



COMPREHENSIVE GUIDELINE

ON INFECTION CONTROL MEASURES IN VHF
(EBOLA & MARBURG)

V1.0

Jan - 2025



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1 SECTION INTRODUCTION

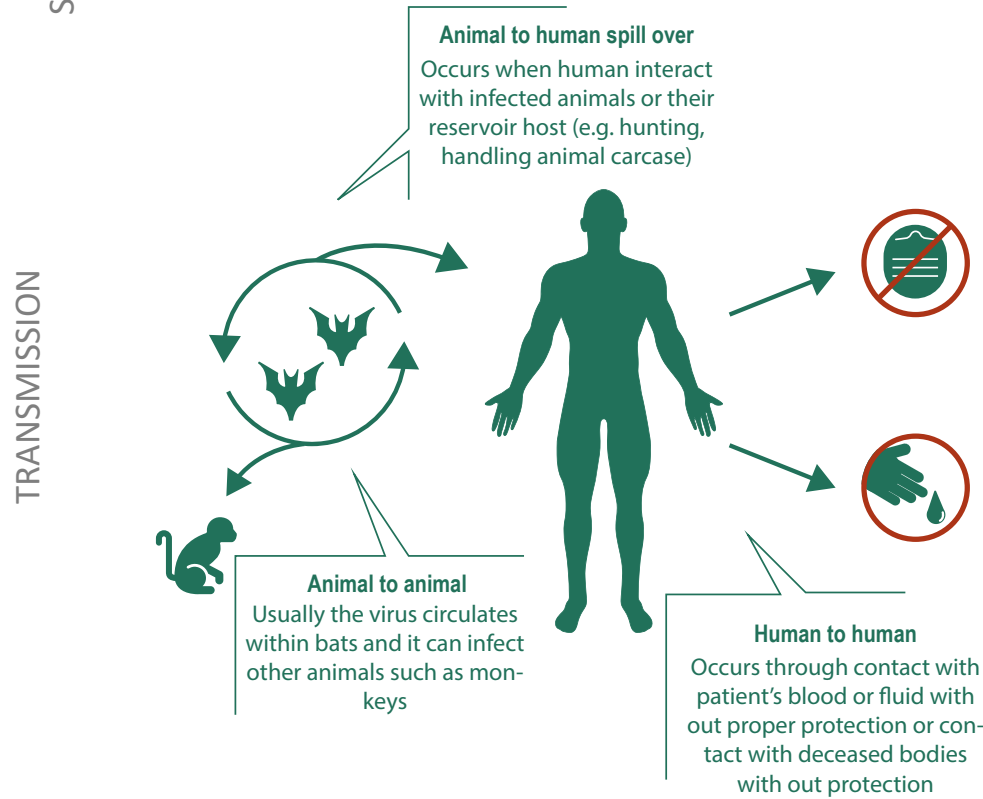
The Marburg and Ebola viruses, members of the **Filoviridae** family, are highly contagious pathogens that have raised significant public health concerns due to their potential to cause large-scale outbreaks. Emerging from wildlife reservoirs in Africa, these viral hemorrhagic fevers (VHFs) have been responsible for sporadic yet severe outbreaks throughout history.

The Marburg virus was first identified during an outbreak in Marburg, Germany, in 1967, which originated from infected African green monkeys imported for research purposes. In contrast, the Ebola virus was first identified in 1976 near the Ebola River in the Democratic Republic of Congo, linked to interactions with infected wildlife or their carcasses. Both viruses are believed to be enzootic in various species of African fruit bats, which serve as their primary reservoirs. Spillover to humans occurs through direct contact with infected animals or intermediate hosts.

