



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Ebola (Ebola Virus Disease)

Guidance on Personal Protective Equipment (PPE) To Be Used By Healthcare Workers during Management of Patients with Confirmed Ebola or Persons under Investigation (PUIs) for Ebola who are Clinically Unstable or Have Bleeding, Vomiting, or Diarrhea in U.S. Hospitals, Including Procedures for Donning and Doffing PPE

Page Summary

Who this is for: Healthcare workers, supervisors, and administrators at U.S. hospitals.

What this is for: To protect healthcare workers and other patients at facilities that provide care to a patient with confirmed Ebola or PUI who is clinically unstable or has bleeding, vomiting, or diarrhea by describing protocols for using PPE.

How to use: Incorporate into infection control and safety training for healthcare workers who provide care to patients with Ebola and use in planning for staffing and supply management.

How it relates to other guidance documents: There are two PPE guidance documents for U.S. hospital workers who may evaluate or care for Ebola patients. Workers should wear this recommended PPE ensemble when evaluating and caring for:

1. A person who meets the definition of a [Person Under Investigation \(PUI\)](#) for Ebola and is
 - a. Exhibiting obvious bleeding, vomiting, or diarrhea; OR
 - b. Clinically unstable and/or will require invasive or aerosol-generating procedures (e.g., intubation, suctioning, active resuscitation).
2. A person with [confirmed Ebola](#).

Refer to [For U.S. Healthcare Settings: Donning and Doffing Personal Protective Equipment \(PPE\) for Evaluating Persons Under Investigation \(PUIs\) for Ebola Who Are Clinically Stable and Do Not have Bleeding, Vomiting, or Diarrhea](#) recommended when evaluating and caring for a [PUI](#) who is:

1. Not exhibiting obvious bleeding, vomiting, or diarrhea; AND
2. Clinically stable and will not require invasive or aerosol-generating procedures (e.g., intubation, suctioning, active resuscitation).

Key points

- Healthcare workers caring for patients with Ebola must have received comprehensive training and demonstrated competency in performing Ebola-related infection control practices and procedures.
- PPE that covers the clothing and skin and completely protects mucous membranes is required when caring for patients with Ebola.
- Personnel providing care to patients with Ebola must be supervised by an onsite manager at all times, and a trained observer must supervise each step of every PPE donning/doffing procedure to ensure established PPE protocols are completed correctly.
- Individuals unable or unwilling to adhere to infection control and PPE use procedures should not provide care for patients with Ebola.

Updates to previous versions of this guidance

This Ebola PPE guidance has been updated to add detail, clarify where needed, and improve the format. Specifically, the guidance was updated to:

- Expand the rationale for respiratory protection;
- Clarify that the trained observer should not serve as an assistant for doffing PPE;
- Suggest that a designated doffing assistant or “buddy” might be helpful, especially in doffing with the powered air purifying respirator (PAPR) option;
- Modify the PAPR doffing procedure to make the steps clearer;
- Change the order of boot cover removal. Boot covers should now be removed after the gown or coverall;
- Clarify the types of gowns and coveralls that are recommended and provide a link to considerations for gown and coverall selection; and
- Emphasize the importance of frequent cleaning of the floor and work surfaces in the doffing area.

Introduction

The following guidance on the types of PPE to be used and the processes for donning (putting on) and doffing (removing) PPE is for all personnel entering the room of a patient hospitalized with Ebola. This guidance reflects lessons learned from the recent experiences of U.S. hospitals caring for patients with Ebola and emphasizes the importance of **training, practice, competence, and observation** of healthcare workers, especially in correct donning and doffing of PPE.

In healthcare settings, Ebola is [spread through direct contact](#) with blood or body fluids of a person who is sick with Ebola or with objects (e.g., bathroom surfaces, medical equipment) that have been contaminated with infectious blood or body fluids. The virus in blood and body fluids can enter a person’s body through broken skin or unprotected mucous

Selecting Protective Clothing >

[Respiratory Protection for Ebola](#) 



[Web-based PPE training](#)


membranes in, for example, the eyes, nose, or mouth. For all healthcare workers caring for patients with Ebola, PPE that fully covers skin and clothing and prevents any exposure of the eyes, nose, and mouth is recommended to reduce the risk of accidental self-contamination of mucous membranes or broken skin. All PPE must be used in the context of a comprehensive infection control program that follows CDC recommendations and applicable Occupational Safety and Health Act of 1970 (OSHA) requirements, including the [Bloodborne Pathogens \(29 CFR 1910.1030\)](#) [\[4\]](#), [PPE \(29 CFR 1910.132\)](#) [\[4\]](#), and [Respiratory Protection \(20 CFR 1910.134\)](#) [\[4\]](#) standards, and other requirements under OSHA (e.g., the General Duty Clause, section 5(a)(1); and prohibitions against discrimination or retaliation against workers, section 11(c)).

To protect healthcare workers who are caring for patients with Ebola, healthcare facilities must provide onsite management and oversight of adherence to safely using PPE, and implement administrative and environmental controls with continuous safety checks through direct observation of healthcare workers, including during the PPE donning and doffing steps.

Section 1. Recommended Administrative and Environmental Controls for Healthcare Facilities

Protecting healthcare workers and preventing spread of Ebola to other patients requires that proper administrative procedures and safe work practices be carried out in appropriate physical settings. These include the following:

