One additional pair as a replacement if they become damaged or contaminate

- Footwear: if in hospital: wear shoes with puncture-resistant soles or rubber boots;
  If in rural setting or patient home: wear rubber boots or shoes with puncture-resistant soles with disposable overshoes secured around the shoes to prevent direct contact with ground and infected bodily fluid spills

**For waste management materials:**
- Leak-proof and puncture resistant sharps container
- Two leak-proof infectious waste bags: one for disposable material (destruction) and one for reusable materials (disinfection)

**Note:** Wear double gloves if the quality of gloves is not realizable and the risk of exposure to blood is higher.

---

Step 1c: Fill out patient documentation:
- Label blood collection tubes with date of collection, patient name, and his/her identifier number.
- Do NOT forget to fill out necessary laboratory form and epidemiological questionnaire.

- If several patients have to be sampled in the same place or during the same investigation, create a line list. One patient per line. The list should include: patient name, identifier number, sex, age (birthdate), clinical information: symptoms, date of onset, date specimen was collected, type of sample taken.

Step 1d: Assemble materials for packaging of samples:
- Plastic leak-proof packaging container
- Disposable (paper) towels
- Cooler or cold box, if sample requires refrigeration

For the shipment of samples to the National Central Laboratory follow Sample Shipment packaging requirements (see document "How to safely ship Emerging and Dangerous Pathogen samples")

Important: A designated Assistant wearing gloves should be available to help you. This person should stand outside the patient room. He/She will help you prepare the sample for transport, assist you with putting on the personal protective equipment, or provide any additional equipment you may need.
Step 2: Put on all personal protective equipment (PPE)

DO NOT ENTER THE PATIENT AREA IF YOU DO NOT HAVE ALL PROTECTIVE GEAR ON

**Step 2a: Perform hand hygiene.** Duration of the entire procedure: 40-60 sec.

- Wet hands with water and enough soap to cover all hand surfaces.
- Rub hands, palm to palm.
- Rotational rubbing of left thumb clasped in right palm and vice versa.
- Back of fingers to opposing palms with fingers interlocked.
- Palm to palm with fingers interlocked.
- Right palm over left dorsum with interlaced fingers and vice versa.
- Rinse hands with water.
- Dry hands thoroughly with single use towel.

**Step 2b: Put on a gown.**

**Step 2c: Put on face protection:**

- Put on a face shield
- Put on a medical mask and eye protection (e.g. eye visor/goggles)

Quick tips: If the patient has respiratory symptoms, wear a medical mask underneath the face shield.

**Step 2d: Put on gloves (over gown cuffs).**

**Note:** Wear double gloves if the quality of gloves is not realizable and the risk of exposure to blood is higher.
Step 3: Collect blood sample from patient (1st part)

Step 3a: Prepare room.
- Put infectious waste bags and leak-proof and puncture resistant sharps container into patient room and make sure they are ready for use.
- Place all blood collection equipment in a place that is easy to access.

Step 3b: Identify and prepare the patient.
- Introduce yourself to the patient and explain what you will do with the blood sample and why.
- Make sure that this is the correct patient from whom you wish to take the blood sample.

Step 3c: Select the site, preferably at the bend of the elbow.
- Palpate the area; locate a vein of good size that is visible, straight and clear.
- The vein should be visible without applying a tourniquet.

Step 3d: Apply a tourniquet around the arm.
- Tie approximately 4-5 finger widths above the selected site.

Step 3e: Ask the patient to form a fist so that the veins are more prominent.

Step 3f: Disinfect the area where you will put the needle.
- Use 70% isopropyl alcohol.
- Wait 30 seconds for the alcohol to dry.
- DO NOT touch the site once disinfected.

Step 3g: When using vacuum extraction system with holder, insert the blood collector tube into the holder.
- Avoid pushing the collector tube past the recessed line on the needle holder or you may release the vacuum.

Step 3h: Anchor the vein by holding the patient’s arm and placing a thumb BELOW the place where you want to place the needle.
- DO NOT touch the disinfected site.
- DO NOT place a finger over the vein to guide the needle.

Step 3i: Perform the blood draw.
- Enter the vein swiftly at a 30° angle.
**Step 3: Collect blood sample from patient (last part)**

**Step 3a:** When blood starts to flow, ask patient to open his/her hand.

**Step 3b:** Once sufficient blood has been collected (minimum 5ml), release the tourniquet BEFORE withdrawing the needle.

**Step 3c:** Withdraw the needle gently.
- Give the patient a clean gauze or dry cotton wool ball to press gently on the site.
- Ask the patient NOT to bend the arm.

**Step 3m:** Remove blood collector tube from holder and put into rack.

**Step 3n:** Put needle into leak-proof and puncture resistant sharps container.

- If the sharps container DOES NOT HAVE a needle remover:
  - Put the needle and holder into a sharps container.
  - Do not remove the needle from the holder.
  - Do not reuse the needle.

- If the sharps container HAS a needle remover:
  - Remove the needle following instructions on the sharps container.
  - Put the holder into the infectious waste bag for disinfection.

**Step 3o:** Stop the bleeding and clean the skin.
- Do not leave patient until bleeding has stopped.
- Put an adhesive bandage on the site, if necessary.

**Step 3p:** Put items that drip blood or have body fluids on them into the infectious waste bag for destruction.

**Quick Tips:**
- The blood holder tray and rack will need to be disinfected after use.
- A minimum of 5ml of blood should be collected for each patient.
Step 4: Prepare blood sample for transport

Step 4a: Take the blood tube from the tray and wipe the blood tube with a disposable paper towel.

Step 4b: Place all items that came into contact with blood into the infectious waste bag for destruction.

Step 4c: Protect the sample from breaking during transport by wrapping the tube of blood in a paper towel.

Step 4d: Ask the designated assistant to approach the patient room, without entering.
- This person should have gloves on.
- This person should come close to you holding the open plastic leak-proof packaging container.
- This person should not enter the patient room.

Step 4e: The person who has collected the blood sample should put the wrapped tube of blood into the plastic leak-proof packaging container.
- Be careful not to touch outside of leak-proof plastic tube with gloves.

Step 4f: Have the designated, gloved assistant tightly close the top of the plastic leak-proof packaging container.

Note: The sample is now ready for shipment to the National Central Laboratory. Follow Sample Shipment packaging requirements for infectious substances.

Store samples at room temperature for up to 24 hours. If you need to store the sample for one week before shipping, store between 0-5°C Celsius.
If you need to store the sample for more than one week before shipping, store at -20°C Celsius (or better at -70°C Celsius if available). Avoid freeze-thaw cycles.

World Health Organization
Step 5a: Remove the gloves.
1. Grasp the outer edge of the 1st glove and peel it off.
2. Hold the 1st glove in the gloved hand and drag a bare finger under the 2nd glove.
3. Remove 2nd glove from the inside, creating a "bag" for both gloves and throw it in waste bag for disposal.

Step 5b: Remove the gown
1. Untie the gown
2. Remove the gown from behind starting at the neck and shoulders.
3. Dispose of the gown in the infectious waste bag for destruction.

Step 5c: Perform Hand hygiene. Duration of the entire procedure: 40-60 sec.

Step 5d: Take off face protection

When wearing a face shield:
- Remove face shield from behind.
- If it is a reusable face shield, place it in an infectious waste bag for disinfection.
- If it is a disposable face shield, place it in an infectious waste bag for destruction.
- Optional: If wearing a medical mask, remove the medical mask from behind, starting with the bottom strap, and place it in an infectious waste bag for destruction.

When wearing goggles and a mask:
- Remove goggles from behind.
- If reusable goggles, place it in an infectious waste bag for disinfection.
- If disposable goggles, place it in an infectious waste bag for destruction.
- Remove the medical mask from behind, starting with the bottom strap, and place it in an infectious waste bag for destruction.

Step 5e: Perform Hand hygiene. Duration of the entire procedure: 40-60 sec.

Quick Tips:
- Place all reusable equipment into a separate infectious waste bag for disinfection.

When collecting blood samples from multiple patients:
- Change gloves between each patient.
- Wash hands between each patient.
- DO NOT WASH GLOVED HANDS.
- DO NOT REUSE GLOVES.

