

# Infection prevention and control measures in health-care settings for Ebola or Marburg disease outbreaks

Module 3: Personal protective equipment for direct or indirect contact with patients with Ebola or Marburg disease or their environment

*August 2024*

# DISCLAIMER

Prior to taking this course you should be familiar with standard and transmission - based precautions.

Please go to the OpenWHO site, Infection prevention and control channel to learn more about standard and transmission-based precautions.

[Infection Prevention and Control \(openwho.org\)](https://openwho.org)

# IPC LEARNING MODULES

This course on IPC for Ebola and Marburg disease consists of four modules which will highlight the infection prevention and control recommendations as outlined in the *WHO Infection prevention and control guideline for Ebola disease and Marburg disease (August 2023)*



Module 1: Modes of transmission of *Ebolavirus* and *Marburgvirus*



Module 2: Screening and isolation during readiness and response for an outbreak.



Module 3: **Personal protective equipment** for direct or indirect contact with patients with Ebola or Marburg disease or their environment



Module 4: IPC measures for the environment

Part 1: Safe handling of linen

Part 2: Environmental cleaning and disinfection

Part 3: Waste management



# Objectives of this presentation

1. Describe direct and indirect contact
2. Identify the relevant health and care workers the PPE recommendations pertain to
3. Describe the PPE requirements for direct and indirect care
4. Outline the steps for putting on and removing PPE

*For PPE for screening and triage - please review Module 2*

# Definition of direct and indirect contact

**Direct contact** is contact with the patient themselves who have confirmed or suspected Ebola disease (EBOD)/Marburg disease (MARD).

**Indirect contact** is contact with items that may be contaminated with *Ebolavirus* or *Marburgvirus*.

- Some health and care worker groups are more likely to have direct contact with patients (e.g. nurses and doctors)
- Others are more likely to have contact with contaminated items (e.g. cleaners and waste management workers)
- The priorities and risks for different health and care worker groups and tasks informs guidance for some specific items of PPE

# Key principles and concepts about PPE for Ebola or Marburg disease for direct or indirect care (1)

- Mucous membranes (such as eyes and mouth) should always remain covered by PPE
  - Face shields (or goggles) do not protect facial mucosa from splashes adequately alone<sup>1</sup>
  - A medical mask is required as well and should be cupped to avoid it collapsing against the mouth
  - Facial protection are removed at a late stage during doffing, to protect mucous membranes for as long as possible
- PPE covering clothing should be resistant to penetration by blood or other body fluids and single use items should never be reused
  - Coveralls allow a wider range of movements while maintaining more coverage than gowns, but the removal process is more complex
  - If a gown is used, it should be paired with a head and neck cover to ensure coverage of the whole head and neck area
  - An apron provides additional protection for the front of the body where contamination is most likely and helps protect the zip of coveralls (a potential weak point) from contamination

<sup>1</sup>World Health Organization. Infection prevention and control guideline for Ebola and Marburg disease, August 2023.



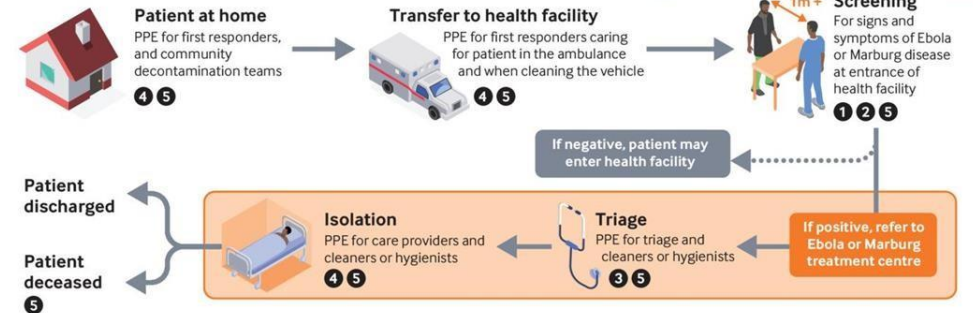
# Key principles and concepts about PPE for Ebola or Marburg disease for direct or indirect care (2)