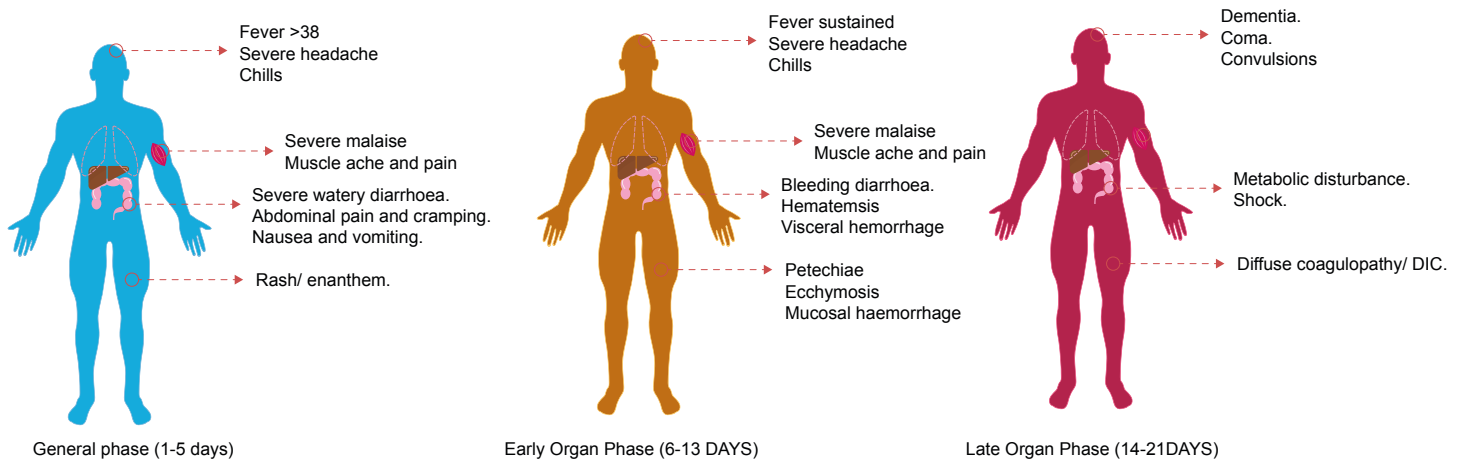
Human-to-human transmission occurs through direct contact with infected bodily fluids, tissues, or contaminated fomites. Healthcare settings present significant transmission risks, emphasizing the need for meticulous infection control measures and strict isolation protocols.

The impact of VHF outbreaks on healthcare facilities can be devastating. Healthcare workers are particularly vulnerable, often working in high-stress environments and facing heightened exposure risks. As a result, ongoing training and preparedness are essential to combat these infectious agents effectively and mitigate their toll on healthcare systems and personnel.

2 SECTION TRANSMISSION & CLINICAL PICTURE



Marburg and Ebola diseases share many similarities in their signs and symptoms. Both illnesses progress rapidly, with an incubation period ranging from 2 to 21 days. Initially, they present with generalized symptoms, which quickly escalate to affect multiple organ systems. This progression often leads to multi-system failure, with outcomes ranging from recovery to death.



3 SECTION INFECTION CONTROL & PREVENTION

3.1 Patient Placement and Isolation:

- Suspected or confirmed cases should be managed under **contact and droplet precautions**. **Airborne precautions** should be implemented during aerosol-generating procedures (AGPs).
- Suspected and confirmed cases should be isolated in a **single room** equipped with a designated toilet and an anteroom or designated area for donning and doffing of PPEs.
- **Essential equipment** for routine care should be stored inside the room to minimize unnecessary movement in and out.
- Entry to the room should be **strictly restricted**, and only personnel designated to care for the patient should be allowed inside.
- Keep a log sheet for healthcare workers attending the patient for easier identification and contact tracing purposes.

