



## PERSONAL PROTECTIVE EQUIPMENT AND EBOLA VIRUS DISEASE

### TECHNICAL INFORMATION PAPER No. 55-047-0818

#### PURPOSE.

This Technical Information Paper (TIP) provides guidance regarding use of Personal Protective Equipment (PPE) in association with Ebola Virus Disease (EVD) patients. It does not change any existing Department of Defense (DOD) directives, policies, or procedures related to EVD PPE usage at DOD Medical Treatment Facilities (MTFs).

#### REFERENCES.

- References are listed in Appendix A
- Additional Resources are listed in Appendix B
- Definition of terms can be found in the Glossary

#### APPLICABILITY.

This TIP addresses the proper PPE usage for encounters with EVD patients. This TIP is applicable to DOD MTF personnel.

#### BACKGROUND.

The Ebola Virus is a member of a group of viruses that cause Viral Hemorrhagic Fevers (VHF). These viruses are broken into four virus families: family Arenaviridae, family Bunyaviridae, family Filoviridae, and family Flaviviridae. The family Filoviridae includes the Genus *Ebolavirus*. There are five known species within the Genus *Ebolavirus*, four of which cause VHF in humans: *Tai Forest ebolavirus*, *Sudan ebolavirus*, *Zaire ebolavirus*, *Bundibugyo ebolavirus*. The fifth species, *Reston ebolavirus*, is known to cause VHF only in simians, but it is the only strain that appears to be airborne. All family Filoviridae viruses are single-stranded negative-sense Ribonucleic acid viruses, which produce filamentous infectious virions. These virions are typically approximately 80 nanometers in diameter. The first recorded outbreak of EVD happened along the Ebola River in Zaire (Democratic Republic of the Congo) in 1976. Subsequent outbreaks occurred around the world through March 2014 when the largest outbreak to date started. The 2014 outbreak included the countries of Guinea, Liberia, and Sierra Leone. In September 2014, Operation United Assistance was launched to aid in the combat of the EVD epidemic. The question arose as to how Department of the Army personnel, Soldiers and Civilians, would protect themselves when working in areas with active EVD and treating a potential EVD case at a MTF. In 2018 a new outbreak of EVD occurred in the Democratic Republic of Congo. This TIP serves as an update to TIP 55-047-0116.

## **TIERED EXPOSURE RISK.**

Like all known human-viable strains of EVD, transmission is limited to direct contact of broken skin or mucous membranes with blood, emesis, fecal material, and other bodily fluids from an infected person. Transmission does not occur from casual contact with an asymptomatic patient. Due to the pathway of disease transmission, a person interacting with an EVD patient exhibiting symptoms should use caution and utilize proper PPE. The time interval from infection with EVD to the onset of symptoms is 2 to 21 days, with the average being 8 to 10 days after exposure.

Typical symptoms of EVD infection can include:

- a fever of 100.4 degrees Fahrenheit (°F) or higher
- weakness
- severe headache
- joint and muscle aches
- abdominal pain
- diarrhea
- vomiting
- unexplained bleeding (hemorrhaging)
- unexplained bruising (ecchymosis)

Less common symptoms of EVD infection can include:

- lack of appetite
- rash
- red eyes
- hiccups
- coughing
- chest pain
- difficulty breathing
- difficulty swallowing

The approach PPE use criteria is based upon a tiered exposure risk, dependent upon EVD exposure and the severity of the symptoms the patient is presenting. Currently there are three tier levels. A Tier I patient is asymptomatic with no known exposure to EVD, some risk of exposure to EVD, or a high risk of exposure to EVD. A Tier II patient is symptomatic with either no known exposure to EVD or some risk of exposure to EVD. A Tier III patient is symptomatic with high risk of exposure to EVD. A graphic depiction of the tiered exposure risk approach can be found in Table 1.

**Table 1. Personal Protective Equipment Tier Guidance**

	No Known Exposure	Some Risk of Exposure <sup>a</sup>	High Risk of Exposure <sup>b</sup>
Asymptomatic	Tier 1	Tier 1	Tier 1
Symptomatic	Tier 2	Tier 2	Tier 3

Notes:

<sup>a</sup> Some Risk of Exposure – In the past 21 days, has had close contact with EVD patient; worked or spent time in a mine or cave inhabited by bat colonies where EVD transmission is active; handled, butchered, or consumed dead primates, bats, rodents or other wild animals where EVD transmission is active; or provided patient care in healthcare facilities in EVD outbreak affected countries.