- Use a respirator (e.g. N95, FFP2 or FFP3) for aerosol generating procedures
- Footwear should cover the top of the foot and the ankle as a minimum- rubber boots are preferred if available
- Two pairs of gloves are recommended for both indirect and direct care

# PPE recommendations for direct or indirect contact

Limiting the spread of Ebola and Marburg disease requires a coordinated infection prevention and control response. This includes practices throughout the patient journey, such as maintaining appropriate distances where possible, isolating people with suspected or confirmed disease, and wearing appropriate personal protective equipment (PPE).

This graphic summarises some key points from the updated World Health Organization (WHO) guidance, published in August 2023. At each step in the patient journey the black circles indicate the suggested PPE for health and care workers as they interact with the patient and their environment, as shown in the table at the bottom of the graphic.



	Body	Face	Hands	Feet
<b>1 Screening</b> Minimum 1 metre distance, use "no-touch technique"	Scrub 1			Closed-toe shoes Doesn't have to be waterproof rubber boots in this setting but could be based on availability
<b>2 Screening</b> Minimum 1 metre distance cannot be maintained	Scrub + fluid-resistant gown 1 + 2	Medical mask Mask should be fluid resistant and non-collapsible 2	One pair of gloves Nitrile preferred 2	
<b>3 Triage</b> Likely patient contact	Scrub + fluid-resistant coverall 1 + 2	+ Eye protection Face shield or goggles 3	Two pairs of gloves Nitrile preferred 2 + 3	Triage more likely to wear rubber boots
<b>4 Patient care</b> Direct or indirect contact with patients	Scrub + fluid-resistant coverall + disposable or reusable apron 1 + 2 + 3	Gown + head and neck covering 4		Usually waterproof rubber boots
<b>5 Environmental services and burial teams</b> Cleaners, hygienists, and waste handlers (health facilities and community settings). Safe and dignified burial teams	Scrub + fluid-resistant coverall + heavy duty apron 1 + 2 + 3	Use respirator for aerosol generating procedures 5	Two pairs of gloves Nitrile preferred inside, with a heavy duty outer glove 2 + 3	Waterproof rubber boots

Source: Willet et al. BMJ 2024;384:bmj.p2811

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# PPE recommendations for direct or indirect contact

**4 Patient care**  
Direct or indirect contact with patients



Source: Willet et al. BMJ 2024;384:bmj.p2811

# PPE for contact with patients who have Ebola or Marburg disease

- Medical mask\* and eye protection
- Fluid resistant coverall OR a fluid resistant gown and head and neck covering
- Two pairs of gloves - preferably nitrile
- Apron (disposable or reusable) to cover the coverall or gown
- Rubber boots

\*Use a respirator for aerosol generating procedures



Coverall



Gown with head and neck covering



Always put on PPE under the supervision of a trained buddy. Do not use tape to secure PPE in place.

1. Remove all personal items.



2. Put on scrubs and rubber boots<sup>1</sup>. Tie hair back.



3. Select correct size of PPE. Do not use if damaged or expired.

4. Perform hand hygiene with ABHR or soap and water.

5. Put on the inner pair of gloves.



6. Put on fluid resistant gown. Gown sleeves should go over the inner pair of gloves.



7. Put on non-collapsible medical mask.

Use seal-checked respirator if performing aerosol generating procedures.



8. Put on face shield OR goggles.



9. Put on head and neck covering.



10. Put on disposable or reusable waterproof apron.

For hygienists, cleaners, waste handlers and safe and dignified burial teams, use heavy duty apron.



11. Put on second pair of gloves over the cuff. For hygienists, cleaners, waste handlers and safe and dignified burial teams, use heavy duty gloves.