3.2 Donning And Doffing Area:

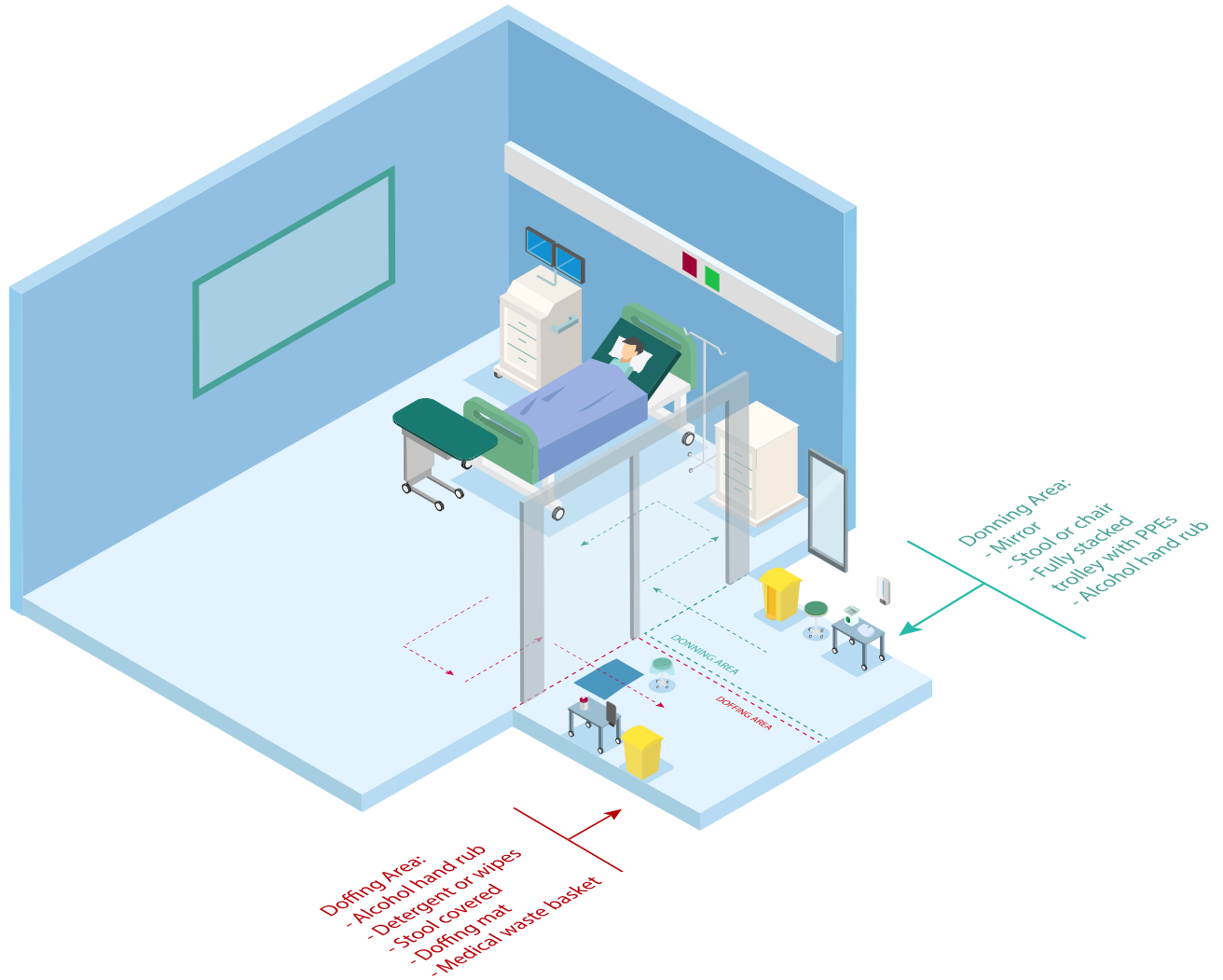
To minimize or prevent contamination, it is essential to establish two separate zones for **donning** and **doffing** personal protective equipment (PPE). This separation ensures the cleanliness of the donning zone and the equipment within it.

The donning area should include:

- A **mirror** to ensure PPE is worn correctly.
- **Alcohol-based hand rub** for hand hygiene.
- A **stool or chair** to assist in wearing PPE.
- A **trolley stocked** with all required PPE.

The doffing area should include:

- **Disinfectant wipes** or wipes for cleaning surfaces and equipment.
- A **covered stool** for safe PPE removal.
- **Alcohol-based hand rub** for hand hygiene.
- A **medical waste bin** for proper disposal of used PPE.
- A **doffing mat** to designate the area for removing PPE safely.



*“An optimally organized donning and doffing area highlighting the importance of **one-way flow direction** to minimize cross-contamination. The donning area features a mirror for correct PPE fitting, alcohol hand rub for hygiene, a stool or chair for ease, and a trolley stacked with necessary PPEs. The doffing area, critical in preventing contamination, includes disinfectant wipes or detergent, a covered stool, alcohol hand rub, a medical waste basket, and a specific mat used for safe doffing.”*