<sup>b</sup> High Risk of Exposure – In the past 21 days, has had a percutaneous or mucous membrane exposure to body fluids of an EVD patient, provided direct care to an EVD patient without proper PPE, performed lab work on confirmed EVD patient samples without proper PPE, participated in funeral rites or had direct exposure to human remains in areas where EVD transmission is active without proper PPE, or had a failure/breach of PPE during any of the previous tasks.

The Centers for Disease Control and Prevention (CDC) categorizes suspected EVD patients differently. The CDC defines patients as either a Person Under Investigation (PUI) or a Confirmed Case. These two categories are broken into two subcategories based upon the stability of the patient. Stability in relation to EVD is defined by the CDC as “exhibiting obvious bleeding, vomiting, copious diarrhea or a clinical condition that warrants invasive or aerosol-generating procedures.” Table 2 provides a crosswalk of the CDC definitions to the Tiered Risk Approach.

**Table 2. Tiered Risk Approach Crosswalk**

	Person Under Investigation	Confirmed Case
Stable Patient	Tier I	Tier II
Unstable Patient	Tier III	Tier III

**REQUIREMENTS.**

**Work Zones**

Three zones are needed to properly contain the possible spread of EVD. The zones must be clearly marked and separated. Each zone should be self-contained.

- Hot Zone. This zone is where active EVD patients or infectious material is known or expected to be present. In this zone, full PPE is needed in accordance with the appropriate tier level. Spot decontamination occurs here.
- Warm Zone. This zone acts as a transition zone. In this location, final PPE checks are made before entering the hot zone, and decontamination and doffing occur when leaving

the hot zone. A worker is allowed to leave the warm zone only after fully decontaminated. There is no hot zone work permitted in the warm zone.

- Cold Zone. This zone is considered to be a contamination-free area. Only baseline PPE is needed here. Nothing is permitted into the cold zone from a warmer zone unless it has been decontaminated.

### **Decontamination Solution**

An approved decontamination solution needs to be used to ensure proper decontamination.

- Bleach Solution. A solution of bleach can be used to decontaminate non-porous surfaces that may have EVD contamination. The proper solution is 1 part household bleach (5–8.5 percent sodium hypochlorite) and 9 parts water. This solution must be made fresh every 24 hours as it breaks down with time.
- List L Compounds. The U.S. Environmental Protection Agency (EPA) created a list of approved, effective decontaminants. The EPA list L contains all the approved decontamination solutions. Please note contact times and appropriate surfaces vary per decontamination solution listed.

### **Respiratory Protection Program**

Under Army Regulation 11-34, all personnel who use respiratory protection must be enrolled into a Respiratory Protection Program (RPP), regardless of the type of respiratory protection used or whether the use is mandated or voluntary. Enrollment in a RPP requires the following:

- Jobsite Standing Operating Procedure. There must be a written jobsite Standing Operating Procedure (SOP) on proper respirator selection, use (to include cleaning and storage), and maintenance.
- Medical Clearance. Enrollees must obtain, at a minimum, an annual medical clearance. The medical clearance includes both a medical questionnaire (Title 29 Code of Federal Regulation (CFR) Part 1910.134) and a physical medical evaluation.
- Training. Enrollees must participate in training for the use of a respirator; this must take place prior to first use and repeated, at a minimum, annually.
- Fit Testing. Fit testing is required (Title 29 CFR 1910.134) for any tight-fitting respirators (see definition in the Glossary) issued. At a minimum, fit testing will take place annually or whenever changes occur to the user's face or a new respirator is issued.

### **Hand Hygiene**

Proper hand hygiene is necessary throughout the donning of PPE, patient interaction, and doffing of PPE. Perform hand hygiene after contact with respiratory secretions and/or body fluids, before and after patient contact, and after touching contaminated objects or materials. Hand hygiene includes use of approved hand sanitizer as well as washing with soap and water.

## **Waste Disposal**

All PPE and associated waste (tape, gauze, etc.) generated should be disposed of properly as EVD waste. Proper EVD waste procedures are outlined in the Army Public Health Center's EVD Waste Management in MTF SOP (EHE37-001).