- At an administrative level, the facility's infection prevention management team (i.e., infection control), in collaboration with the facility's occupational health department and other clinical departments, should:
 - Establish and implement triage protocols to effectively and promptly identify patients who could have Ebola.
 - Designate site managers who are responsible for overseeing the implementation of routine and additional precautions for healthcare worker and patient safety. These site managers should have experience in implementing protocols for employee safety, infection control, and patient safety. A site manager's sole responsibility is to ensure the safe delivery of clinical care to patients with Ebola. They are responsible for all aspects of Ebola infection control, including access to supplies and ongoing evaluation of safe practices with direct observation of care before, during, and after staff enter an isolation and treatment area.
 - At least one site manager should be on-site at all times in the location where a patient with Ebola is receiving care.
 - Consider engaging the hospital incident command structure to further facilitate implementing Ebola-specific precautions.
 - Identify, ahead of time, critical patient care functions and essential healthcare workers to care for patients with Ebola, collect laboratory specimens, and manage the environment and waste.
 - Ensure healthcare workers have been trained and evaluated in all recommended protocols to safely care for patients with Ebola before they enter the patient care area.
 - Ensure that workplace safety programs are in place and have been followed, in particular for OSHA's Bloodborne Pathogens, PPE and Respiratory Protection standards described above. Coordinate with safety program administrators to ensure that all PPE, including respirators, has been selected on the basis of a written risk assessment and that requirements for medical surveillance, medical clearance, fit testing, training, maintenance, storage, reporting, etc. are in place for all workers with potential exposure to Ebola.
 - Train healthcare workers on all PPE recommended in the facility's protocols. Healthcare workers should practice donning and doffing procedures and must demonstrate competency through testing and assessment before caring for patients with Ebola.

- Healthcare workers should practice simulated patient care activities while wearing the PPE to understand the types of physical stress that might be involved and determine tolerable shift lengths.
 - Use trained observers to make certain that PPE is being used correctly and that donning and doffing PPE protocols are being adhered to by using a checklist for each step of the donning and doffing procedure.
 - Personnel who are unable to correctly use PPE and adhere to protocols should not provide care for patients with Ebola.
- Document training of observers and healthcare workers for proficiency and competency in donning and doffing PPE and in performing all necessary care-related duties while wearing PPE.
- Designate spaces so that PPE can be donned and doffed in separate areas to prevent any cross-contamination.
- Key safe work practices include the following:
 - Identify and promptly isolate the patient with Ebola in a single patient room with a closed door and a private bathroom or covered bedside commode.
 - Limit room entry to only those healthcare workers essential to the patient's care and restrict non-essential personnel and visitors from the patient care area.
 - Monitor the patient care area at all times, and, at a minimum, log entry and exit of all healthcare workers who enter the room of a patient with Ebola.
 - Be able to safely conduct routine patient care activities (e.g., obtaining vital signs and conducting clinically-appropriate examinations, collecting and appropriately packaging laboratory specimens).
 - Dedicate a trained observer to watch closely and provide coaching for each donning and each doffing procedure to ensure adherence to donning and doffing protocols.
 - Ensure that healthcare workers take sufficient time to don and doff PPE slowly and correctly without distraction.
 - Reinforce the need to keep hands away from the face during any patient care and to limit touching surfaces and body fluids.
 - Frequently disinfect gloved hands by using an alcohol-based hand rub (ABHR), particularly after contact with body fluids.
 - Prevent needlestick and sharps injuries by adhering to correct sharps handling practices,
 - Avoid unnecessary procedures involving sharps.
 - Use needleless IV systems whenever possible.
 - Immediately clean and disinfect any visibly contaminated PPE surfaces, equipment, or patient care area surfaces using an [*EPA-registered disinfectant wipe](#) .
 - Regularly clean and disinfect surfaces in the patient care area, even in the absence of visible contamination.
 - Only nurses or physicians should clean and disinfect surfaces in the patient care areas to limit the number of additional healthcare workers who enter the room.
 - Observe (by the site manager or his/her designee) healthcare workers in the patient room if possible (e.g., through a glass-walled intensive care unit [ICU] room, video link) to identify any unrecognized lapses or near misses in safe care.
 - Establish a facility exposure management plan that addresses decontamination and follow-up of healthcare workers in the case of any unprotected exposure. Training and follow-up should be part of the healthcare worker training.

Section 2. Principles of PPE

Healthcare workers must follow the basic principles below to ensure that no infectious material reaches unprotected skin or mucous membranes while providing patient care.

- Donning
 - PPE must be donned correctly in proper order before entry into the patient care area; PPE should not be later modified while in the patient care area. The donning activities must be directly observed by a trained observer.
- During Patient Care
 - PPE must remain in place and be worn correctly for the duration of work in potentially contaminated areas. PPE should not be adjusted during patient care. In the event of a significant splash, the healthcare worker should immediately move to the doffing area to remove PPE. The one exception is that visibly contaminated outer gloves can be changed while in the patient room and patient care can continue. Contaminated outer gloves can be disposed of in the patient room with other [Ebola-associated waste](#).
 - Healthcare workers should perform frequent disinfection of gloved hands using an ABHR, particularly after contact with body fluids.
 - If during patient care any breach in PPE occurs (e.g., a tear develops in an outer glove, a needlestick occurs, a glove separates from the sleeve), the healthcare worker must move immediately to the doffing area to assess the exposure. The facility exposure management plan should be implemented; including correct supervised doffing and appropriate occupational health follow-up, if indicated by assessment. In the event of a potential exposure, bloodborne pathogen exposure procedures must be followed in accordance with the [OSHA Bloodborne Pathogens Standard](#) [↗](#).
- Doffing
 - Removing used PPE is a high-risk process that requires a structured procedure, a trained observer, a doffing assistant in some situations, and a designated area for removal to ensure protection.
 - PPE must be removed slowly and deliberately in the correct sequence to reduce the possibility of self-contamination or other exposure to Ebola.
 - A stepwise process should be developed and used during training and patient care.

Double-gloving provides an easy way to remove gross contamination by changing an outer glove during patient care and when removing PPE. Beyond this, more layers of PPE may make it more difficult to perform patient care duties and put healthcare workers at greater risk for percutaneous injury (e.g., needlesticks), self-contamination during care or doffing, or other exposures to Ebola. If healthcare facilities decide to add additional PPE or modify this PPE guidance, they must consider the risk/benefit of any modification and train healthcare workers on how to correctly don and doff for the modified procedure. Donning and doffing steps may need to be adapted on the basis of the specific PPE that is purchased by the hospital. If adaptations are made, facilities must select PPE that offers a similar or higher level of protection than what is recommended here, train healthcare workers in its use, and ensure they demonstrate competence in its use before caring for a patient with Ebola.