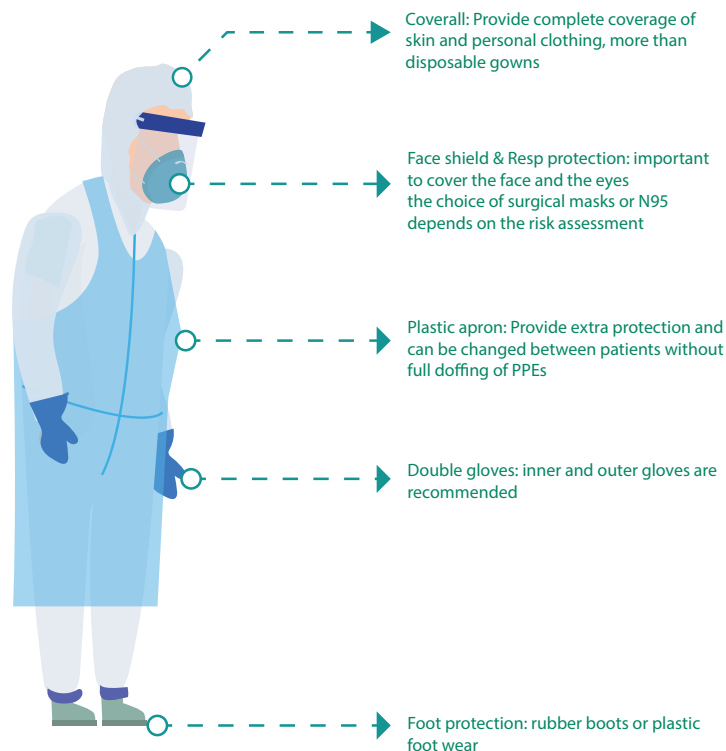
3.3 Personal Protective Equipment:

Due to the transmission nature of both Ebola and Marburg, healthcare providers should select personal protective equipment that ensures full coverage of skin, clothing, and mucus membranes. This level of protection can be achieved using coveralls, face shield masks or N95 masks (depending on the procedure), in addition to double gloves and rubber boots or shoe covers. The donning and doffing sequences for Ebola/Marburg slightly differ, with special attention given to the doffing sequence to ensure no contamination of the skin or clothing occurs.

3.4 Buddy System:

Having an assistant or a “Buddy” during the donning and doffing of PPEs and while preparing to provide care for suspected/confirmed cases of Ebola/Marburg is helpful in the following ways:

- **Provide assistance** when needed during the donning/doffing sequence.
- **Check and confirm** that PPEs are worn properly and that no parts of the body are exposed.
- **Inspect and verify** the integrity of PPEs and clothing after providing care or performing procedures on patients.



Steps of Donning PPEs in Ebola/Marburg (N95):



Remove any personal items such as watches and rings
Change to medical scrub



Perform hand hygiene



Inspect PPEs that they are intact and ensure they are the correct size



While sitting, wear shoe covers



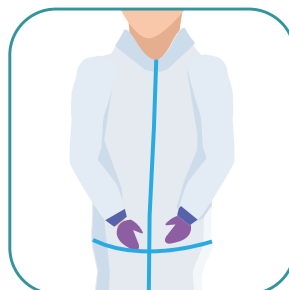
Or rubber boots



Wear inner pair of gloves



Start donning coveralls by inserting legs first and then sleeves



Zip up coveralls



As extra precaution, the cuff can be taped by duct tape

COMPREHENSIVE GUIDELINE IPC IN VHF



Wear either surgical mask or N95 according to risk assessment



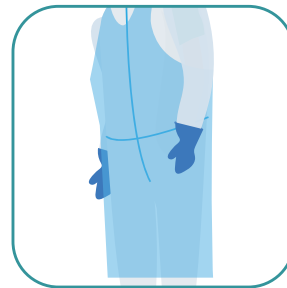
Roll the hood of coverall and cover the head



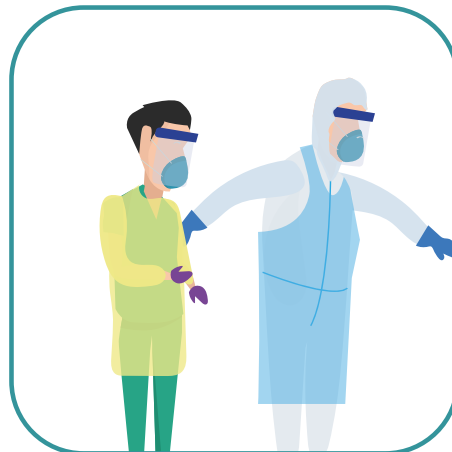
Wear face shield



Wear outer gloves and ensure they extend above coverall cuffs



A disposable plastic apron can be used for extra protection



Inspector or observer checks that the PPEs are donned appropriately and that they aren't any exposed skin or clothes