## **Personnel**

Personal Protective Equipment Trained Observer:

A PPE Trained Observer will be present to guide the PPE donning and doffing process. The observer will conduct a quality assurance and validation check to assess integrity of PPE and assure no skin or mucous membranes are exposed. The PPE Trained Observer will not proceed further than the warm zone and will be one tier level lower than the individual doffing. Although the observer may physically help with the donning of PPE, they will not assist with doffing.

Personal Protective Equipment Assistant:

A PPE Assistant will be present during the doffing procedure to assist in the removal of PPE. The assistant will be in PPE one tier level lower than the individual being assisted. Additionally they will follow all instructions presented by the PPE Trained Observer.

## **PERSONAL PROTECTIVE EQUIPMENT.**

The use of PPE in relation to EVD exposure can be broken into three categories: respiratory protection; eye protection; and protection of the remainder of the body. Each level of exposure risk has specific PPE requirements. Tier I requires the least amount of PPE and is least cumbersome to patient care, but subsequently is the least protective. Alternatively, Tier III PPE requires the most equipment and is the most cumbersome to patient care, but it is also the most protective. It is important that prior to entering any tier-level work zone, that all PPE is fully functional, properly sized, fitted, and the user is comfortable with its use and contingency plans. All donning and doffing of PPE should be done within view of a PPE Trained Observer. All Tier III doffing should be done with the assistance of the PPE Assistant, additionally the PPE Assistant may assist with doffing at any lower tier level.

## **General Personal Protective Equipment Information**

- **Gloves:** Perform hand hygiene prior to donning and after doffing gloves. Properly doff gloves by pinching glove in wrist area and peeling it away from the body and towards the fingers. Hold the removed glove in the opposite gloved hand. Insert a finger under cuff of glove and peel towards fingers, rolling glove inside out, containing the removed glove.
- **N-95 Respirator.** Use of the N-95 respirator is the preferred respiratory protection option for Tier II, but is the non-preferred option for Tier III. When using this option ensure that the proper size respirator is selected and a good seal is formed when donning the

respirator. The N-95 respirator is a tight-fitting respirator, and users are required to be enrolled in a RPP and to be fit tested prior to use. Use of an N-95 respirator without fit testing is not permitted. Any N-95 respirator equipped with an exhalation valve located on the front of the mask should not be used, as it provides the patient no protection from any possible pathogen the health care provider may be transmitting.

- **Fluid-Resistant Mask.** If non-aerosolizing tasks are being performed while using Tier II PPE and an N-95 respirator cannot be used, either for lack of supplies or fit-testing, a fluid-resistant mask may be used. A fluid-resistant mask, commonly referred to as a surgical mask, does not provide the same level of protection as an N-95 respirator, as they are designed with the purpose of protecting the patient from the health care provider, and not the provider from the patient. When this option is selected, it is important to ensure the adjustable nose bridge is properly cinched against the nose, and the mask is fully and properly fastened to the head.
- **Full-Face Shield.** A disposable full-face shield is used to protect the eyes and skin of the face from any possible splash of EVD-containing materials. The face shield should be worn over the surgical hood, and provide full coverage of the exposed skin of the face. It is important to place the forehead rest on the surgical hood to ensure complete skin coverage.
- **Surgical Hood.** This hood needs to be made of impermeable material and cover the neck. Ensure that the combination of surgical hood and full-face shield leaves no exposed skin on the head.
- **Scrubs.** Scrubs must be issued by the MTF and must be long sleeved. The MTF may choose to supply either reusable (laundered) or disposable scrubs. If reusable scrubs are used they must be laundered in a manner that prevents possible EVD contamination survival. Ensure the scrubs are properly sized to allow for freedom of movement.
- **Impermeable Gown.** The impermeable gown must be disposable, resistant to micro-organism penetration and have long sleeves. The gown should cover the body from the neck to the knees, wrap around the sides of the body and close in the back.
- **Loose Fitting Powered Air Purifying Respirator (PAPR).** Use of the PAPR is the preferred Tier III respiratory protection option. Use of a loose fitting PAPR does not require fit testing, but the user must be enrolled in the RPP. (Specifically, user must obtain medical clearance for use and complete annual training prior to use of a PAPR.) Proper cartridges must be selected for use with EVD patients; it is recommended that a combination high-efficiency particulate air and acid gas cartridge (specifically protective for chlorine) be used. The PAPR is ineffective if the blower battery is low or if the blower unit fails; therefore, a second battery must be accessible while in the hot zone.