Section 3. Training on Correct Use of PPE

Training ensures that healthcare workers are knowledgeable and proficient in donning and doffing PPE before caring for a patient with Ebola. Comfort and proficiency when donning and doffing are only achieved by repeatedly practicing correct use of PPE. Healthcare workers should be required to demonstrate competency in using PPE, including donning

and doffing while being observed by a trained observer, before working with patients with Ebola. Training should be tailored to the intended audience and effectively transmit the required information. In addition, during practice, healthcare workers and their trainers should assess proficiency and comfort with performing required duties while wearing PPE. People unwilling or unable to fulfill these requirements should not care for a patient with Ebola.

- The following elements are essential for PPE training:
 - How to safely don, adjust, use, and doff the specific PPE that the healthcare worker will use;
 - How to safely conduct routine clinical care;
 - Limitations of the PPE (e.g., duration of use, degree of protection);
 - What to do in the case of an equipment failure or detection of a breach in PPE;
 - How to maintain PPE and appropriately dispose of it after use; and
 - The possible physiologic strain associated with using PPE, and how to recognize and report early signs and symptoms, such as fatigue.
- Training must be interactive and should allow frontline healthcare workers to practice donning, adjusting, using, and doffing the specific PPE that the employee will use.
- Hospitals should ensure that the trained employees understand the content of the training and can correctly perform the required tasks.
- Hospitals should also ensure that employees can demonstrate how to properly don, use, and doff the same type/model PPE and respirators that they will use when caring for a patient.
- Regular refresher trainings are essential to maintaining these skills.

Section 4. Use of a Trained Observer

Because the sequence and actions involved in each donning and doffing step are critical to avoid exposure, a trained observer should read aloud to the healthcare worker each step in the procedure checklist and visually confirm and document that the step has been completed correctly. The trained observer has the sole responsibility of ensuring that donning and doffing processes are adhered to. The trained observer must be knowledgeable about all PPE recommended in the facility's protocol and the correct donning and doffing procedures, including how to dispose of used PPE, and must be qualified to provide guidance and recommendations to the healthcare worker. The trained observer will coach, monitor, and document successful donning and doffing procedures, and provide immediate corrective instruction if the healthcare worker is not following the recommended steps. However, the trained observer should NOT provide physical assistance during doffing, which would require direct contact with potentially contaminated PPE. The trained observer is required to wear PPE, nonetheless, because the coaching role will necessitate being present in the PPE removal area during the doffing process. PPE for the trained observer is described in Section 8. The trained observer should know the exposure management plan in the event of an unintentional break in procedure. A designated doffing assistant or "buddy" might be helpful in some circumstances, e.g., during the doffing of the PAPR.

Section 5. Designating Areas for PPE Donning and Doffing

- Ensure that areas for donning and doffing are designated as separate from the patient care area (e.g., patient's room) and that there is a predominantly one-way flow from the donning area to the patient care area to the doffing area.
- Confirm that the doffing area is large enough to allow freedom of movement for safe doffing as well as space for a

[waste receptacle](#), a new glove supply, and ABHR used during the doffing process. If using a PAPR with external belt-mounted blower, confirm that there is an area or container designated for collecting PAPR components for cleaning and disinfection, as well as routine maintenance.

Facilities should ensure that space and layout allow for clear separation between clean and contaminated areas. Separate the space into distinct areas and establish a directional, one-way flow of care, moving from clean areas (e.g., area where PPE is donned and unused equipment is stored) to the patient room and to the PPE removal area (area where potentially contaminated PPE is removed and discarded). The direction of flow should be marked (e.g., signs on the floor) with visible signage; temporary plastic enclosures can be added if necessary. Existing anterooms to patient rooms have been used for doffing but in many cases are not ideal because of their small dimensions. As an alternative, some steps of the PPE removal process may be performed in a clearly designated area of the patient's room near the door, provided these steps can be seen and supervised by a trained observer (e.g., through a window) and provided that the healthcare worker doffing PPE can hear the instructions of the trained observer.

Whenever possible, close the end of the hallway of a ward or ICU to through traffic, thereby restricting access to the patient's room to essential personnel who are properly trained in recommended infection prevention practices for caring for patients with Ebola. Designate two adjacent rooms, located on either side of the patient's room, to be cleared of equipment and furniture and used as donning and doffing areas. Glass-enclosed rooms or other designs (e.g., wide glass doors, windows, video monitoring) to observe ongoing care in the patient room and activity in the doffing area are preferred. The path from the room of the patient with Ebola to an external doffing room should be as short as possible and clearly defined and/or enclosed as a contaminated area that is cleaned frequently along with the doffing area. If areas are reconfigured, the facility should make certain the space remains compliant with all applicable building and fire codes.

Post signage to highlight key aspects of PPE donning and doffing, including


- Designating clean areas vs. contaminated areas
- Reminding healthcare workers to wait for a trained observer before removing PPE
- Listing each step of the doffing procedure
- Reinforcing the need for slow and deliberate removal of PPE to prevent self-contamination
- Reminding healthcare workers to disinfect gloved hands in between steps of the doffing procedure, as indicated below.

Designate the following areas with appropriate signage

1. PPE Storage and Donning Area

This is a clean area outside the patient room (e.g., a nearby vacant patient room, a marked area in the hallway outside the patient room) where clean PPE is stored and where healthcare workers don PPE before entering the contaminated area and the patient's room. Do not store potentially contaminated equipment (e.g., PAPR components that have not been cleaned and disinfected), used PPE, or waste removed from the patient's room in the clean area. If waste must pass through this area, it must be [properly contained](#).

2. Patient Room

Use a single-patient room, preferably with a private bathroom; a covered bedside commode with bagging of human waste is an alternative approach. Plan ahead for the need to store many bags of regulated medical waste before their secondary containment. Additional guidance on waste management can be accessed at [Ebola-Associated Waste Management](#) and www.osha.gov/Publications/OSHA_FS-3766.pdf  [PDF – 6 pages]. The door to the patient room should be kept closed. Any item or healthcare worker exiting this room should be considered contaminated.