Note: If double gloving, remove both outer and inner gloves following the same steps.
### Step 1: Before handling the sample, prepare all shipping equipment

#### Step 1a: Manage logistics
- Identify the name and telephone number and/or e-mail of 1) responsible person/emergency contact at the National Reference Laboratory (this person should be available 24 hours a day until shipment arrives), and 2) lead epidemiologist/medical officer at the Ministry of Health
- Notify National Reference Laboratory and the lead epidemiologist/medical officer that the sample shipment will be coming
- Verify schedule/timetable for the company transporting the sample

#### Step 1b: Assemble equipment for packing samples

**Packing**
- Absorbent material in sufficient quantity to absorb the entire liquid content, should the primary container(s) leak
- Leak-proof secondary container
- Rigid shipping box
- Inner lining
- Cushioning material, e.g. bubble wrap
- Tape to seal the outer package (if required)

**Shipping / Transporting**
- Receiver’s name, address and telephone number
- Epidemiological questionnaire or line-list which includes patient name, sex, age (birthdate), clinical information, symptoms, date of onset, date specimen collected, type of sample
- Laboratory form or letter describing the main epidemiological and clinical findings and the lab tests that are required
- Waterproof marker

If refrigeration of the samples is necessary
- Styrofoam container
- Frozen ice pads

### Quick Tips for Category A shipments (infectious substances that can cause permanent disability, life-threatening or fatal disease when exposed to healthy people or animals)
- Ensure the primary and secondary containers are leak-proof
- Blood collection tubes in a sealed plastic bag or a screw-capped rigid tube can constitute a leak-proof primary container
- Do not place any sharps in your package: no needles, no cutters, no blades
- Shipping packages can be reused; but the packaging needs to be appropriately disinfected
- The minimal dimensions to ship a Category A package is 10cm x 10cm x 10cm
- Remember that training to ship Category A samples is a legal requirement and must be renewed every 2 years

---

### Step 2: Prepare the sample

- **If the sample is in a plastic leak-proof primary container**: proceed to Step 3.
- **If sample is not in a plastic leak-proof primary container**: follow steps 2a – 2h.

#### Step 2a: Put on a gown, face protection and gloves (over cuffs)
- See WHO document "How to safely collect blood samples from persons suspected to be infected with highly infectious blood-borne pathogens”

#### Step 2b: Protect the sample from breaking during transport by wrapping the tube of blood in a paper towel or cushioning material.
- Do not wipe sample collection tubes with disinfectant. Use disposable paper towel only.

#### Step 2c: Ask a designated assistant to approach you with the unscrewed plastic leak-proof primary packaging container
- This person should have gloves on.

#### Step 2d: Place the wrapped tube of blood into the plastic leak-proof primary packaging container
- Be careful not to touch the outside of the plastic leak-proof primary packaging container tube with contaminated gloves

#### Step 2e: Have the designated, gloved assistant tightly close the plastic leak-proof primary packaging container
- Disinfect with a disinfectant the outer side of the plastic leak-proof packaging container

#### Step 2f: Both persons should remove their personal protective equipment
- See WHO document "How to safely collect blood samples from persons suspected to be infected with highly infectious blood-borne pathogens”

#### Step 2g: Put contaminated items into an infectious waste bag for destruction

#### Step 2h: Both persons should perform hand hygiene
- Duration of the entire procedure: 40-60 sec
Step 3: Package the sample

<table>
<thead>
<tr>
<th>Step 3a: Prepare the rigid shipping box by inserting the inner lining into it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 3b: Open the secondary leak-proof container</td>
</tr>
<tr>
<td>✓ Choose the size of the container to match the number of samples being shipped</td>
</tr>
<tr>
<td>Step 3c: Insert the absorbent material</td>
</tr>
<tr>
<td>✓ There should be enough material to absorb all contents in primary container</td>
</tr>
</tbody>
</table>

| Step 3d: Wrap the primary container with cushioning material |
| ✓ If packaging more than one sample, wrap each primary container individually with the bubble wrap to prevent breakage |
| Step 3e: Place the primary container(s) into the secondary container |
| Step 3f: Close the secondary container |

How to safely ship blood samples from suspected Ebola cases within a country by road, rail and sea
Step 3: Package the sample

| Step 3g: If refrigeration is not necessary, place the secondary container into the lined rigid shipping box and proceed to step 3j. |
| Step 3h: Place the secondary leak-proof container into a styrofoam container and surround with ice packs |
| Step 3i: Place styrofoam container into the rigid shipping box |

If refrigeration is necessary

| Step 3j: Put laboratory form / letter and epidemiological questionnaire into an envelope |
| Step 3k: Put laboratory form / letter and epidemiological questionnaire into the rigid shipping box |
| ✓ If no refrigeration is needed, place the laboratory form/letter and epidemiological questionnaire inside the box |
| ✓ If refrigeration is needed, place the form/letter on the outside of the styrofoam container so that moisture will not destroy the writing on the forms |

| Step 3l: Close the top of the box |
| Step 3m: Tape the box closed |

How to safely ship blood samples from suspected Ebola cases within a country by road, rail and sea
Step 4: Mark and label the box

**Step 4a: Write the name and addresses on box**
- Shipper's name and address
- Receiver's name and address

**Step 4b: Write the name and the telephone number of the contact person at the National Reference Laboratory**
- Person should be available 24 hours a day until shipment arrives

**Step 4c: Place the ‘Infectious Substance’ label on box**
- Write: "Infectious substance, affecting humans, UN2814"

**Step 4d: Verify that the orientation arrows are on the box**
- Arrows should be placed on opposite sides of box
- Arrows are required when total volume of infectious substance exceeds 50 ml per box

Step 5: Finalise the shipment

**Step 5a: Contact the transporting company to either pick-up shipment, or inform them that you will bring the shipment to them**
- Inform the transporting company if short delivery times are required due to refrigeration

**Step 5b: Contact the National Reference Laboratory to inform them that samples have been sent**

**Step 5c: Obtain shipping and tracking receipt and store in a safe location for 2 years**
- If possible, scan and email the tracking receipt to the lead epidemiologist / medical officer in charge of outbreak investigation and the responsible person in the laboratory
APPENDIX C: COMPONENTS OF CLINICAL MANAGEMENT OF EBOLA VIRUS DISEASE

Rapid screening to identify any patient who is potentially infected with Ebola, followed by triage, isolation, and prompt clinical management, is critical. Patients should be screened and triaged at the point of entry to health care with a screening tool approved in your country.

CLINICAL ASSESSMENT

Clinical assessment is a thorough clinical examination looking for the symptoms and signs listed in Table 1-1 in Chapter 1. Even though EVD is classified as a hemorrhagic fever, hemorrhage is not always present and is a late clinical feature of the disease and may be severe internal bleeding that is not visible. For this reason it is called Ebola Virus Disease (EVD).

Based on presence of signs and symptoms, Ebola Virus Disease can be divided into four stages.

Stage 1
- From Days 1–3
- General weakness and malaise
- High fever > 39°C, constant with peaks of 40–41°C

Stage 2
- From Days 4–7
- Sore throat (with white exudative patches) very common
- Headache; back, chest, side, or abdominal pain
- Conjunctivitis
- Nausea and vomiting
- Diarrhea
- Productive cough
- Proteinuria
- Low blood pressure (systolic < 100 mmHg)

Stage 3
- After 7 days
- Edema of the face and neck
- Convulsions
- Mucosal bleeding (mouth, nose, eyes)
Internal bleeding
Encephalopathy with confusion or disorientation

Stage 4
After 14 days
Coma and death

Those patients who recover may experience transient alopecia (loss of hair) or ataxia (lack of coordination of muscle movements).

Clinical assessment helps identify probable cases; however, the definitive diagnosis is made by laboratory tests.

CLINICAL MANAGEMENT OF A SUSPECTED OR CONFIRMED CASE OF EVD

At the time this document was prepared, there was no specific treatment available for EVD. Supportive management of symptoms is the only recommended management available at this time. However, experimental medications may be tested during the current outbreak.

- **Fever:** Give paracetamol tablets; avoid diclofenac, ibuprofen, or aspirin due to blood thinning effects.
- **Acute blood loss and anemia:** Transfuse whole blood to manage bleeding and shock.
- **Pain:** Provide paracetamol tablets or morphine.
- **Difficulty in breathing:** Give oxygen 5 liters/minute if Saturation of Peripheral Oxygen (SpO2) as measured by pulse oximeter is < 90%.
- **Congestive cardiac failure:** Manage respiratory or congestive heart failure following clinic guidelines.
- **Dehydration:** Replace fluids and electrolytes with oral rehydration solution (ORS). Administer IV fluids only when oral route is not possible and rehydration is needed urgently. Preventing dehydration by encouraging the patient to maintain normal water intake will help reduce the need for therapeutic fluids.
- **Nausea and vomiting:** Give tablet chlorpromazine 25–50 mg 4 times a day to manage nausea and vomiting. For children, give promethazine.
- **Heartburn:** For patients older than 10 years, give tablet omeprazole 20 mg daily and antacids. In children less than 10 years, give magnesium trisilicate 5–10 ml 3 times a day.
- **Hypoglycemia:** Monitor blood glucose and give IV D50 5 ml/kg to children and 25–50 ml of D50 to adults.
- **Confusion in cooperative patient:** Sedation; consider giving diazepam 5–15 mg daily in 3 divided doses.
- **Confusion and aggression in non-cooperative patient:** Sedation; give haloperidol 5 mg IM to adults.