- Impermeable Suit. The Impermeable suit must be disposable and resistant to micro-organism penetration. Suits with integrated thumb loops and booties are preferred. Care must be taken to properly dispose of suite after use.

**Specific Personal Protective Equipment Requirements by Tier**

The PPE required for use during encounters with suspected EVD patients will vary upon the Tiered Exposure Risk category. Generally each higher level builds upon the previous level. Table 3 describes the equipment required in each tier level.

**Table 3. Personal Protective Equipment Requirements by Tier Level**

	<b>Precaution Level*</b>	<b>Respiratory Protection</b>	<b>Eye Protect</b>	<b>Body Protection</b>
<b>Tier I</b>	Standard	None Prescribed	None Prescribed	Hands: Single layer disposable examination gloves
<b>Tier II</b>	Contact and Droplet	N-95 (Preferred) or Fluid Resistant Mask	Full face shield	Head: Surgical hood Body: Hospital-issued long sleeve scrubs and disposable impermeable gown with long sleeves Hands: Double layer of disposable extended cuff surgical gloves Legs and Feet: Tube Socks, hospital issued shoes and knee-high impermeable boot covers
<b>Tier III</b>	Contact, Droplet and Airborne	Loose Fitting PAPR^ (Preferred) or N-95	PAPR Hood or Full face shield (N-95 option only)	Head: Surgical hood if N-95 option being used Body: Hospital-issued long sleeve scrubs, Impermeable suit and disposable impermeable gown with long sleeves Hands: Preferably triple layer of disposable extended cuff surgical gloves. Double layer may be used and is recommended by the CDC#. Legs and Feet: Tube Socks, hospital issued shoes and knee-high impermeable boot covers

\* - Definition of levels of precaution can be found in Glossary

^ - PAPR – Powered Air Purifying Respirator

# - CDC – Centers for Disease Control and Prevention

## **Donning and Doffing Procedures for Personal Protective Equipment**

Each tier of PPE has specific donning and doffing procedures that are listed below. Regardless of tier level the PPE must be inspected prior to donning by user to check for proper fit and ensure there are no visible defects. While donning PPE the PPE Trained Observer will utilize the MTF generated donning checklist to aid the user. Prior to entry into the hot zone, the PPE Trained Observer and PPE Assistant will check for any compromises in PPE and for complete skin coverage. Prior to doffing PPE the PPE Trained Observer and the PPE assistant will conduct a visual inspection for any compromises in the PPE and any gross contamination. If any areas are found, spot decontamination of those locations should take place immediately. During the doffing procedure the PPE Trained Observer will utilize the MTF generate doffing checklist to aid the user, and the PPE assistant will physically aid the user doff PPE.

### Tier I PPE

#### *Donning:*

- Conduct proper hand hygiene
- Don properly sized disposable examination gloves

#### *Doffing:*

- Conduct proper hand hygiene
- Doff disposable gloves using proper technique to invert gloves as they are removed
- Dispose of gloves in properly labeled medical waste container
- Conduct proper hand hygiene

### Tier II PPE

#### *Donning:*

- Engage PPE Trained Observer
- Remove all street clothes (including all jewelry and personal communication devices)
- Don hospital-issued, correctly sized, disposable long sleeve scrubs
- Put on hospital-issued tube socks and fasten to scrub pants leg with duct tape
- Don correctly sized hospital-issued shoes
- Don extended cuff surgical glove, and extend cuff over scrub top sleeve. Fasten glove to scrub sleeve with duct tape
- Don and secure impermeable gown according to manufacturer's recommendations
- Don N-95 respirator or fluid-resistant mask. When donning the N-95 respirator, ensure that the proper size respirator is selected and a good seal is formed. When donning the fluid-resistant mask, ensure a snug fit.
- Don surgical hood
- Don face shield, ensuring all skin is covered by PPE
- Don second pair of extended cuff surgical gloves. Extend cuff over impermeable gown. This final layer should not be taped to allow for glove exchange.
- Don knee-high boot covers and fasten to scrub pant legs with duct tape