3. PPE Doffing Area

Designate an area near the patient's room (e.g., anteroom or adjacent vacant patient room that is separate from the clean area) where healthcare workers leaving the patient's room can stand to doff and discard their PPE. Alternatively, some steps of the PPE removal process may be performed in a clearly designated area of the patient's room near the door, provided these steps can be seen and supervised by a trained observer (e.g., through a window and provided that the healthcare worker doffing PPE can hear the instructions of the trained observer). Do not use this designated area within the patient room for any other purpose. Stock gloves in a clean section of the PPE removal area accessible to the healthcare worker while doffing.

In the PPE removal area, provide supplies to disinfect PPE and perform hand hygiene and space to remove PPE, including an easily cleaned and disinfected seat where healthcare workers can remove boot or shoe covers. If space allows, designate stations around the perimeter of the doffing room where each piece of PPE will be removed, moving from more contaminated to less contaminated areas of the room as PPE is doffed. Provide [leak-proof disposable infectious waste containers](#) for discarding used PPE. Provide a container to collect all reusable PAPR components. Frequently clean and disinfect the PPE removal area, including after each doffing procedure has been completed. One way such cleaning may be achieved is by having another healthcare worker who has just donned their full PPE clean the doffing area, moving from cleaner to dirtier areas within the doffing area, before entering the patient's room.

Facilities should consider making showers available for use for the comfort of healthcare workers after doffing PPE at the end of their shift; the heat from wearing PPE is likely to cause significant perspiration.

Section 6. Selecting PPE for Healthcare Workers Who Care for Patients with Ebola

This section outlines several PPE combinations and how they should be worn. The key to safely wearing PPE is consistent and correct use reinforced by repeated training and practice. Variations in PPE used to care for patients with Ebola should be avoided within a facility. A facility should select and standardize the PPE to be used by all healthcare workers who are directly interacting with patients with Ebola. OSHA's Bloodborne Pathogens standard requires employers to establish a written Exposure Control plan designed to eliminate or minimize employee exposures and should include procedures for donning and doffing the PPE ensemble that is chosen. The protocol must be reviewed by staff who participate in Ebola care and the trained observer should ensure the protocol is adhered to.

[Airborne transmission](#) of Ebola has not been documented in hospitals or households during any of the human outbreaks investigated to date. However, certain procedures (e.g., bronchoscopy, endotracheal intubation) might create mechanically generated aerosols that could be infectious. Such aerosol-generating procedures require additional precautions. Experience in the care of patients hospitalized with Ebola in the United States indicates that the level of care may change unexpectedly and could require an aerosol-generating procedure. Because there might not be time for staff

to leave the room to don proper PPE for an aerosol-generating procedure, CDC recommends that all healthcare workers entering the room of a patient with Ebola wear respiratory protection that would protect them during an aerosol-generating procedure. This would include a NIOSH-certified, fit-tested N-95 or higher respirator, or a PAPR.

Safety and comfort are both critical for healthcare workers wearing PPE while caring for patients with Ebola. Standardized attire under PPE (e.g., surgical scrubs or disposable garments and dedicated washable footwear) helps the donning and doffing process and eliminates concerns of contaminating personal clothing. Footwear should be closed-toe, soft-soled, washable, and have a closed back. If facilities elect to use different PPE from what is outlined below (e.g., coveralls with either an integrated hood or a surgical hood with integrated full face shield), they must train healthcare workers on how to use each type of PPE type and ensure that donning and doffing procedures are adjusted and practiced accordingly. Extra layers of PPE are not advised because they can reduce comfort, field of vision, and mobility and increase the risk of error and injury while adding no meaningful protection for the wearer.

In this guidance, *impermeable* gowns and coveralls indicates that the material and construction have demonstrated resistance to synthetic blood and simulated bloodborne pathogens. In contrast, *fluid-resistant* indicates a gown that has demonstrated resistance to water or a coverall that has demonstrated resistance to water or synthetic blood. These categories reflect the currently available U.S. product specifications; specific test methods that assess resistance for these products are listed in Table 1. When purchasing gowns and coveralls, facilities should follow specifications in Table 1 to ensure they select gowns and coveralls as described in Sections 5 and 6 below.

Table 1. Specifications for impermeable and fluid-resistant gowns and coveralls

	Gown	Coverall
Impermeable	Surgical or isolation* gown that passes: <ul style="list-style-type: none"> • ANSI/AAMI PB70 Level 4 requirements 	Coverall* made with fabric and seams/closures that passes: <ul style="list-style-type: none"> • ASTM F1671 (13.8kPa) or • ISO 16604 \geq 14 kPa
Fluid-resistant	Surgical or isolation* gown that passes: <ul style="list-style-type: none"> • ANSI/AAMI PB70 Level 3 requirements or • EN 13795 high performance surgical gown requirements 	Coverall* made of fabric that passes: <ul style="list-style-type: none"> • AATCC 42 \leq 1 g and AATCC 127 \geq 50 cm H₂O or EN 20811 \geq 50 cm H₂O or • ASTM F1670 (13.8kPa) or • ISO 16603 \geq 3.5 kPa

*Testing by an ISO 17025 certified third party laboratory is recommended.

For more details, refer to technical document “Considerations for Selecting Protective Clothing used in Healthcare for Protection Against Microorganisms in Blood and Body Fluids”, which provides a more detailed explanation of the scientific evidence and national and international standards, test methods, and specifications for fluid-resistant and impermeable [protective clothing used in healthcare](#).