Steps of donning of PPEs in Ebola/Marburg (PAPR):



Remove any personal items such as watches and rings
Change to medical scrub



Perform hand hygiene



Inspect PPEs that they are intact and ensure they are the correct size



While sitting, wear shoe covers



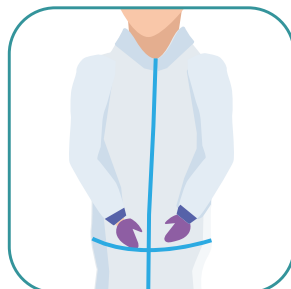
Or rubber boots



Wear inner pair of gloves



Start donning coveralls by inserting legs first and then sleeves



Zip up coveralls



As extra precaution, the cuff can be taped by duct tape



The observer assists in attaching the belt and the device to the back of HCWs



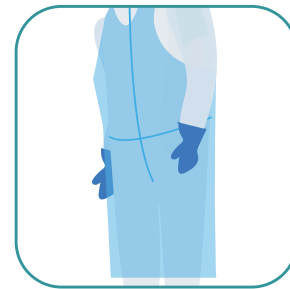
Wear the hood and ask the assistant to attach the hose



Tuck the remaining parts of the hood inside the coverall



Wear outer gloves and ensure they extend above coverall cuffs



A disposable plastic apron can be used for extra protection



Inspector or observer checks that the PPEs are donned appropriately and that they aren't any exposed skin or clothes

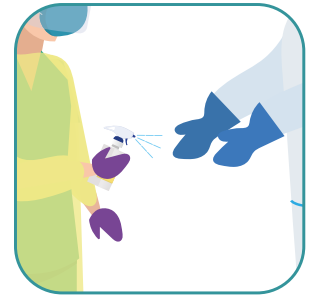
Steps of Doffing of PPEs (With N95 or PAPR):



Step into diluted disinfectant if needed to clean footwear



The observer checks if any parts are exposed or contaminated (if present, the observer should clean it with disinfectant)



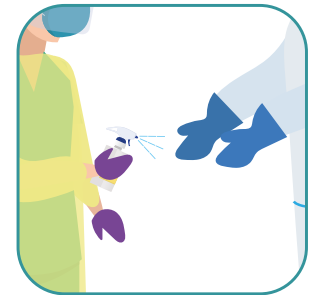
Perform hand hygiene on the outer gloves and allow them to dry



The observer assists with doffing the plastic apron by untying the back ties while the wearer pulls it away from the body



Safely dispose it in the medical waste bin



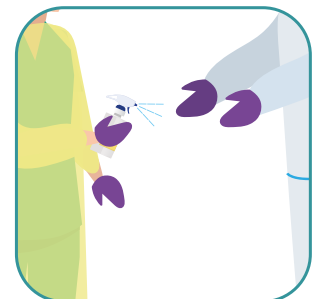
Preform hand hygiene on the outer gloves



The observer checks if the coveralls are intact and not contaminated (if so, the observer disinfect the contaminated parts)



Safely remove the outer gloves in medical waste bin



Perform hand hygiene on the inner gloves

Follow the sequence if wearing PAPR if not skip to the next



The observer removes the PAPR device safely. The wearer removes the hood of PAPR safely



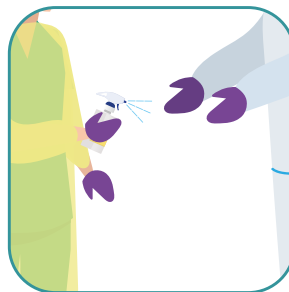
The observer places the device and its components on covered table and disinfect its parts



Discard the hood or disinfect it if its reusable and perform hand hygiene



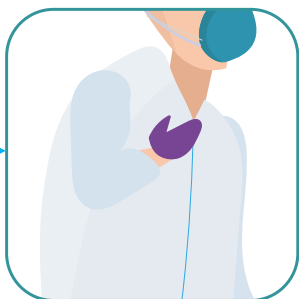
While leaning forward, remove the face shield by touching only the straps and pulling away from the face