- **Hypotension/shock:** Manage airway, give oxygen, give IV fluids (Ringer’s lactate or normal saline 20 ml/kg/hour in the first 2 hours and then continue based on the systolic blood pressure); consider giving vaspressors if systolic BP less than 90 mmHg, monitor-record-respond accordingly.

- **Infections:** Treat other infections as if they occur.


Treatment recommendations listed above are draft guidelines and should be adapted to local needs and conditions.

**PSYCHOLOGICAL SUPPORT FOR PATIENTS WITH EVD**

One of the key components of effective management of patients with EVD is providing psychological support. The reasons for psychological support include the following:

- Rejection and stigmatization by friends, family members, and community
- High mortality and fear of death
- Infectious nature of the disease
- Myths and misinformation surrounding the disease

Not only the patients but also their relatives and caregivers need psychological support. Health facilities should arrange for a nurse skilled in providing mental health/psychological support to the patients and others. Though it is difficult for caregivers wearing PPE to counsel patients, all efforts should be made to support the patients. Thorough assessment of mental health should be carried out on admission and should be monitored as disease progresses. Medical management of symptoms of anxiety is essential. Psychological and spiritual support for terminally ill patients and bereavement, grief, and loss experienced by family members should be addressed using the guidance given in the box on the following page.
HOW TO PROVIDE PSYCHOLOGICAL AND SPIRITUAL SUPPORT TO PATIENTS AND FAMILY MEMBERS

- Offer patients active listening, counseling, and social/emotional support.
- Listen to patients and their family members with empathy.
- Understand reactions to the losses in their life.
- Be prepared to “absorb” some reaction, for example, anger projected onto you as a health worker.
- Connect with a spiritual counselor or pastoral care as appropriate.
- Do not impose your own views. If you share religious beliefs, praying together may be helpful.
- Tell relatives that you very much appreciate their keenness in caring for the patient, but EVD is very highly infectious and you want to protect them, so they should not handle/manage patient.
- Patients and family members may want to talk about death and issues such as who will care for children in case of death.
- Help patients not to have feelings of guilt and regret. A spiritual counselor may help if one is available. Anyone entering the patient care area should strictly comply with PPE guidelines.

In case of death:
- Look for and respond to grief reactions.
- Help the family accept the death.
- Share sorrow, encourage them to talk.
- Inform family members about the arrangements for the funeral.
- Counsel family members about the risk of handling human remains and that trained teams will assist with the funeral.
- Answer any questions that relatives may have.

Follow the standard guidelines given in Palliative Care: Symptom Management and End-of-Life Care, Integrated Management of Adolescent and Adult Illnesses, World Health Organization, page 45, at: http://www.who.int/hiv/pub/imai/genericpalliativecare082004.pdf?ua=1

Psychological support is needed during hospitalization and in case of death, as well as at the time of discharge for those patients who recover.

DISCHARGING PATIENTS WHO HAVE RECOVERED FROM EVD

Providing appropriate instructions and other support at the time of discharge is essential to ensuring complete recovery as well as reducing the risk of any transmission to the patient’s family members, other relatives, and other caregivers. Given below are key points to help health care providers manage the discharge of patients who recover from EVD.

Discharging Alert Cases of EVD

Discharge of an alert case of EVD can occur if the patient has been reviewed by the clinical management team and the team has found that the patient did not meet the case definition of a suspected case as there is no history of contact with any suspected or confirmed case, OR the patient
has a conclusive diagnosis that is not EVD, or co-infection, and has responded well to the condition being treated.

A suspected or confirmed case of EVD is discharged when the patient has:

- 3 or more days without symptoms, including diarrhea, bleeding, and coughing; however, lactating women continue to secrete the virus in breast milk and men continue to secrete the virus in semen, so patients should be advised accordingly at the time of discharge; and
- Significant improvement in clinical condition; and
- Relatively improved physical condition; and
- Negative laboratory tests 48 hours after the first positive test.

The discharge package for EVD patients includes:

- Mattress (4-inch)
- Bed sheets
- Clothing, if the patient’s clothes were destroyed on admission
- Kitchen ware (saucepan, plastic cup, plastic plate, jerrican, water bucket)
- Laundry soap
- Disinfectant – Jik/bleach
- Tarpaulin
- Blanket
- Mosquito net (long-lasting insecticide-treated bed net)
- A pair of shoes
- Condoms
- Sanitary pad (for female patients)
- Food ration

It is essential to explain to a male patient being discharged that he should use condoms for at least 3 months to prevent the possibility of transmission of Ebola virus during sex.

**FOLLOW-UP PLAN FOR PATIENTS WHO RECOVERED FROM EVD**

Even though the confirmed patients are discharged based on laboratory and clinical criteria, they may take weeks to recover fully. They may also face stigmatization and/or rejection. Those patients who turn out to be negative after laboratory tests and had some other disease may also take long to recover and face some rejection. Even the routine medical care departments may be reluctant to receive them. The follow-up plan includes the following:
- Appropriate education and psychological support for family members, other relatives, and other caregivers about the patient’s condition and the fact that the patient is not infectious at the time of discharge.
- Appropriate instructions on nutritional requirements and how to meet them.
- A 3-month supply of condoms, with counseling and condom skills-building.
- Replacement feeding options for breastfeeding women until PCR tests are negative.
- A 1-month supply of vitamins.
RECOMMENDATIONS AND RELATED SPECIFICATION FOR PROCURING PPE

**Recommendation 1a:** Protection of the mucosae of eyes, nose and mouth.

**Recommendation 1**

All health workers should have the mucous membranes of their eyes, mouth and nose completely covered by PPE while providing clinical care for patients with filovirus disease in order to prevent virus exposure.

*Strong recommendation, high quality evidence for protecting mucous membranes compared to no protection.*

**Recommendation 2**

All health workers should use either a face shield or goggles while providing clinical care for patients with filovirus disease in order to prevent virus exposure.

*Strong recommendation, very low quality evidence for the comparative effectiveness of face shields and goggles for the prevention of filovirus transmission to health workers.*

**Technical description of goggles (Recommendation 2)**

- Good seal with the skin of the face
- Flexible frame to easily fit all face contours without too much pressure
- Covers the eyes and the surrounding areas and accommodates for prescription glasses
- Fog and scratch resistant
- Adjustable band to secure firmly so as not to become loose during clinical activity
- Indirect venting to reduce fogging
- May be re-usable (provided appropriate arrangements for decontamination are in place) or disposable
- Quality compliant with standards:
  - EU standard directive 86/686/EEC, EN 166/2002
  - ANSI/ISEA Z87.1-2010

---

Technical description of face shield (Recommendation 2)

- Made of clear plastic and provides good visibility to both the wearer and the patient
- Adjustable band to attach firmly around the head and fit snugly against the forehead
- Fog resistant (preferable)
- Completely covers the sides and length of the face
- May be re-usable (made of material which can be cleaned and disinfected) or disposable
- Quality compliant with standards:
  - EU standard directive 89/686/EEC, EN 166/2002
  - ANSI/ISEA Z87.1-2010

Recommendation 3
Health workers should wear a fluid-resistant medical/surgical mask with a structured design that does not collapse against the mouth (e.g., duckbill, cup shape) while caring for patients with filovirus disease in order to prevent virus exposure.

*Strong recommendation, low quality evidence when comparing medical/surgical mask with particulate respirator for transmission of filovirus infections.*

The mask should be fluid resistant when used with goggles. Fluid resistance is not required if the mask is used together with a face shield.

Technical description of fluid-resistant medical/surgical mask (Recommendation 3)

- High fluid resistance
- Good breathability
- Internal and external faces should be clearly identified
- Structured design that does not collapse against the mouth (e.g., duckbill, cup shape)
- Quality compliant with standards:
  - EN 14683 Type IIR performance
  - ASTM F2100 level 2 or level 3 or equivalent

Recommendation 4
Health workers should use a fluid-resistant particulate respirator while caring for patients with filovirus disease during procedures that generate aerosols of body fluids in order to prevent virus exposure.

*Strong recommendation, moderate quality evidence when evidence on aerosol-generating procedures for other pathogens is also considered.*
Not all N95 particulate respirators are necessarily fluid resistant; only N95 respirators labelled as “surgical N95 respirator” are tested for fluid resistance.

The particulate respirator should be tested for fluid resistance when used with goggles. Fluid resistance is not required if the particulate respirator is used together with a face shield.