Section 7. Recommended PPE When Caring for a Patient with Confirmed Ebola or Unstable PUI

- **Impermeable garment:**
 - **Single-use (disposable) impermeable gown** extending to at least mid-calf.
OR
 - **Single-use (disposable) impermeable coverall.** Coveralls without integrated hoods are preferred; coveralls with or without integrated socks are acceptable. Coveralls and gowns should be available in appropriate sizes so people with long arms are able to cover their forearms without gaps between gloves and sleeves when extending their arms to perform normal duties. Consider selecting gowns or coveralls with thumb hooks to the secure sleeves over the inner glove. Facilities that choose to tape gloves will need to ensure that the tape does not tear the gloves or gown/coverall during doffing and that sharp implements, such as scissors, are not needed to remove the tape. Experience in some facilities suggests that taping can increase risk by making the doffing process more difficult and cumbersome; however, other facilities have identified ways to optimize the use of tape and other adherent materials to anchor sleeves over inner gloves. **Scissors should never be used to remove tape or any other part of PPE.**
- **Respiratory Protection:** Either a PAPR or disposable, NIOSH-certified N95 respirator should be worn in case a potentially aerosol-generating procedure needs to be performed emergently. PAPRs with a full-face covering and head-shroud make accidental self-contamination during care more difficult (e.g., while adjusting eyeglasses); disposable N95 face piece respirators are less cumbersome and can be easier to doff safely. Any respirator must be used in the context of a comprehensive, written respiratory protection program as required under [OSHA Respiratory Protection Standard](#) [\[4\]](#), 29 CFR 1910.134. This standard includes a hazard assessment to ensure appropriate respirator protection, fit testing, medical evaluation, and training of the worker. When required in the occupational setting, tight-fitting respirators cannot be used by people with facial hair that interferes with the face seal.
 - **PAPR:** A hooded respirator with a full face shield, helmet, or headpiece. Any reusable helmet or headpiece must be covered with a single-use (disposable) hood that extends to the shoulders and fully covers the neck and is compatible with the selected PAPR. If a hood is used over the PAPR, it must not interfere with the function of the PAPR. The facility should follow manufacturer's instructions for decontaminating reusable components and, on the basis of those instructions, develop facility protocols that include designating responsible personnel who ensure that the equipment is safely and appropriately reprocessed and that batteries are fully charged before reuse.
 - A PAPR with a self-contained filter and blower unit integrated inside the helmet can facilitate doffing.
 - A PAPR with external belt-mounted blower unit requires an additional doffing step, as described below.
 - **N95 Respirator:** Single-use (disposable) N95 respirator or higher in combination with single-use (disposable) surgical hood extending to shoulders and single-use (disposable) full face shield¹. If N95 respirators are used instead of PAPRs, healthcare workers should be carefully observed to ensure that they do not inadvertently touch their faces under the face shield during patient care.
- **Single-use (disposable) examination gloves with extended cuffs.** Two pairs of gloves should be worn so that a heavily soiled outer glove can be safely removed and replaced during care. At a minimum, outer gloves should have

extended cuffs. Double-gloving also allows potentially contaminated outer gloves to be removed during doffing to avoid self-contamination.

- **Single-use (disposable) boot covers** that extend to at least mid-calf. In addition, single-use (disposable) ankle-high shoe covers ("surgical booties") worn over boot covers may be considered to facilitate the doffing process, reducing contamination of the floor in the doffing area thereby reducing contamination of underlying shoes. Although the use of shoe covers over boot covers may be analogous to using double gloves to ensure safe doffing, the risk of significant contamination to underlying shoes from the floor during the doffing process is very low relative to the risk of gloved hand contamination. Thus facilities may consider methods other than shoe covers worn over boot covers to facilitate doffing of footwear including, most importantly, frequent cleaning of the floor in the doffing area. Boot and shoe covers (if the latter are used) should allow for ease of movement and must not present a slip hazard to the wearer.
 - **Single-use (disposable) shoe covers** are acceptable only if they will be used in combination with a coverall with integrated socks.
- **Single-use (disposable) apron** that covers the torso to the level of the mid-calf should be used over the gown or coveralls if patients with Ebola are vomiting or have diarrhea, and should be used routinely if the facility is using a coverall that has an exposed, unprotected zipper in the front. An apron provides additional protection, reducing the contamination of gowns or coveralls by body fluids and providing a way to quickly remove a soiled outer layer during patient care. Select an apron with a neck strap that can be easily broken or untied to avoid having to pull the strap over the head, which makes it easier to remove without self-contamination when exchanging a soiled apron during care or when removing the apron during the doffing procedure.

Section 8. Recommended PPE for Trained Observer and Doffing Assistant during Observations of PPE Doffing

The trained observer should not enter the room of a patient with Ebola but must be in the PPE donning and doffing area to observe donning and doffing procedures, as outlined in Section 7. The following PPE are recommended for trained observers and doffing assistants observing the doffing process:

- Single-use (disposable) fluid-resistant gown that extends to at least mid-calf or single-use (disposable) fluid-resistant coverall without integrated hood.
- Single-use (disposable) full face shield.
- Single-use (disposable) surgical mask.
- Single-use (disposable) gloves with extended cuffs. Two pairs of gloves should be worn. At a minimum, outer gloves should have extended cuffs.
- Single-use (disposable) ankle-high shoe covers. Shoe covers should allow for ease of movement and not present a slip hazard to the wearer.

Trained observers should don and doff selected PPE according to the same procedures outlined below.

Facilities may elect to use impermeable gowns or coveralls for their trained observers to standardize the PPE in the unit, for ease of training personnel on a single item, and to prevent healthcare personnel entering the patient care area from inadvertently selecting a fluid-resistant gown or coverall instead of the recommended impermeable garment. If facilities

elect to use fluid-resistant gowns or coveralls for their trained observers, they must take measures (e.g., staff training, good signage, clear labeling of the product, good inventory management practices) to ensure that the correct garment is selected by appropriate personnel.

Section 9. Recommended Sequences for Donning PPE

Section 9A. Donning PPE, PAPR Option

Donning PPE, PAPR Option – This donning procedure assumes the facility has elected to use PAPRs. An established protocol facilitates training and compliance. A trained observer should verify compliance with the protocol.