*Doffing:*

- Engage PPE trained observer
- Engage PPE assistant (If utilized)
- Spot decontaminate gloves and gown with decontamination solution
- Spray door handle to the warm room with decontamination solution
- Grasp front of gown and pull away from body to break ties. Do not touch the underlying interior suit. Roll the gown inside out while removing, touching only the contaminated gown.
- If outer layer of gloves does not come off with gown doff, follow Tier I instructions and dispose of gloves in EVD waste container.
- Remove boot covers
- Spray gloved hands with decontamination solution
- Enter warm zone by walking over a disposable fluid absorbent pad soaked with decontamination solution
- Reach behind head and remove the face shield, discard in the EVD waste container. Ensure not to touch front of shield.
- Spray gloved hands with decontamination solution
- Remove surgical hood, ensuring not to touch underlying skin. Dispose of surgical hood in the EVD waste container.
- Spray gloved hands with decontamination solution
- Remove N-95 respirator or fluid-resistant mask without touching front of mask. Dispose of N-95 respirator or fluid-resistant mask in the EVD waste container.
- Spray gloved hands with decontamination solution
- Doff inner gloves following Tier I instructions. Dispose of gloves in EVD waste container.
- Enter cool zone by walking over a disposable fluid absorbent pad soaked with decontamination solution.
- Perform hand hygiene
- Take full body shower

Tier III PPE

*Donning (PAPR Option):*

- Engage PPE trained observer
- Engage PPE assistant (If utilized)
- Ensure flow rate of blower unit of PAPR is greater than 6 ft<sup>3</sup>/min
- Remove all street clothes (including all jewelry and personal communication devices)
- Don hospital-issued, correctly sized, disposable long sleeve scrubs
- Put on hospital-issued tube socks and fasten to scrub pants with duct tape
- Don correctly sized hospital-issued shoes
- Don extended cuff surgical gloves, and extend cuff over scrub top sleeve. Fasten glove to scrub sleeve with duct tape.
- Don knee-high, disposable boot covers. Fasten boot cover to scrub pant leg with duct tape.
- Don properly sized impermeable suit and zip to mid-chest

- Attach PAPR belt with blower unit to waist
- Attach breathing tube to blower unit and PAPR hood
- Turn on blower unit and don PAPR hood
- Don upper half of impermeable suit, placing thumbs through integrated thumb loops in suit
- Have the PPE trained observer or assistant tuck inner PAPR hood liner into impermeable suit and finish zipping suit fully closed
- Smooth outer PAPR hood cape to fully cover shoulders
- Don second pair of extended cuff surgical gloves. Extend cuff over impermeable suit and duct tape to suit sleeve.
- Don impermeable gown and secure
- Don third pair of extended cuff surgical gloves, extend cuff to cover sleeve of impermeable gown. This final layer should not be taped to allow for glove exchange.

*Donning (N-95 Option):*

- Engage PPE trained observer
- Engage PPE assistant (If utilized)
- Remove all street clothes (including all jewelry and personal communication devices)
- Don hospital-issued, correctly sized, disposable long sleeve scrubs
- Put on hospital-issued tube socks and fasten to scrub pants with duct tape
- Don correctly sized hospital-issued shoes
- Don extended cuff surgical gloves, and extend cuff over scrub top sleeve. Fasten glove to scrub sleeve with duct tape.
- Don knee-high, disposable boot covers. Fasten boot cover with duct tape to scrub pant leg.
- Don properly sized impermeable suit, placing thumbs through integrated thumb loops in suit. Zip fully closed.
- Don N-95 respirator, ensure that the proper size respirator is selected and a good seal is formed when donning the respirator
- Don surgical hood. Ensure cape of surgical hood lays flat against impermeable suit.
- Don face shield, ensure all skin is covered by PPE
- Don second pair of extended cuff surgical gloves. Extend cuff over impermeable suit and tape to suit sleeve.
- Don impermeable gown and secure
- Don third pair of extended cuff surgical gloves, extend cuff to cover sleeve of impermeable gown. This final layer should not be taped to allow for glove exchange.