**Technical description of particulate respirator (Recommendation 4)**

- Shape that will not collapse easily
- High filtration efficiency
- Good breathability
- Quality compliant with standards for surgical N95 respirator:
  - NIOSH N95, EN 149 FFP2, or equivalent
- Fluid resistance: minimum 80 mmHg pressure based on ASTM F1862, ISO 22609, or equivalent
- Flexwing (not shown in picture)

- Quality compliant with standards for particulate respirator worn with full-face shield:
  - Only to be used together with a face shield
  - NIOSH N95, EN149 FFP2, or equivalent

**Recommendation 5**

All health workers should wear double gloves while providing clinical care for patients with filovirus disease in order to prevent virus exposure.

*Strong recommendation, moderate quality evidence for double gloving as compared to single glove use.*

**Recommendation 6**

Nitrile gloves are preferred over latex gloves for health workers providing clinical care for patients with filovirus disease in order to prevent virus exposure.

*Strong recommendation, moderate quality evidence on effectiveness and safety of nitrile gloves over other alternatives.*
Appendix D-4 Prevention and Control of Ebola Virus Disease in Health Care Facilities with Limited Resources

Technical description of gloves (Recommendations 5, 6)

- Nitrile
- Non-sterile
- Powder free
- Outer gloves preferably reach mid-forearm (e.g., minimum 280mm total length)
- Different sizes
- Quality compliant with standards:
  - EU standard directive 93/42/EEC Class I, EN 455
  - EU standard directive 89/686/EEC Category III, EN 374
  - ANSI/ISEA 105-2011
  - ASTM D6319-10 OR equivalent

Recommendation 7

Health workers should wear protective body wear in addition to regular on-duty clothing (e.g., surgical scrubs) while caring for patients with filovirus disease in order to prevent virus exposure.

*Strong recommendation, high quality evidence for using protective body wear as against using no protection, based on accumulated evidence from other infections with similar modes of transmission.*

Recommendation 8

Compared with other forms of protective body wear, the choice of PPE for covering clothing should be either a disposable gown and apron, or a disposable coverall and apron; the gown and the coverall should be made of fabric that is tested for resistance to penetration by blood or body fluids or to blood-borne pathogens.

*Conditional recommendation, very low quality evidence comparing effectiveness of gowns and coveralls.*

Technical description of disposable gown (Recommendation 8)

- Single use
- Length, mid-calf to cover the top of the boots
- Avoidance of colours which are culturally unacceptable, e.g., black
- Light colours preferable to better detect possible contamination
- Thumb/finger loops to anchor sleeves in place
- Quality compliant with either of two standards, depending on resistance of materials:
  - Option 1: tested for resistance to fluid penetration: EN 13795 high performance level, or AAMI level 3 performance, or equivalent
  - Option 2: tested for resistance to blood-borne pathogen penetration: AAMI PB70 level 4 performance, or equivalent
**Technical description of disposable coverall (Recommendation 8)**

- Single use
- Avoidance of colours which are culturally unacceptable, e.g., black
- Light colours preferable to better detect possible contamination
- Thumb/finger loops to anchor sleeves in place
- Different sizes available – large size especially important
- Quality compliant with either of two standards, depending on resistance of materials:
  1. Option 1: tested for resistance to blood and body fluid penetration: meets or exceeds ISO 16603 class 3 exposure pressure, or equivalent
  2. Option 2: tested for resistance to blood-borne pathogen penetration: meets or exceeds ISO 16604 class 2 exposure pressure, or equivalent

Note: for each of the two options mentioned above, different products may be available. The coverall material described in option 2 is associated with higher heat stress and less breathability; this reduces continuous wearing time and results in more frequent changes compared to option 1.

---

**Surgical scrubs** are for use as regular on-duty wear and are not considered PPE. Details are provided for ease of procuring these items. Scrubs are preferable to street clothes while the health worker is on-duty.

**Technical description of surgical scrubs (trousers and tops)**

- Tightly woven
- Minimum linting
- Non-sterile, reusable or single use
- Top/tunic: short sleeves
- Trouser: drawstring waist enclosure
- Different size

---

**Recommendation 9**

The choice of aprons should be, in order of preference:
1. Disposable, waterproof apron
2. If disposable aprons are not available, heavy duty, reusable waterproof aprons can be used if appropriate cleaning and disinfection between patients is performed.

*Strong recommendation, very low quality evidence comparing effectiveness of disposable and reusable apron.*
Technical description of waterproof apron (Recommendation 9.1)

- Disposable or single use
- Made of polyester with PVC-coated, or other waterproof material
- Straight apron with bib
- Minimum basis weight: 250g/m²
- Covering size: approximately 70-90cm width x 120-150cm height, or standard adult size
- Option 1: Adjustable neck strap with back fastening at the waist
- Option 2: Neck strap allowing for tear-off with back fastening at the waist

Technical description of heavy duty apron (Recommendation 9.2)

- Heavy duty non-woven apron
- Straight apron with bib
- Fabric: 100% polyester with PVC coating, or 100% PVC, or 100% rubber, or other fluid resistant material (e.g., rubber, PVC)
- Water proof, sewn strap for neck and back fastening
- Minimum basis weight: 300g/m²
- Covering size: approximately 70-90cm width x 120cm-150cm height
- Reusable (provided appropriate arrangements for decontamination are in place)

Recommendation 10
All health workers should wear waterproof boots (e.g., rubber/gum boots) while caring for patients with filovirus disease in order to prevent virus exposure.

*Strong recommendation, very low quality evidence comparing boots with other types of foot wear.*

Technical description of waterproof boots (Recommendation 10)

- Nonslip, have a PVC sole which is completely sealed
- Knee-high, in order be higher than the bottom edge of the gown
- Optional light colour to better detect possible contamination
- A variety of sizes to improve comfort and avoid trauma to the feet
**Recommendation 11**
All health workers should wear a head cover that covers the head and neck while providing clinical care for patients with filovirus disease in order to prevent virus exposure

*Conditional recommendation, low quality evidence effectiveness of head cover in preventing transmission.*

<table>
<thead>
<tr>
<th>Technical description of hood or head cover (Recommendation 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Single-use</td>
</tr>
<tr>
<td>• Preferably fluid-resistant</td>
</tr>
<tr>
<td>• Adjustable and immovable once adjusted</td>
</tr>
<tr>
<td>• Facial opening constructed without elastic, reaching the upper part of the gown or coverall</td>
</tr>
</tbody>
</table>

| Hood | Surgical head cover |

**Recommendation 12**
The head cover is suggested to be separate from the gown or coverall, so that these items may be removed separately.

*Conditional recommendation, low-quality evidence comparing different types of head covers.*
APPENDIX E: INCINERATORS AND BURIAL SITES FOR WASTE DISPOSAL

HOW TO BUILD AND USE A SIMPLE DRUM INCINERATOR FOR WASTE DISPOSAL

STEP 1: Where possible, select a site downwind from the clinic.

STEP 2: Build a simple incinerator using local materials (mud or stone) or a used oil drum (e.g., a 55-gallon drum). The size depends on the amount of daily waste collected.

STEP 3: Make sure the incinerator has:
- Sufficient air inlets underneath for good combustion
- Loosely placed fire bars to allow for expansion
- An adequate opening for adding fresh refuse and for removal of ashes
- A long enough chimney to allow for a good draft and evacuation of smoke

STEP 4: Place the drum on hardened earth or a concrete base.

STEP 5: Burn all combustible waste, such as paper and cardboard, as well as used dressings and other contaminated wastes. If the waste or refuse is wet, add kerosene so that a hot fire burns all the waste. Ash from incinerated material can be treated as non-contaminated waste.

Figure E-1. Design for a Simple Oil Drum Incinerator

Source: South East Asia Regional Office (SEARO)/World Health Organization. 1988.
HOW TO MAKE AND USE A SMALL BURIAL SITE FOR WASTE DISPOSAL¹

STEP 1: Find an appropriate location (see above).

STEP 2: Dig a pit 1 meter (3 feet) square and 2 meters (6 feet) deep. The bottom of the pit should be 2 meters (6 feet) above the water table.²

STEP 3: Dispose of the contaminated waste in the pit and cover the waste with 10–15 cm (4–6 inches) of dirt each day. The final layer of dirt should be 50–60 cm (20–24 inches) and compacted to prevent odors and attraction of insects, and to keep animals from digging up the buried waste.

Depending on the volume of waste, this pit should last 30 to 60 days.

Figure E-2. Plan for a Small Burial Pit

Adapted from: World Health Organization 1999.

¹ Adapted from: South East Asia Regional Office (SEARO)/World Health Organization. 1988.
² Burial can be used as a method of waste disposal only where the water table is more than 12 feet below the surface.
APPENDIX F: HOW TO CONDUCT SAFE AND DIGNIFIED BURIAL OF A PATIENT WHO HAS DIED FROM SUSPECTED OR CONFIRMED EBOLA VIRUS DISEASE

Introduction and Background

WHO has developed a protocol to provide information on the safe management of burial of patients who died from suspected or confirmed Ebola virus disease. These measures should be applied not only by medical personnel but by anyone involved in the management of burial of suspected or confirmed Ebola patients.