1. **Engage Trained Observer:** The donning process is guided and supervised by a trained observer, who confirms visually that all PPE is serviceable and has been donned successfully. The trained observer should use a written checklist to guide and confirm each step in donning PPE and can verify the integrity of the ensemble. No exposed clothing, skin or hair of the healthcare worker should be visible at the conclusion of the donning process.
2. **Remove Personal Clothing and Items:** Change into surgical scrubs (or disposable garments) and dedicated washable (plastic or rubber) footwear in a suitable clean area. No personal items (e.g., jewelry including rings, watches, cell phones, pagers, pens) should be brought into the patient room. Long hair should be tied back. Eye glasses should be secured with a tie.
3. **Inspect PPE Before Donning:** Visually inspect the PPE ensemble to be worn to ensure that it is in serviceable condition, all required PPE and supplies are available, and the sizes selected are correct for the healthcare worker. The trained observer should review the donning sequence with the healthcare worker before the donning process and read it aloud to the healthcare worker in a step-by-step fashion.
4. **Put on Boot Covers:** If a coverall without integrated socks is worn, the upper band of the boot cover will be worn UNDER the pants leg of the coverall to prevent pooling of liquids between the coverall pants leg and upper band of boot cover. This step can be omitted if wearing a coverall with integrated socks.
5. **Put on Inner Gloves:** Put on first pair of gloves.
6. **Put on Gown or Coverall:** Put on gown or coverall. Ensure gown or coverall is large enough to allow unrestricted freedom of movement. Ensure cuffs of inner gloves are tucked under the sleeve of the gown or coverall.
 - a. If a PAPR with a self-contained filter and blower unit that is integrated inside the helmet is used, then the belt and battery unit must be put on before donning the impermeable gown or coverall so that the belt and battery unit are contained under the gown or coverall.
 - b. If a PAPR with external belt-mounted blower is used, then the blower and tubing must be on the outside of gown or coverall to ensure proper airflow.
7. **Put on Outer Gloves:** Put on second pair of gloves (with extended cuffs). Ensure the cuffs are pulled over the sleeves of the gown or coverall.
8. **Put on Respirator:** Put on PAPR with a full face-shield, helmet, or headpiece.
 - a. If a PAPR with a self-contained filter and blower unit integrated inside the helmet is used, then a single-use (disposable) hood that extends to the shoulders and fully covers the neck must also be used. Be sure that the hood covers all of the hair and the ears, and that it extends past the neck to the shoulders.
 - b. If a PAPR with external belt-mounted blower unit and attached reusable headpiece is used, then a single-use (disposable) hood that extends to the shoulders and fully covers the neck must also be used. Ensure that the hood covers all of the hair and the ears and it extends past the neck to the shoulders.

9. **Put on Outer Apron (if used):** Put on a disposable apron to provide an additional layer for the front of the body.
10. **Verify:** After completing the donning process, the trained observer should verify the integrity of the ensemble. The healthcare worker should be able to extend the arms, bend at the waist, and go through a range of motion sufficient for patient care delivery while all remaining correctly covered. A mirror in the room can be useful for the healthcare worker while donning PPE.

Section 9B. Donning PPE, N95 Respirator Option

Donning PPE, N95 Respirator Option – This donning procedure assumes the facility has elected to use N95 respirators. An established protocol facilitates training and compliance. Use a trained observer to verify successful compliance with the protocol.

1. **Engage Trained Observer:** The donning process is guided and supervised by a trained observer who confirms visually that all PPE is serviceable and has been donned successfully. The trained observer should use a written checklist to confirm each step in donning PPE and verify the integrity of the ensemble. No exposed clothing, skin or hair of the healthcare worker should be visible at the end of the donning process.
2. **Remove Personal Clothing and Items:** Change into surgical scrubs (or disposable garments) and dedicated washable (plastic or rubber) footwear in a suitable, clean area. No personal items (e.g., jewelry including rings, watches, cell phones, pagers, pens) should be brought into patient room. Long hair should be tied back. Eye glasses should be secured with a tie.
3. **Inspect PPE Before Donning:** Visually inspect the PPE ensemble to be worn to ensure it is in serviceable condition, all required PPE and supplies are available, and the sizes selected are correct for the healthcare worker. The trained observer should review the donning sequence with the healthcare worker before donning begins and read it aloud during donning in a step-by-step fashion.
4. **Put on Boot Covers.** If a coverall without integrated socks is worn, the upper band of the boot cover will be worn UNDER the pants leg of the coverall to prevent pooling of liquids between the coverall pants leg and upper band of boot cover. This step can be omitted if wearing a coverall with integrated socks.
5. **Put on Inner Gloves:** Put on first pair of gloves.
6. **Put on Gown or Coverall:** Put on gown *or* coverall. Ensure gown *or* coverall is large enough to allow unrestricted freedom of movement. Ensure cuffs of inner gloves are tucked under the sleeve of the gown *or* coverall.
7. **Put on N95 Respirator:** Put on N95 respirator. Complete a user seal check.
8. **Put on Surgical Hood:** Over the N95 respirator, place a surgical hood that covers all of the hair and the ears, and extends past the neck to the shoulders. Ensure that hood completely covers the ears and neck.
9. **Put on Outer Apron (if used):** Put on a disposable apron to provide an additional layer for the front of the body.
10. **Put on Outer Gloves:** Put on second pair of gloves (with extended cuffs). Ensure the cuffs are pulled over the sleeves of the gown *or* coverall.
11. **Put on Face Shield:** Put on full face shield over the N95 respirator and surgical hood to protect the eyes, as well as front and sides of the face.
12. **Verify:** After completing the donning process, the trained observer should verify the integrity of the ensemble. The healthcare worker should be able to extend the arms, bend at the waist, and go through a range of motion sufficient for patient care delivery while all remaining correctly covered. A mirror in the room can be useful for the healthcare worker while donning PPE.