*Doffing (PAPR Option):*

- Engage PPE trained observer
- Engage PPE assistant
- Spot decontaminate gloves and gown with decontamination solution
- Spray door handle to the warm room with decontamination solution
- Grasp front of gown and pull away from body to break ties. Roll the gown inside-out while removing, touching only contaminated gown.

- If outer layer of gloves do not come off with gown doff, follow Tier I glove removal instructions and dispose of gloves in EVD waste container
- Spray gloved hands with decontamination solution
- Enter warm zone by walking over a disposable fluid absorbent pad soaked with decontamination solution
- The PPE assistant will spray individuals doffing PPE with decontamination solution. (Note: cap the side cartridges and leave the bottom cartridge open to prevent decontamination solution from entering cartridge.)
- Remove PAPR blower, but DO NOT turn off. Hand the blower unit with belt to the PPE assistant.
- Unzip impermeable suit and remove suit to ankles. Do not touch the interior of the suit. Roll suit inside out when removing, touching only the contaminated suit. Gloves should come off with resistant suit.
- Step out of impermeable suit. Dispose of impermeable suit in EVD waste container.
- If outer layer of gloves does not come off with gown doff, follow Tier I glove removal instructions and dispose gloves in EVD waste container.
- Spray gloved hands with decontamination solution.
- The PPE assistant will remove PAPR hood by pulling hood straight up. Detach PAPR breathing tube and dispose of PAPR hood in EVD waste container.
- Turn off PAPR blower unit and decontaminate bottom cartridge.
- Remove all cartridges and dispose in EVD waste container.
- Remove boot covers, one at a time while in the warm zone, then step into cold zone as covers are removed. Dispose boot covers in EVD waste container.
- Doff innermost glove following Tier I instructions. Dispose of gloves in EVD waste container.
- Perform hand hygiene
- Take full body shower

*Doffing (N-95 Option):*

- Engage PPE trained observer
- Engage PPE assistant
- Spot decontaminate gloves and gown with decontamination solution
- Spray entry handle to the warm room with decontamination solution
- Grasp front of gown and pull away from body to break ties. Do not touch the interior suit. Roll the gown inside out when removing, touching only contaminated gown.
- If outer layer of gloves does not come off with gown doff, follow Tier I glove removal instructions and dispose of gloves in EVD waste container.
- Spray gloved hands with decontamination solution
- Enter warm zone by walking over a disposable fluid absorbent pad soaked with decontamination solution
- The PPE assistant will spray individuals doffing PPE with decontamination solution
- Reach behind head, remove the face shield, and discard in the EVD waste container. Ensure not to touch front of shield.
- Spray gloved hands with decontamination solution.

- Remove surgical hood, ensure to not touch underlying skin. Dispose in the EVD waste container.
- Unzip impermeable suit and remove suit to ankles. Do not touch the interior suit. Roll suit inside out when removing, touching only the contaminated suit. Gloves should come off with resistant suit.
- Step out of impermeable suit. Dispose impermeable suit in EVD waste container.
- If outer layer of gloves do not come off with gown doff, follow Tier I glove removal instructions and dispose of gloves in EVD waste container.
- Spray gloved hands with decontamination solution.
- Remove boot covers, one at a time while in the warm zone, stepping into cold zone as covers are removed. Dispose boot covers in EVD waste container.
- Remove N-95 respirator or fluid-resistant mask without touching front of mask. Dispose in the EVD waste container.
- Doff inner gloves following Tier I instructions. Dispose gloves in EVD waste container.
- Enter cool zone by walking over a disposable fluid absorbent pad soaked with decontamination solution.
- Perform hand hygiene
- Take full body shower

### **Personal Protective Equipment Trouble**

#### Breach in PPE

A breach in PPE consists of tears or holes in gloves, gowns, and/or suits, as well as separations in the seams. If a breach occurs, remain calm and stop work immediately. Spray area of breach with decontamination solution while remaining in hot zone. Follow doffing procedures and exit into warm room. Doff to level below breach. If breach is completely to scrubs, decontaminate scrubs with decontamination solution and immediately shower. It is necessary to report all breaches to leadership.

#### PAPR Failure

Remain calm, remove yourself from imminent EVD hazard, and decontaminate outer layer of gloves. Check all PAPR equipment is connected and turned to the on-position, to include the blower unit and battery unit. If needed, change battery within hot zone. If the previous solutions do not restore PAPR function, proceed to decontaminate and doff equipment as stated above.