Twelve steps have been identified describing the different phases Burial Teams have to follow to ensure safe burials, starting from the moment the teams arrive in the village up to their return to the hospital or team headquarters after burial and disinfection procedures. These steps are based on tested experiences from the field.

The handling of human remains should be kept to a minimum. Always take into account cultural and religious concerns. Only trained personnel should handle remains during the outbreak.

The burial process is very sensitive for the family and the community and can be the source of trouble or even open conflict. Before starting any procedure the family must be fully informed about the dignified burial process and their religious and personal rights to show respect for the deceased. Ensure that the formal agreement of the family has been given before starting the burial. No burial should begin until family agreement has been obtained.

Step 1: Prior to departure: Team composition and preparation of disinfectants
Step 2: Assemble all necessary equipment
Step 3: Arrival at deceased patient home: prepare burial with family and evaluate risks
Step 4: Put on all Personal Protective Equipment (PPE)
Step 5: Placement of the body in the body bag
Step 6: Placement of the body bag in a coffin where culturally appropriate
Step 7: Sanitize family’s environment
Step 8: Remove PPE, manage waste and perform hand hygiene
Step 9: Transport the coffin or the body bag to the cemetery
Step 10: Burial at the cemetery: place coffin or body bag into the grave.
Step 11: Burial at the cemetery: engaging community for prayers as this dissipates tensions and provides a peaceful time.
Step 12: Return to the hospital or team headquarters

Please send your comments, suggestions and corrections by email to: edpinfo@who.int and fermentypg@who.int

1 Adapted, with the permission of the publisher, from: Field Situation: How to Conduct Safe and Dignified Burial of a Patient Who Has Died from Suspected or Confirmed Ebola Virus Disease, Geneva, World Health Organization, October 2014: http://apps.who.int/iris/bitstream/10665/137379/1/WHO_EVD_GUIDANCE_Burials_14.2_eng.pdf?ua=1, accessed December 6, 2014.
Step 1: Prior to departure, team composition and preparation of disinfectants

Prior to departure
One team should comprise:

- 4 members, wearing full PPE for field situation
- 1 sprayer, wearing full PPE for field situation
- 1 technical supervisor, not wearing PPE
- 1 communicator, a person who interact with family and community, not wearing PPE
- 1 religious representative, not wearing PPE

All burial management team members should be clear on their roles and responsibilities, including who is the technical supervisor.

Disinfectant solutions must be prepared for the same day:

- 0.05% chlorine solution for hand hygiene
- 0.5% chlorine solution for disinfection of object and surfaces

Step 2: Assemble all necessary equipment
☐ Assemble Body Bag to hold the body of the deceased:
  - Impermeable, vinyl, minimum thickness 400 microns
- Should be able to hold 100-125 kilos (200-250 lbs)
- At least 4 handles included in the body bag to allow safe hand carry
- Provide full containment of blood borne pathogens

☐ Assemble all necessary equipment to prevent infections:
  
  For hand hygiene:
  - Alcohol-based handrub solution (recommended) OR
  - Clean running water, soap and towels (recommended) OR
  - Chlorine solution 0.05% (when option above are not available)

  Personal Protection Equipment (PPE):
  - One pair of disposable gloves (non-sterile, ambidextrous)
  - One pair of heavy duty gloves
  - Disposable coverall suit (e.g., Tyvek suit) + impermeable plastic apron
  - Face protection: goggles and mask
  - Footwear: rubber boots (recommended) OR if not available, shoes with puncture-resistant soles and disposable overshoes
Gloves | Goggles | Mask | Rubber boots
--- | --- | --- | ---
Hand sprayer 0.05% Chlorine | Back sprayer 0.5% Chlorine | Sharps container | Waste bags for disposable and reusable items

For waste management materials:
- Disinfectant:
  - one Hand sprayer (0.05% chlorine solution)
  - one Back Sprayer (0.5% chlorine solution)
- Leak-proof and puncture resistant sharps container
- Two leak-proof infectious waste bags: one for disposable material (destruction) and one for reusable materials (disinfection)

**Step 3:** Arrival: prepare burial with family and evaluate risks
1. Prior to departure the team leader must brief the burial team about how to conduct a dignified burial in this particular religious and social context.

2. Arrival of the burial team from the Red Cross Society, Ministry of Health, WHO or MSF.

3. The staff should not be wearing PPE upon arrival.

4. Greet the family and offer your condolences before unloading the necessary material from the vehicles. Request respectfully for a family representative.

5. The communicator should contact a local faith representative at the request of the family members to arrange to meet at the place of collection for the burial of the deceased. If a local faith representative is not available the team leader can use the list provided of phone contacts, with the agreement of the family.

6. The communicator and the faith representative should work together with the family witness (such as a paternal uncle), to make sure that the burial is carried out in a dignified manner.

7. Burial team to wait whilst the faith representative and family witness can be called and have completed their discussion with the communicator about the safe and dignified burial.

8. The Burial team leader should ensure that the family witness and other family members have understood these procedures. **Obtain the formal agreement of the family’s representative before proceeding.**

9. Burial team to refer to separate guidelines for the dignified burial of Muslim and Christian patients.

10. Identify the family members who will be participating in the burial rituals (prayers, orations, closing of the coffin, …). If the family has prepared a coffin, identify 4 family members to carry the coffin.
11. Verify that the grave is dug. If this is not the case, send selected people to dig the grave at the cemetery or at the area identified by the family. This site should be agreed upon by the local authorities and neighbours.

12. Propose to one or two family members to witness the preparation activities of the body of the deceased patient on behalf of the other family members.

13. Ask the family witness if there are any specific requests from the family or community, for example, about the personal effects of the deceased. The family should decide what to do with the personal effects of the deceased (burn, bury in the grave or disinfect).

14. Allow the family witness, family members to take pictures of the preparation and burial. At the request of the family, the Burial team may take pictures on their behalf.

15. Ask the family if they want to prepare a civil, cultural or religious item (e.g., identity plaque, cross, picture of deceased) for the identification of the grave.

**Procedure for the dignified burial of a Christian patient**

- Ask the family if there are any specific requests with regard to a dignified burial. Explain the process of a dignified Christian burial to the family members.
- Give the family opportunity to view and an alternative to touching and bathing the body - e.g., sprinkling of water over the body or reading a scripture - placing the written scripture verse on the body before closing the body bag... their needs to be locally adapted and discussed.
- Provide a symbol of dignity and clothing - e.g., a white cloth.
- Identify a religious leader known or accepted by the family.
  - Burial teams should have lists and contact details of local religious leaders to offer to the family if they do not have their own priest.
- The priest, can offer spiritual consolation, can pray with the family and read appropriate scriptures.
  - Prayer, blessing and sprinkling of the body with blessed water can be given without the need for physical contact.
  - Giving thanks for the life of the person.
- Identify a burial site the family can accept and ensure the grave is appropriately labelled.
  - Allow the family members the opportunity to be involved in the digging/preparation of the grave, if that is their custom or preference.
  - Once the body/coffin is in the grave, allow the family members the option to throw the first soil in/on the grave according to local practice, hierarchy or tradition.
  - If the family would like certain items to be buried with the deceased, they should identify them to the Burial Team who will ensure this is done. (Family must not handle items themselves that have been in recent close contact with the deceased).
  - Invite the family to prepare or place the label / religious symbol at the grave e.g., a cross.
- A memorial service can be held at a later date, as per custom and/or preference.
### Procedure for the dignified burial of a Muslim patient

An information card that uses the steps below, endorsed (signed) by a local Imam or Muslim representative, could be used to perform the dignified burial of a patient who has died from suspected or confirmed Ebola.

- The team leader will explain the safe and dignified process of burial.
- Ask the family if there are any specific requests in regard to the process of a dignified burial, for example, do they want to perform a dry ablation on the body prior to burial?
- Deceased Muslims should not be cremated or placed in the body bag naked.
- A dry ablation can be performed by a Muslim member of the burial team on the deceased patient before being placed in the body bag. Otherwise a Muslim person/family member can perform this simple procedure once they have been placed in the body bag (see next page information for dry ablation).
- The deceased patient is shrouded by wrapping in a plain white cotton sheet before being placed in the body bag. The shroud should be knotted at both ends. The BMT should provide a shroud for the family or they provide one themselves.
- If there are female members of the Burial team, they should shroud deceased female patients prior to placing in a body bag (see next page information for shrouding).
- Permission can be sought in advance from the Imam that the body bag can be used to represent a shroud. White body bags should be used for Muslim patients.