Preparing for Doffing

The purpose of this step is to prepare for the removal of PPE. The doffing area should be separated into areas where early and later steps of doffing are conducted (e.g., separate chairs or ends of a bench). Before entering the PPE removal area, look for, clean, and disinfect (using an [*EPA-registered disinfectant wipe](#)) visible contamination on the PPE. As a final step before doffing, disinfect outer-gloved hands with either an [*EPA-registered disinfectant wipe](#) or ABHR, and allow to dry. Verify that the trained observer is available in the PPE removal area before entering and beginning the removal process. Some facilities, especially those using PAPRs, might find it helpful to have a designated assistant to help with doffing. An assistant who is only assisting in doffing should wear the same PPE as the trained observer. If the doffing assistant is entering the patient's room (e.g. as a clinician), the assistant should wear the same PPE as other personnel entering the patient's room. The observer should not touch the person who is doffing and should not serve as the doffing assistant or "buddy." A mirror in the room can be useful for the healthcare worker while doffing PPE.

Section 9C. Doffing PPE, PAPR Option

Doffing PPE, PAPR Option – PPE should be doffed in the designated PPE removal area. Place all PPE waste in a leak-proof infectious [waste container](#).

1. **Engage Trained Observer:** The doffing process should be supervised by the trained observer, who reads aloud each step of the procedure and confirms visually that the PPE is removed properly. Before the healthcare worker doffs PPE, the trained observer should coach and remind the healthcare worker to avoid reflexive actions that may put them at risk, such as touching their face. Post this instruction and repeat it verbally during doffing.
2. **Inspect:** Inspect the PPE to assess for visible contamination, cuts, or tears before starting to remove. If any PPE is visibly contaminated, then clean and disinfect using an [EPA-registered disinfectant wipe](#) .
3. **Disinfect Outer Gloves:** Disinfect outer-gloved hands with either an [*EPA-registered disinfectant wipe](#) or ABHR, and allow to dry.
4. **Remove Apron (if used):** Remove (e.g., by breaking or untying neck strap and releasing waist ties) and roll the apron away from you, containing the soiled outer surface as you roll; discard apron taking care to avoid contaminating gloves or other surfaces.
5. **Inspect:** After removing the apron, inspect the PPE ensemble for visible contamination or cuts or tears. If visibly contaminated, then clean and disinfect affected areas using an [*EPA-registered disinfectant wipe](#) .
6. **Disinfect and Remove Outer Gloves:** Disinfect outer-gloved hands with either an [*EPA-registered disinfectant wipe](#) or ABHR. Remove and discard outer gloves, taking care not to contaminate inner glove during removal process.
7. **Inspect and Disinfect Inner Gloves:** Inspect the inner gloves' outer surfaces for visible contamination, cuts, or tears. If an inner glove is visibly soiled, then disinfect the glove with either an [*EPA-registered disinfectant wipe](#) or ABHR, remove the inner gloves, perform hand hygiene with ABHR on bare hands, and don a new pair of gloves. If no visible contamination is identified on the inner gloves, then disinfect the inner-gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR. If a cut or tear is detected on an inner glove, immediately review occupational exposure risk per hospital protocol.
8. **Remove Respirator with External Belt-Mounted Blower:** Remove the headpiece. The healthcare worker may need help removing the headpiece while still connected to the belt-mounted blower and filter unit. (Note: If a PAPR with a self-contained blower in the helmet is used, wait until step 14 to remove components.)
 - a. Remove the belt-mounted blower unit and place all reusable PAPR components in an area or container designated for the collection of PAPR components for disinfection.

- b. Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
- 9. **Remove Gown or Coverall:** Remove and discard.
 - a. Depending on gown design and location of fasteners, the healthcare worker can either untie fasteners, have the doffing assistant or “buddy” unfasten the gown, or gently break fasteners. Avoid contact of scrubs or disposable garments with outer surface of gown during removal. Pull gown away from body, rolling inside out and touching only the inside of the gown.
 - b. To remove coverall, tilt head back and reach zipper or fasteners. Use a mirror to avoid contaminating skin or inner garments. Unzip or unfasten coverall completely before rolling down and turning inside out. Avoid contact of scrubs with outer surface of coverall during removal, touching only the inside of the coverall.
- 10. **Disinfect Inner Gloves:** Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
- 11. **Remove Boot Covers:** Sitting on a new clean surface (e.g., second clean chair, clean side of a bench) pull off boot covers, taking care not to contaminate pants legs.
- 12. **Disinfect Washable Shoes:** Use an [*EPA-registered disinfectant wipe](#) to wipe down every external surface of the washable shoes.
- 13. **Disinfect Inner Gloves:** Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
- 14. **Remove Respirator (if not already removed):** If a PAPR with a self-contained blower in the helmet is used, remove all remaining components here.
 - a. Remove and discard disposable hood.
 - b. Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
 - c. Remove helmet and the belt and battery unit. The healthcare worker may need help removing the PAPR.
 - d. Place all reusable PAPR components in an area or container designated to collect PAPR components for disinfection.
- 15. **Disinfect and Remove Inner Gloves:** Disinfect inner-gloved hands with either an [*EPA-registered disinfectant wipe](#) or ABHR. Remove and discard gloves, taking care not to contaminate bare hands during removal process.
- 16. **Perform Hand Hygiene:** Perform hand hygiene with ABHR.
- 17. **Inspect:** Both the trained observer and the healthcare worker perform a final inspection of the healthcare worker for contamination of surgical scrubs or disposable garments. If contamination is identified, the garments should be carefully removed and the wearer should shower immediately. The trained observer should immediately inform the infection preventionist or occupational safety and health coordinator or their designee for appropriate occupational health follow-up.
- 18. **Scrubs:** Healthcare worker can leave the PPE removal area wearing dedicated washable footwear and surgical scrubs or disposable garments, proceeding directly to showering area where these are removed.
- 19. **Protocol Evaluation/Medical Assessment:** Either the infection preventionist or occupational safety and health coordinator or their designee should meet with each healthcare worker on a regular basis to review the patient care activities performed, identify any concerns about care protocols and record the healthcare worker’s level of fatigue.

Section 9D. Doffing PPE, N95 Respirator Option

Doffing PPE, N95 Respirator Option – PPE should be doffed in the designated PPE removal area. Place all PPE waste in a leak-proof infectious [waste container](#).