Prepared by: Industrial Hygiene Field Services

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## Appendix A References

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Centers for Disease Control and Prevention. 2002. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *MMWR* Vol. 51, No. RR-16:3.

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## **Appendix B Additional References**

Army Public Health Center (Provisional) Ebola Viral Disease Web site:

<https://phc.amedd.army.mil/topics/discond/diseases/Pages/Ebola-Virus-Disease.aspx>

Centers for Disease Control and Prevention Ebola Viral Disease Website:

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

Environmental Protection Agency Approved Ebola Viral Disease Cleaning Solutions:

[https://www.epa.gov/sites/production/files/2018-01/documents/2018.10.01.listl\\_.pdf](https://www.epa.gov/sites/production/files/2018-01/documents/2018.10.01.listl_.pdf)

## Glossary

### **Airborne Precautions**

Guidelines recommended by the Centers for Disease Control and Prevention (CDC) for reducing the risk of airborne transmission of infectious agents. Airborne droplet nuclei consist of small-particle residue (5 micrometer ( $\mu\text{m}$ ) or smaller in size) of evaporated droplets that may remain suspended in the air for a long time. Airborne transmission occurs by dissemination of either airborne droplet nuclei or dust particles containing the infectious agent. Microorganisms carried in this manner can be widely dispersed by air currents and may be inhaled or deposited on a susceptible host from the source patient. Special air handling and ventilation are required to prevent airborne transmission. Airborne precautions apply to patients known or suspected to be infected with epidemiologically important pathogens that can be transmitted by the airborne route. Examples include measles (rubeola), varicella zoster virus infections, Legionella infection, disseminated zoster, and tuberculosis.

### **Antiseptic Hand Rub**

As defined by the CDC: "Applying an antiseptic hand-rub product to all surfaces of the hands to reduce the number of microorganisms present." (Ex. alcohol based hand sanitizer.)

### **Antiseptic Hand wash**

As defined by the CDC: "Washing hands with water and soap or other detergents containing an antiseptic agent."

### **Contact Precautions**

Guidelines recommended by the CDC for reducing the risk of transmission of epidemiologically important microorganisms by direct or indirect contact. Direct-contact transmission involves skin-to-skin contact and physical transfer of microorganisms to a susceptible host from an infected or colonized person. This can occur when health care personnel perform patient-care activities that require physical contact, such as turning or bathing the patient. Direct-contact transmission can also occur between two patients, such as by hand contact, with one patient serving as the source of infectious microorganisms and the other as a susceptible host. Indirect-contact transmission involves contact of a susceptible host with a contaminated intermediate object, usually inanimate, in the patient's environment. Contact precautions apply to specified patients known or suspected to be infected or colonized with epidemiologically important microorganisms that can be transmitted by direct or indirect contact.

### **Droplet Precautions**

Guidelines recommended by the CDC for reducing the risk of droplet transmission of infectious agents. Droplet transmission involves contact of the conjunctivae or the mucous membranes of the nose or mouth of a susceptible person with large-particle droplets (larger than 5  $\mu\text{m}$  in size) containing microorganisms generated from a person who has a clinical disease or is a carrier of the disease. Droplets are generated from the source person primarily during coughing, sneezing, talking, and performance of certain procedures such as suctioning and bronchoscopy. Transmission of large-particle droplets requires close contact between source and recipient persons because droplets do not remain suspended in the air and generally travel only short distances (usually three feet or less). Special air handling and ventilation are not required to prevent droplet transmission because droplets do not remain suspended in the air. Droplet Precautions apply to any patient known or suspected to be infected with epidemiologically important pathogens that can be transmitted by infectious droplets.

### **Hand Hygiene**

As defined by the CDC: “A general term that applies to either hand washing, antiseptic hand wash, antiseptic hand rub, or surgical hand antisepsis.”

### **Hand Washing**

As defined by the CDC: “Washing hands with plain (i.e., non-antimicrobial) soap and water.

### **Standard Precautions**

The minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where healthcare is delivered. These practices are designed to both protect the healthcare provider and prevent the healthcare provider from spreading infections among patients.

### **Tight-Fitting Respirator**

As defined by the Occupational Safety and Health Administration: “A respiratory inlet covering that forms a complete seal with the face.”