Perform hand hygiene on inner gloves and allow them to dry



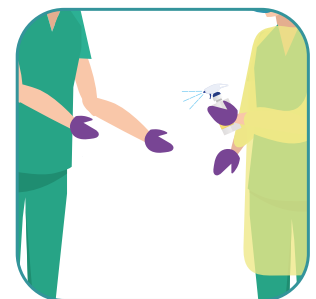
Roll down the coverall head from the inside out (avoid touching the outside)



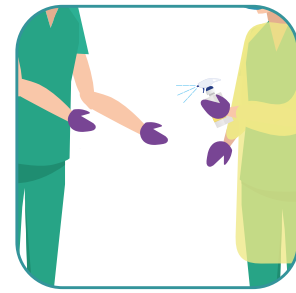
While tilting the head back, unzip the coverall down



Roll down the coverall, paying attention not to touch the outside surface.



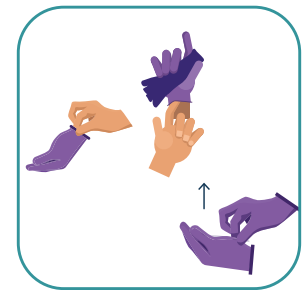
Perform hand hygiene on inner gloves and allow them to dry



While sitting, the wearer removes the foot cover or the boots

Perform hand hygiene on inner gloves and allow them to dry

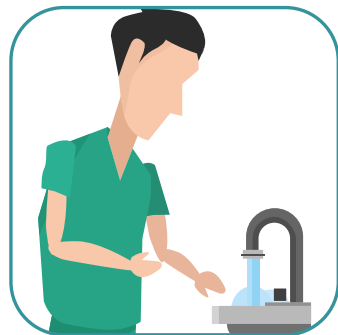
Follow this step for N95



While leaning forward, remove the respiratory protection by untying the back ties and pulling away from face

Perform hand hygiene on inner gloves and allow them to dry

Remove inner gloves in safe manner using envelop technique



Perform good hand hygiene

The observer and the healthcare worker perform a final inspection of the HCS for contamination of clothing, if so the observer should disinfect them

3.5 cleaning and disinfection:

Since Filoviruses can remain viable on surfaces for extended periods, it is crucial to emphasize the importance of thorough environmental cleaning and disinfection, as well as the safe handling of materials that may be contaminated, including blood, sweat, vomit, feces, and other bodily secretions, as they can potentially contain infectious agents.

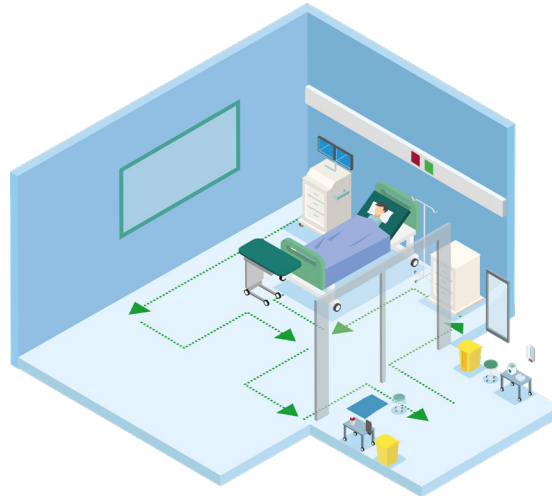
Follow the following precautions during cleaning and disinfection:

- Cleaners should wear recommended PPEs while cleaning and disinfecting care areas
- Strict adherence to hand hygiene
- Use only PHA or MOH approved products for cleaning and disinfection
- Cleaning and disinfectant solutions should be prepared every day
- Change cleaning solutions and refresh equipment frequently while it is used during the day
- Maintain separate implements (buckets, cleaning and disinfection solutions) for each area (e.g., triage, isolation) and conduct cleaning duties separately for each of these areas.



"It's important to organize cleaning equipment and materials in advance, and wear proper personal protective equipment"

- Immediately clean and disinfect any surfaces contaminated with blood, urine, feces, vomit, or other body fluids that are suspected or known to contain the Ebola virus.
- Isolate areas of suspected Ebola virus contamination until decontamination is completed to minimize exposure of individuals not performing the work.
- Use signage to restrict access to areas of suspected or known Ebola virus contamination until decontamination is completed to minimize exposure of individuals not performing the work.
- Routine cleaning of the PPE doffing area should be performed at least once per day and after the doffing of grossly contaminated PPE.



Ensure to mop in unidirectional pattern and always clean from clean to dirty.