1. **Engage Trained Observer:** The doffing process should be supervised by the trained observer, who reads aloud

each step of the procedure and confirms visually that the PPE has been removed properly. Before doffing PPE, the trained observer must remind healthcare workers to avoid reflexive actions that may put them at risk, such as touching their face. Post this instruction and repeat it verbally during doffing.

2. **Inspect:** Inspect the PPE to assess for visible contamination, cuts, or tears before starting to remove. If any PPE is visibly contaminated, then disinfect using an [*EPA-registered disinfectant wipe](#) .
3. **Disinfect Outer Gloves:** Disinfect outer-gloved hands with either an [*EPA-registered disinfectant wipe](#) or ABHR.
4. **Remove Apron (if used):** Remove (e.g., by breaking or untying neck strap and releasing waist ties) and roll the apron away from you, containing the soiled outer surface as you roll; discard apron taking care to avoid contaminating gloves or other surfaces.
5. **Inspect:** After removing the apron, inspect the PPE ensemble for visible contamination or cuts or tears. If visibly contaminated, then clean and disinfect any affected areas by using an [*EPA-registered disinfectant wipe](#) .
6. **Disinfect and Remove Outer Gloves:** Disinfect outer-gloved hands with either an [*EPA-registered disinfectant wipe](#) or ABHR. Remove and discard outer gloves, taking care not to contaminate inner gloves during removal process.
7. **Inspect and Disinfect Inner Gloves:** Inspect the inner gloves' outer surfaces for visible contamination, cuts, or tears. If an inner glove is visibly soiled, then disinfect the glove with either an [*EPA-registered disinfectant wipe](#) or ABHR, remove the inner gloves, perform hand hygiene with ABHR on bare hands, and don a new pair of gloves. If no visible contamination is identified on the inner gloves, then disinfect the inner-gloved hands with either an [*EPA-registered disinfectant wipe](#) or ABHR. If a cut or tear is detected on an inner glove, immediately review occupational exposure risk per hospital protocol.
8. **Remove Face Shield:** Remove the full face shield by tilting the head slightly forward, grasping the rear strap and pulling it gently over the head and allowing the face shield to fall forward, then discard. Care must be taken not to touch the face when removing the face shield. Avoid touching the front surface of the face shield.
9. **Disinfect Inner Gloves:** Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
10. **Remove Surgical Hood:** Unfasten (if applicable) surgical hood, gently remove, and discard. The doffing assistant or "buddy" can assist with unfastening hood.
11. **Disinfect Inner Gloves:** Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
12. **Remove Gown or Coverall:** Remove and discard.
 - a. Depending on gown design and location of fasteners, the healthcare worker can untie fasteners, have the doffing assistant or "buddy" unfasten the gown, or gently break fasteners. Avoid contact of scrubs or disposable garments with outer surface of gown during removal. Pull gown away from body, rolling inside out and touching only the inside of the gown.
 - b. To remove coverall, tilt head back to reach zipper or fasteners. Unzip or unfasten coverall completely before rolling down and turning inside out. Avoid contact of scrubs with outer surface of coverall during removal, touching only the inside of the coverall.
13. **Disinfect Inner Gloves:** Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
14. **Remove Boot Covers:** Sitting on a clean surface (e.g., second clean chair or clean side of a bench) pull off boot covers, taking care not to contaminate scrubs pants legs.
15. **Disinfect and Change Inner Gloves:** Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
 - a. Remove and discard gloves taking care not to contaminate bare hands during removal process.

- b. Perform hand hygiene with ABHR.
 - c. Don a new pair of inner gloves.
16. **Remove N95 Respirator:** Remove the N95 respirator by tilting the head slightly forward, grasping first the bottom tie or elastic strap, then the top tie or elastic strap, and remove without touching the front of the N95 respirator. Discard N95 respirator.
 17. **Disinfect Inner Gloves:** Disinfect inner gloves with either an [*EPA-registered disinfectant wipe](#) or ABHR.
 18. **Disinfect Washable Shoes:** Use an [*EPA-registered disinfectant wipe](#) to wipe down every external surface of the washable shoes.
 19. **Disinfect and Remove Inner Gloves:** Disinfect inner-gloved hands with either an [*EPA-registered disinfectant wipe](#) or ABHR. Remove and discard gloves taking care not to contaminate bare hands during removal process.
 20. **Perform Hand Hygiene:** Perform hand hygiene with ABHR.
 21. **Inspect:** Both the trained observer and the healthcare worker perform a final inspection of healthcare worker for contamination of the surgical scrubs or disposable garments. If contamination is identified, the garments should be carefully removed and the wearer should shower immediately. The trained observer should immediately inform infection preventionist or occupational safety and health coordinator or their designee.
 22. **Scrubs:** Healthcare worker can leave PPE removal area wearing dedicated washable footwear and surgical scrubs or disposable garments, proceeding directly to showering area where these are removed.
 23. **Protocol Evaluation/Medical Assessment:** Either the infection preventionist or occupational health safety and health coordinator or their designee should meet with the healthcare worker on a regular basis to review the patient care activities performed, identify any concerns about care protocols, and record healthcare worker's level of fatigue.

Footnotes

*EPA-registered disinfectant wipe: Use a disposable wipe impregnated with a U.S. Environmental Protection Agency (EPA)-registered hospital disinfectant with a label claim for a non-enveloped virus (e.g., norovirus, rotavirus, adenovirus, poliovirus); see EPA list of Disinfectants for Use Against Ebola Virus at <http://www.epa.gov/oppad001/list-l-ebola-virus.html>.

Related Links

[For U.S. Healthcare Settings: Donning and Doffing Personal Protective Equipment \(PPE\) for Evaluating Persons Under Investigation \(PUIs\) for Ebola Who Are Clinically Stable and Do Not Have Bleeding, Vomiting, or Diarrhea](#)

[Ebola PPE Frequently Asked Questions](#)

Page last reviewed: August 30, 2018

Content source: [Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases \(NCEZID\), Division of Healthcare Quality Promotion \(DHQP\)](#)