#### Dry ablation
- (To be only carried out by a Muslim person or Muslim faith representative).
  - A short Arabic prayer of intention is said over the deceased.
  - The hand of the Muslim Burial team member carrying out the dry ablation (in PPE), softly strikes their hands on clean sand or stone and then gently passes over the hands and then the face of the deceased. This symbolically represents the ablution that would normally have been done with water.
  - A short Arabic prayer is said over the deceased.
  - The body bag is closed if no request for shrouding has been made.
  - Dry ablation can also be carried out over the deceased in the body bag if a Muslim Burial team member is not available and it was not possible to perform directly on the body.
  - This process takes about 1–2 minutes only.

#### Shrouding
- A plain unstitched white cotton sheet (scented with musk, camphor or perfumed) is placed on top of the opened body bag.
- The deceased is lifted by the Burial team and placed on top of the shroud.
- The extended side edges of the shroud are pulled over the top of the deceased to cover the head, body, legs and feet.
- Three strips cut from the same fabric are used to tie and close up the shroud. One for above the head, one for below the feet and one for around the middle of the body. It is knotted at both ends.
- If there are female members of the Burial team, they should shroud the deceased female patients.
- The body bag is closed.
Step 4: Put on all personal protective equipment (PPE)

Evaluate the set-up of the environment

a. Locate the room where the body of the deceased patient is, open the windows and doors for optimal light and ventilation.
b. Evaluate the size and weight of the deceased in order to choose the right size of body bag. This bag needs to be opaque.
c. If a coffin is to be used, place the coffin outside the house.
d. Identify with the family, the rooms and annexes (bathroom, toilet) that were used by the deceased patient as they need to be cleaned and disinfected.

Put on all personal protective equipment (PPE) by burial management team in the presence of the family according to the recommended steps

1. Each individual wear rubber boot
2. Perform hand hygiene
3. Put on coverall suit and plastic apron
4. Put on face mask safety goggles
5. Hood up
6. Make thumb hole in suit
7. Put on inner gloves (under cuff)
8. Put on outer gloves (over cuff)
**Step 5:** Placement of the body in the body bag

Entry into the house with at least 2 persons of the burial team:

a. Laboratory-Epidemiology team collect a post-mortem sample for confirmation (see oral swab protocol).
b. Place the body bag along the body.
c. Open the body bag.
d. At least two persons take the body by arms and legs.
e. Place the body in the body bag.
f. Close the body bag.
g. Disinfecting the outer side of the body bag by spraying over the surface of the body bag with a suitable disinfectant (e.g., 0.5% chlorine solution).

**IMPORTANT NOTES**

- Manipulation of the body should be minimal.
- Remains should not be sprayed, washed or embalmed.
Step 6: Placement of the body bag in the coffin where culturally appropriate

1. Transport the body bag to the coffin, which should be placed outside the house, by 2 or 4 persons wearing PPE (depending on the weight of the body and the number of persons in PPE).
2. Place clothes and/or objects of the deceased patient inside the coffin if the family so wishes.
3. Allow one of the family members to close the coffin, ensure they are wearing gloves at all times.
4. Disinfect the coffin.
5. Respect the grieving time requested by the family.

At the end of this step the coffin is decontaminated and is ready to be transported.

In case no coffin is available, the body bag should be gently placed on the rear of the pickup vehicle by placing the head towards the front. This should be performed by 2 staff wearing PPE.

Step 7: Sanitize family’s environment

Collection of soiled objects, disinfection if needed, or burning and cleaning and disinfection of the environment (rooms, house) wearing PPE:

1. Collect any sharps that might have been used on the patient and dispose them in a leak-proof and puncture resistant container.
2. Clean with clean water and detergent and then disinfect with a suitable disinfectant (e.g., 0.5% chlorine solution) all rooms and annexes of the house that were possibly infected by the deceased patient. Special focus should be given to areas soiled by blood, nasal secretions, sputum, urine, stool and vomit.
3. Clean with water and detergent all objects (e.g., dishes…) possibly infected by the deceased patient; then disinfect with a chlorine solution 0.5%.
4. Gather in a plastic bag, bed linen, clothes and objects of the deceased, if any, that were not placed in the coffin and need to be buried with the coffin. Ensure the bag is tightly closed and disinfected.
5. Mattresses, straw mats soiled with body fluid of the deceased patient should be burnt at a distance from the house. Ensure the family has given permission to destroy the mattresses, straw mat, etc. Team must replace with new items.

After this operation and before proceeding to removing the PPE think through: Has the burial team disinfected or placed in a disinfected bag all belongings of the deceased patient? Did the burial team burn the mattresses?

At the end of this step all places in the home are disinfected.

Step 8: Remove PPE, manage waste and perform hand hygiene

A. Disinfect boots without removing them
B. Remove apron
   1. Untie the apron, remove it and discard into infectious waste bag for disinfection
   2. Wash outer gloves
C. Remove gloves
   1. Remove outer gloves
   2. Wash inner gloves
D. Remove coverall
   1. Take hood off
   2. Pull zip down
   3. Wash inner gloves
   4. Remove coverall suit, from inside, peeling it off
   5. Dispose of the coverall suit in the infectious waste bag for destruction
   6. Wash inner gloves
E1. Remove goggles and mask from behind
   1. Place it in a waste bag for disinfection
   2. Wash inner gloves
E2. Remove mask from behind
   1. Place it in a waste container for destruction
   2. Wash inner gloves
F. Remove inner gloves
   1. Grasp the outer edge of the 1st glove and peel it off
   2. Hold the 1st glove in the gloved hand and drag a bare finger under the 2nd glove
   3. Remove 2nd glove from the inside, creating a “bag” for both gloves and throw it in waste bag for disposal
G. Wash hands
   1. Disinfect rubber boots without removing them. When you are back to Hospital or Team headquarters at the end of the working day, each team member should take off rubber boots and disinfect them (see step 12).
   2. Remove PPE of the burial team carefully following the recommended steps and perform hand hygiene.
3. Recover the single-use PPE in an appropriate waste bag, prepared by the supervisor. The bag will be closed and disinfected and thereafter brought for burning to the hospital (or other designated place where single-use equipment will be burned).

4. Recover any reusable disinfected equipment in a waste bag, closed and disinfected on-site, before bringing this to the hospital or team headquarters for appropriate handling.

5. Perform hand hygiene.

At the end of this step the burial management team has removed their PPE (except the rubber boots) and has performed hand hygiene.

Step 9: Wear gloves and transport the coffin or the body bag to the cemetery

Wear gloves and transport the coffin or the body bag from the house to the cemetery

1. For the transport of the coffin, which has not been soiled, protection with household gloves is sufficient.

2. Distribute household gloves to the family members who will carry the coffin.

3. The rear of the car can serve as a hearse.

4. The coffin is placed (delicately) on the platform of the car that will serve as the hearse, usually the head towards the front.

5. Respect the time of grieving, possibly with a speech about the deceased and religious songs (chants) to aid the departure of the deceased to the cemetery, according to cultural and religious habits.

6. During the departure of the funeral procession to the cemetery, some family members might be on rear of the car with the coffin.

7. No family member should sit in the car cabin.
8. Only the burial management team, without PPE, has the right to sit in the car cabin.
9. The other participants of the funeral will follow on foot, behind the car at walking pace, with the alarm lights on and possibly dressed with funeral signs (bundles of palm trees on the bumper).
10. Conventional expression of pain through shouting, crying/songs of crying should be respected.

**At the end of this step the coffin has departed for the cemetery.**

**Step 10: Burial at cemetery: place coffin or body bag into the grave**

**Placement of coffin or body bag into the grave**

1. Manually carry the coffin or body bag to the grave, which is already prepared, by the carriers wearing household gloves, followed by the funeral participants.
2. Place strings/ropes (and/or lianas) for lowering the coffin or body bag into the grave.
3. The coffin or body bag is placed on the ropes.
4. Slowly lower the coffin or body bag into the grave, either with ropes prepared in advance, or with individuals wearing gloves who stepped into the graves.
5. Place the coffin or body bag and bags with clothes and objects belonging to the deceased into the grave.
6. Depending on the custom in place, respect the rituals that allow for the spirit of the deceased to be liberated (opening of a node of the closed coffin, pulling the ropes from the grave…).

**Step 11: Burial at the cemetery: engaging community for prayers**

Engage community for prayers as this dissipates tensions and provides a peaceful time.

1. Respect the time required for prayers and funeral speeches.
2. Family members and their assistants should be allowed to close the grave.
3. Special attention should be given to the first shovel of earth, in general this is done carefully around the head area.