Spill management:

- In case of bulk spill or matter (e.g. vomit or diarrhea), cover the spill with absorbing material (e.g. paper towels) , then pour disinfectant on it to saturate the area (observe contact time).
- To assure complete disinfection, further disinfect the surface after the bulk spill has been removed using a suitable disinfectant.
- All materials used for the patients and disposable items worn by staff should be double bagged in airtight yellow bags for immediate transport outside the unit for incineration.
- Treat sewage and other fluids with household bleach (i.e., for 5 minutes or longer) before flushing.
- Use only yellow bags in the isolation room.

3.6 Medical Waste and Linen Management:

Medical Waste Handling:

- Use double leak-proof bags to collect medical waste and place them in leak-proof containers.
- Always ensure the outer surface of waste bags or containers is clean and free from spills or contamination. If contamination is present, clean and disinfect outer surfaces prior to any further handling.
- Rigorous adherence to packaging procedures, including decontaminating waste containers at the source (i.e., where the waste was generated), can significantly minimize the potential for worker exposure to the Ebola virus and other infectious agents.
- To prevent toppling and spillage, position waste containers as low as feasible on dollies, hand trucks, carts, or within transport vehicles. If containers are stacked, ensure they are securely fastened using appropriate straps or tie-downs.

Handling Soiled Linens:

- Soiled linens are considered contaminated.
- Place soiled linens in leak-proof bags at the site of use and transport them directly to the decontamination area for incineration.
- Linens used by patients suspected or confirmed with Viral Hemorrhagic Fever (VHF) should not be mixed with other linens.



3.7 Specimen handling and transportation:

- Follow PHA's National Laboratory Biosafety and Biosecurity Manual – V1.0

4 SECTION MANAGEMENT OF DECEASED

The management of deceased bodies within healthcare facilities during an Ebola/ Marburg outbreak is a crucial element of public health response. Safely handling and disposing of deceased individuals within the healthcare setting is essential to minimize the risk of further transmission of the virus while adhering to strict infection control measures.

This process requires a careful balance to effectively control the outbreak and ensure the dignity of those who have passed away.

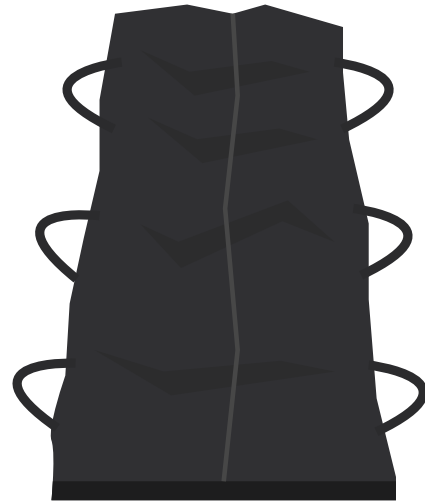
4.1 General points

- Only personnel trained in handling body of a person who has died from Ebola/Marburg should perform the task.
- When handling the body of a person who has died from Ebola/ Marburg:
 - Do not wash or clean the body.
 - Do not perform an autopsy unless it is necessary.
 - Do not remove any inserted medical equipment from the body such as intravenous (IV) lines, endotracheal or other tubing, or implanted electronic medical devices.
- HCWs dealing with the body should wear all PPEs (refer to Personal Protective equipment)



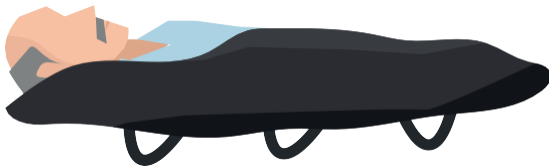
4.2 Specifications of Body Bags:

- Impermeable, vinyl, minimum thickness 152 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.



4.3 placement in body bag:

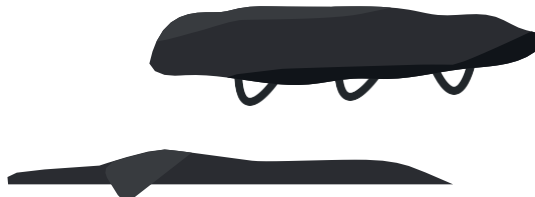
Place the body in the first body bag



wipe over the surface of the first body bag using a hospital-approved disinfectant and seal it.



Place in a second body bag, wipe the surface clean, label it and move it to the cemetery as soon as possible



4.4 Transportation of Deceased body:

- Wear full PPEs to transport the body bag to the ambulance that will serve.
- Transport the body bag should be by 2 or 4 persons (depending on the weight of the body).
- The body bag is placed (delicately) on the platform of the car that will serve, usually the head towards the front.
- No family member should sit in the car cabin.
- The ambulance used for the funerals needs to be cleaned and disinfected.



Ebola and Marburg PPE Donning Checklist

Staff name:	Inspector name:	Department:	Date:
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Steps	Compliance			Comment
1. Remove any personal items such as watches and rings, wear medical scrub	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A
2. Perform hand hygiene	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
3. Inspect all PPEs and ensure they are intact and correct size	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
4. Wear shoe covers or rubber boots.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
5. Wear inner gloves	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
6. Donning coveralls by inserting legs first and then sleeves.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
7. Zip up coveralls	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
8. Cuff taped by duct tape	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
9. Wear a surgical mask or N95 or PAPR according to risk assessment	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
10. For PAPR: The observer assists in attaching the belt and the device to the back of HCW	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
11. For PAPR: Wear the hood and the assistant attach the hose to it.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
12. For PAPR: Tuck inside the remaining parts of the hood.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
13. For PAPR: Skip steps 14,15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
14. Roll the hood of the coverall and cover the head	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
15. Wear face shield	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
16. Wear outer gloves and ensure that they extend above coverall cuffs.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
17. A disposable plastic apron can be used for extra protection.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
18. The inspector or observer checks that the PPEs are donned appropriately and there aren't any exposed skin or clothing	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....

Auditor name:

Signature:

Ebola and Marburg PPE Doffing Checklist

Staff name:	Inspector name:	Department:	Date:	
Steps	Compliance			Comment
1. Step into diluted disinfectant if needed to clean footwear	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
2. The inspector checks if any parts are exposed or contaminated	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
3. Perform hand hygiene on outer gloves	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
4. Buddy or inspector assist with doffing of the plastic apron by untying it from the back while the wearer pulls away from his body	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
5. The used plastic apron is discarded in medical waste bin	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
6. Perform hand hygiene on outer gloves	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
7. The inspector checks if the coverall is intact or contaminated	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
8. Dispose of outer gloves in a safe manner in the medical waste bin	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
9. Perform hand hygiene on inner gloves	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
10. For PAPR: Buddy or inspector starts to safely remove the PAPR device and disinfect its part after placing it on a covered table.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
11. For PAPR: The wearer removes the hood, discards it in medical waste, or disinfects it if reusable.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
12. While leaning forward, remove the face shield by touching only the straps and pulling away from the face	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
13. Perform hand hygiene on inner gloves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
14. Roll down the head cover from the inside out (avoid touching the outside).	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
15. While tilting your head, unzip the coverall all the way down.	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
16. Roll down the coverall without touching the outside surface	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
17. Discard in the medical waste bin	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
18. Perform hand hygiene on inner gloves	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
19. While sitting remove rubber boots	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
20. Perform hand hygiene on inner gloves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
21. Remove respiratory without touching the outside surface	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
22. Discard in the medical waste bin	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
23. Perform hand hygiene on inner gloves	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
24. Remove inner gloves in a safe manner	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
25. Perform hand washing	<input type="radio"/> Yes	<input type="radio"/> NO	<input type="radio"/> N/A	.....
26. The observer perform final inspection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Auditor name:

Signature:

Reference:

- **World Health Organization.** Infection prevention and control guideline for Ebola and Marburg disease. August 2023. Available from: [World Health Organization](#)
- **Centers for Disease Control and Prevention.** Infection Prevention and Control Recommendations for Patients in U.S. Hospitals who are Suspected or Confirmed to have Selected Viral Hemorrhagic Fevers. October 2024. Available from: [CDC](#)
- **World Health Organization.** Ebola and Marburg virus disease epidemics: preparedness, alert, control, and evaluation. Interim version 1.2. 2014. Available from: [World Health Organization](#)
- **Centers for Disease Control and Prevention.** Safe Handling of Human Remains of Ebola Patients in U.S. Hospitals and Mortuaries. May 2024. Available from: [CDC](#)
- **World Health Organization.** Marburg virus disease. Fact sheet. October 2024. Available from: [World Health Organization](#)