4. Place an identification on the grave (name of the deceased and the date) and a religious symbol if requested.

5. Recover all household gloves.

6. Place household gloves in an infectious waste bag for disinfection.

7. Burial team to attend funeral and offer condolences or offer small gifts to support the funeral.

8. **Family to communally wash hands with disinfectant after the burial (using chlorine solution 0.05% or make an alcohol-based hand-rub solution available for hand hygiene performance) for all members involved in the funeral process.**

9. Thank the family members.

**Step 12:** Return to the Hospital or Team headquarters

1. Organize the incineration of the single-use (disposable) equipment at the hospital or in another designated place for burning this type of equipment.

2. The reusable equipment is again disinfected and dried.

3. The post-mortem samples are sent to the laboratory team.

4. The car used for the funerals needs to be cleaned and disinfected (especially the rear).
5. At the end of the working day, before going back home, each team member should take off rubber boots and disinfect them with 0.5% chlorine solution. Rubber boots should be kept at the hospital or team headquarters.

It may be worthwhile to use a checklist, to ensure that all steps are followed during the entire process from arrival at the house until the end.
APPENDIX G: CHECKLIST FOR PLANNING AND PREPAREDNESS FOR AN EBOLA VIRUS DISEASE OUTBREAK

<table>
<thead>
<tr>
<th>ELEMENTS TO PLAN AND PREPARE FOR EVD OUTBREAK</th>
<th>ACTION NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination</td>
<td></td>
</tr>
<tr>
<td>1. Structure for Planning and Decision-Making</td>
<td></td>
</tr>
<tr>
<td>• An internal, multidisciplinary coordination committee for EVD outbreak preparedness has been created.</td>
<td></td>
</tr>
<tr>
<td>• A person has been designated as the outbreak preparedness coordinator. (Insert name)</td>
<td></td>
</tr>
<tr>
<td>• (Illustrative) Members of the planning committee include the following hospital staff members (insert names):</td>
<td></td>
</tr>
<tr>
<td>− Administration</td>
<td></td>
</tr>
<tr>
<td>− Legal counsel</td>
<td></td>
</tr>
<tr>
<td>− Infection control</td>
<td></td>
</tr>
<tr>
<td>− Hospital disaster coordinator</td>
<td></td>
</tr>
<tr>
<td>− Risk management</td>
<td></td>
</tr>
<tr>
<td>− Facility engineering</td>
<td></td>
</tr>
<tr>
<td>− Nursing administration</td>
<td></td>
</tr>
<tr>
<td>− Medical staff</td>
<td></td>
</tr>
<tr>
<td>− Intensive care</td>
<td></td>
</tr>
<tr>
<td>− Emergency department</td>
<td></td>
</tr>
<tr>
<td>− Laboratory service</td>
<td></td>
</tr>
<tr>
<td>− Respiratory therapy</td>
<td></td>
</tr>
<tr>
<td>− Psychiatry</td>
<td></td>
</tr>
<tr>
<td>− Public relations</td>
<td></td>
</tr>
<tr>
<td>− Security</td>
<td></td>
</tr>
<tr>
<td>− Materials management</td>
<td></td>
</tr>
<tr>
<td>− Staff development</td>
<td></td>
</tr>
<tr>
<td>− Occupational health</td>
<td></td>
</tr>
<tr>
<td>− Food services</td>
<td></td>
</tr>
<tr>
<td>− Pharmacy</td>
<td></td>
</tr>
<tr>
<td>− Telecommunications/IT</td>
<td></td>
</tr>
<tr>
<td>− Other members</td>
<td></td>
</tr>
<tr>
<td>• A state or local health department person has been identified as a committee liaison. (Insert name)</td>
<td></td>
</tr>
<tr>
<td>• A linkage with local transportation services has been established. (Planning organization)</td>
<td></td>
</tr>
</tbody>
</table>

2. Development of a Written EVD Outbreak Plan

• A written plan has been completed or is in progress that includes the elements listed in #3 below.
• Responsibility has been assigned for updating relevant hospital policies/procedures as necessary. (Name: ______________________)  
• The plan specifies the circumstances under which the plan will be activated.
• The plan describes the organizational structure that will be used to operationalize the plan.

---

### ELEMENTS TO PLAN AND PREPARE FOR EVD OUTBREAK

<table>
<thead>
<tr>
<th>ACTION NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibilities of key personnel related to executing the plan have been described.</td>
</tr>
<tr>
<td>A simulation exercise has been developed to test the effectiveness of the plan.</td>
</tr>
<tr>
<td>A simulation exercise has been performed. (Date performed ________________.)</td>
</tr>
</tbody>
</table>

#### 3. Elements of an EVD Outbreak Plan

**SURVEILLANCE**

1. Hospital-wide syndromic surveillance has been established (with initial focus in the emergency room).
2. Criteria for detecting/identifying clusters of cases have been established hospital-wide (with initial focus in emergency room).
3. Responsibility has been assigned for reviewing national, regional and local EVD activity trends and informing the EVD outbreak coordinator of evidence of an emerging problem. (Name _________________.)
4. A system has been developed and tested for using central, regional, or national laboratory facilities to confirm early cases as soon as possible.
5. A system for monitoring for nosocomial transmission of EVD has been implemented and tested by monitoring for non-EVD patients.
6. A system for reporting to central/national surveillance authorities has been established.

**COMMUNICATION**

- An outbreak spokesperson(s) has been assigned to represent the health care facility in case of outbreak before the community and media:
  - Person responsible for updating public health reporting ____________________________
  - Clinical spokesperson for the facility ___________________________________________
  - Media spokesperson for the facility ____________________________________________
- Relationship has been established with professional specialists to help with the development of accurate and timely messages, before and during an outbreak:
  - Specialist _________________________________________________________________
  - Specialist _________________________________________________________________
- Key points of contact outside the facility have been identified:
  - Regional health department contact __________________________________________
  - Local health department contact ____________________________________________
  - Newspaper contact(s) ______________________________________________________
  - Radio contact(s) __________________________________________________________
  - Public official(s) __________________________________________________________
- A list of other health care facilities with which it will be necessary to maintain communication has been established:
  - A plan for updating key facility personnel on a daily basis has been established.
  - The person(s) responsible for providing these updates is/are:
  - A strategy for regularly updating clinical, emergency department, and outpatient staff on the status of the EVD outbreak, once detected, has been established. (Responsible person: _________________.)
  - A plan for informing patients and visitors about the level of EVD activity has been established.
- An education and training plan on EVD has been developed for personnel:
  - Language- and reading level-appropriate materials for educating all personnel about EVD and the facility’s EVD outbreak plan have been identified.
  - Means for accessing global and local web-based information sites have been identified and communicated to personnel.
  - A system for tracking which personnel have completed EVD training is in place.
  - A plan is in place for rapidly training non-facility staff brought in to provide patient care when insufficient numbers of personnel are available.
**ELEMENTS TO PLAN AND PREPARE FOR EVD OUTBREAK**

<table>
<thead>
<tr>
<th>ACTION NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All triage staff, nursing leadership, and clinical leaders are familiar with protocols and procedures for notifying the designated points of contact to inform: 1) hospital leadership (infection prevention and control, infectious disease, administration, laboratory, and others as applicable); and 2) local public health authorities regarding a suspected or confirmed EVD case.</td>
</tr>
</tbody>
</table>

**CASE IDENTIFICATION AND MANAGEMENT**

| • A specific location (designated isolation bed or designated isolation ward) has been identified for triage of patients with suspected or confirmed EVD. Staff have been educated on proper patient placement for suspected or confirmed EVD patients. |
| • Front-line staff have been educated and trained to identify risks and signs/symptoms of EVD. |
| • The plan includes use of signage to direct and instruct patients with possible EVD on the triage process. Relevant screening criteria have been posted in conspicuous places at emergency department triage stations, clinics, and other acute care locations. |
| • A system has been established to separate patients with possible EVD from other patients seeking medical attention. |
| • Clinical management guidelines for patients with suspected and confirmed EVD infection have been adapted for local use. |
| • A method for tracking the admission and discharge of patients with EVD has been developed. |
| • The tracking method has been tested with non-EVD patients. |

**INFECTION PREVENTION AND CONTROL**

| • Infection prevention and control guidelines and procedures have been adapted to the local situation (in facilities and in alternative care areas). |
| • Laboratory biosafety guidelines, including collection and transport of specimens, are in place and current. Laboratory guidelines are posted conspicuously in the laboratory. |
| • Lab personnel are aware of current guidelines for specimen collection, transport, testing, and submission for patients with suspected or confirmed EVD. |
| • Spot checks and inspections of triage staff have been conducted to determine if they are incorporating screening procedures and are able to initiate notification, isolation, and PPE procedures. |
| • Health care workers have adequate training in infection prevention and control, including Standard and Transmission-Based Precautions. |
| • Equipment (i.e., PPE) is available to implement recommended infection prevention and control guidelines. |
| • Staff are familiar with environmental infection control procedures for suspected or confirmed EVD patients (cleaning, disinfecting, trash handling, linens, etc.). |
| • Contact tracing and confinement, if proposed, can be implemented. |
**ELEMENTS TO PLAN AND PREPARE FOR EVD OUTBREAK**

<table>
<thead>
<tr>
<th>ACTION NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAINTAINING ESSENTIAL HEALTH SERVICES</strong></td>
</tr>
<tr>
<td><strong>Health services personnel:</strong></td>
</tr>
<tr>
<td>- Health care personnel have met all the training requirements for PPE and infection control, are able to use PPE correctly, and have been trained in management and exposure precautions for suspected or confirmed EVD cases.</td>
</tr>
<tr>
<td>- Key trained staff to be &quot;first responders&quot; have been identified.</td>
</tr>
<tr>
<td>- A system for detecting symptomatic personnel before they report for duty has been developed. This system has been tested during a non-EVD outbreak period.</td>
</tr>
<tr>
<td>- A policy for managing health care personnel with a known unprotected EVD exposure has been established and staff have been educated on these procedures. Staff should have ready access to medical consult.</td>
</tr>
<tr>
<td>- A policy for managing health care personnel with symptoms of or documented EVD has been established.</td>
</tr>
<tr>
<td>- Policies and procedures for screening and work restrictions for exposed or ill health care personnel have been developed, and sick leave policies for health care personnel that are non-punitive, flexible, and consistent with public health guidance have been developed.</td>
</tr>
<tr>
<td>- Mental health and faith-based resources that will provide counseling to personnel during an EVD outbreak have been identified.</td>
</tr>
<tr>
<td>- A strategy for housing health care personnel who may be needed on-site for prolonged periods of time is in place.</td>
</tr>
<tr>
<td>- A strategy for accommodating and supporting personnel who have child or elder care responsibilities has been developed.</td>
</tr>
<tr>
<td>- A plan is in place to address unmet staffing needs in the hospital.</td>
</tr>
<tr>
<td>- The minimum number and categories of personnel needed to care for a group of patients with EVD have been determined.</td>
</tr>
<tr>
<td>- Responsibility for assessing day-to-day clinical staffing needs during an EVD outbreak has been assigned.</td>
</tr>
<tr>
<td>- Persons responsible are: _________________________________ (names and/or titles)</td>
</tr>
<tr>
<td>- Legal counsel has reviewed emergency laws for using health care personnel with out-of-state licenses.</td>
</tr>
<tr>
<td>- Sources from which additional health care workers might be recruited have been identified.</td>
</tr>
<tr>
<td>- A priority list for reassignment of personnel has been developed.</td>
</tr>
<tr>
<td>- A set of health care roles for which volunteers may be suitable has been developed.</td>
</tr>
<tr>
<td>- Local organizations have been identified and notified for seeking volunteers.</td>
</tr>
<tr>
<td>- Protocols have been developed for training volunteers for defined health care roles.</td>
</tr>
<tr>
<td><strong>Health facility capacity:</strong></td>
</tr>
<tr>
<td>- An area of the facility where patients should ideally be treated during an EVD outbreak situation has been identified.</td>
</tr>
<tr>
<td>- A threshold has been established for canceling elective admissions and surgeries.</td>
</tr>
<tr>
<td>- Facilities that would accept non-EVD patients in order to free up bed space have been identified, and agreements have been reached.</td>
</tr>
<tr>
<td>- Areas of the facility that could be utilized for expanded bed space have been identified.</td>
</tr>
<tr>
<td>- The estimated patient capacity for this facility is _________________</td>
</tr>
<tr>
<td>- Plans for expanded bed capacity have been discussed with local and regional planning groups.</td>
</tr>
<tr>
<td>- Potential alternative overflow facilities for expansion of medical care have been identified (may include gymnasiums, schools, tents on hospital grounds, etc.).</td>
</tr>
</tbody>
</table>
## ELEMENTS TO PLAN AND PREPARE FOR EVD OUTBREAK

<table>
<thead>
<tr>
<th>ACTION NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>− Alternative care plans with relevant partners, including those outside of the health sector, such as transportation and food services (e.g., FedEx, DHL, bread or milk distributors) have been developed.</td>
</tr>
<tr>
<td>− Critical health services (e.g., trauma, childbirth, severe illness, etc.) that should be maintained even in the face of an outbreak have been identified.</td>
</tr>
<tr>
<td>− Mechanism for maintaining essential medical services for persons with chronic medical problems serviced by this facility (e.g., hemodialysis, HIV/AIDS, TB) has been addressed.</td>
</tr>
<tr>
<td>− Areas of hospital operations where the demand may increase significantly, but continuing operation is critical (e.g., sewerage, electricity, water supply, security) have been identified and plans developed on how to keep them operational.</td>
</tr>
<tr>
<td>− Criteria and protocols for closing the facility to new admissions are in place.</td>
</tr>
<tr>
<td>− Criteria and protocols for limiting visitors have been established.</td>
</tr>
<tr>
<td>− Hospital Security has had input into procedures for enforcing facility access controls.</td>
</tr>
<tr>
<td>− Clinical care and health service plans have been coordinated with bordering local authorities to avoid migration to centers where enhanced services may be perceived to exist.</td>
</tr>
</tbody>
</table>

### Consumable resources/health service supplies:
- A primary plan and contingency plan to address supply shortages have been developed.
- A detailed inventory has been conducted to assess available supply of PPE suitable for Standard, droplet, and contact precautions. An adequate supply of necessary PPE is ensured.
- Adequate EVD PPE supplies are maintained in triage, emergency department, and all patient care areas.
- The existing system for tracking available medical supplies in the health care facility to determine whether it can detect rapid consumption, including items that provide personal protection (e.g., gloves, masks), has been evaluated.
- Necessary improvements in the above system have been made to respond to growing demands for resources during an EVD outbreak.
- A plan has been developed to stockpile, as possible, enough consumable resources (masks, gloves, etc.) for the duration of a pandemic wave.
- Need for stockpiling additional medical supplies has been assessed and sources identified.
- The level of care that might be provided in alternative health care facilities has been identified and a contingency plan developed for providing these alternative facilities with the equipment and supplies adequate for the level of care that will be provided.
- A strategy has been developed for the distribution of stockpiled supplies and medication.
- If possible, two-way radios have been obtained to ensure communication in case phone lines are damaged.
- A contingency plan has been established for situations in which primary sources of basic supplies become limited. If you cannot ensure access to the national stockpile, consider development of an appropriate stockpile in the facility, and at least an 8-week supply of potable water.
- Fuel has been stockpiled for health care facility transport and generators.
- Plans for obtaining limited resources have been discussed with local and regional planning and response groups.
### ELEMENTS TO PLAN AND PREPARE FOR EVD OUTBREAK

<table>
<thead>
<tr>
<th>ACTION NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excess mortality:</strong></td>
</tr>
<tr>
<td>– Plans for expanding morgue capacity have been discussed with community leaders, religious leaders, and/or other key stakeholders.</td>
</tr>
<tr>
<td>– Emergency capacity for storage of corpses before burial, in a culturally appropriate way, has been identified.</td>
</tr>
<tr>
<td>– Protocols have been developed for safe handling of corpses in a culturally appropriate way.</td>
</tr>
<tr>
<td>– Staff have been educated on the need for PPE when handling an EVD patient post-mortem.</td>
</tr>
<tr>
<td>– Community leaders have been involved in all planning to ensure their support and assistance in worst case scenario where practice comes in conflict with necessary public safeguards.</td>
</tr>
<tr>
<td><strong>Mortality estimates have been used to estimate the number of body bags and shrouds.</strong></td>
</tr>
</tbody>
</table>

### INFORMATION DISSEMINATION AND EDUCATION OF THE COMMUNITY

<table>
<thead>
<tr>
<th>ACTION NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community leaders have been involved to ensure that they are well-informed on critical issues and prepared to help as needed.</strong></td>
</tr>
<tr>
<td><strong>Signs have been posted in health care waiting rooms, schools, churches, and other areas where people are in close proximity to describe basic infection control mechanisms and hygiene.</strong></td>
</tr>
<tr>
<td><strong>Advice on reducing the risk of transmission of EVD has been made available to the public.</strong></td>
</tr>
<tr>
<td><strong>Health messages have been developed for families, visitors, and communities in appropriate languages and literacy levels.</strong></td>
</tr>
<tr>
<td><strong>Common myths and misconceptions have been addressed in written and verbal communication.</strong></td>
</tr>
</tbody>
</table>
REFERENCES


innovating to save lives | www.jhpiego.org