12. Ensure buddy check and name and time of entry are put on PPE.

Name \_\_\_\_\_  
Time \_\_\_\_\_



<sup>1</sup> If boots are not available, use slip on shoes (no laces) that cover the ankle and the top of the foot.

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# General principles when putting on PPE

Putting on and removing the PPE requires practical training and practice with a trained supervisor.

- In this presentation we will only review the steps for putting on and removing a coverall with head and neck covering.
- There are posters available for putting on and removing a gown and head and neck covering.

# General principles when putting on PPE

- Putting on PPE should always be done under the supervision of a trained buddy
- Check the PPE to ensure it is not damaged or expired
- All personal items (jewellery, watches, cell phones etc.) must be removed prior to putting on PPE
- Hair should be tied back
- Scrubs should be worn under the PPE
- Rubber boots should be worn.
  - If not available, wear slip on shoes that cover the ankle and top of the foot
- Perform hand hygiene before putting on the PPE
- Never use tape to secure PPE in place



# Spraying of humans with disinfectants

- Health and care workers should not be sprayed with disinfectants (e.g. chlorine solutions) at any time during the removal of PPE
- No persons should be sprayed with disinfectant solutions this includes; spraying of feet/boots, spraying during PPE removal, use of disinfectants in showers or spraying disinfectants in any setting where humans are present
  - Spraying with chlorine has been associated with skin, eye and respiratory irritation
  - Spraying may be regarded as unacceptable by health workers and patients
  - High quality training and education should be in place to ensure best practice for putting on and taking off PPE
  - Health and care workers should leave the area if PPE becomes heavily contaminated. PPE should be safely taken off following procedures and new PPE put on to re-enter the area



# General principles when taking off PPE

**Removing the PPE is the highest risk for health and care workers for self - contamination. This requires practical training with a trained supervisor prior to entering an isolation area.**

- Taking off PPE should always be done under the supervision of a trained buddy.
- During PPE removal there are several steps that involve glove disinfection
  - Contaminated hands (bare and gloved hands) are the most common way to transfer contaminated material to the mucous membranes (eyes, nose and mouth).
  - Keep gloved hands clean so they can remove PPE without contaminating the skin
- Goggles should be removed after the coverall to provide protection to the eyes
- Avoid touching the outer areas of the PPE to prevent contamination of gloves
- Remove rubber boots without touching them (or overshoes if wearing shoes). If the same boots are to be used outside of the high-risk zone, keep them on but clean and decontaminate appropriately before leaving the PPE removal/doffing area



# Poster for steps to remove PPE:

Always remove PPE under the supervision of a trained buddy.

1. Perform glove disinfection of outer gloves with ABHR or soap and water.

2. a. Untie or break apron strap from the back/waist. b. Remove apron leaning forward and keeping it away from the body. If disposable apron place safely in waste bin. If reusable/heavy duty apron place safely in bucket for decontamination.



3. Perform glove disinfection of outer gloves with ABHR or soap and water.

4. Remove outer pair of gloves and dispose of them safely in waste bin. If heavy duty gloves used place safely in bucket for decontamination.

5. Perform glove disinfection of inner gloves with ABHR or soap and water.

6. While wearing inner gloves, remove hood of the coverall. Unzip coverall completely and remove from shoulders to feet. Avoid touching skin or scrubs.



7. Perform glove disinfection of inner gloves with ABHR or soap and water.

8. Remove eye protection by lifting the strap from behind the head and dispose of it safely in waste bin. If reusable eye protection is used, place safely in bucket for decontamination.



OR

9. Perform glove disinfection of inner gloves with ABHR or soap and water.



11. Perform glove disinfection of inner gloves with ABHR or soap and water.



13. Step into 0.5% chlorine foot bath. Step out of the foot bath and remove rubber boots without touching them.

14. Perform hand hygiene with ABHR or soap and water.

Always remove PPE under the supervision of a trained buddy.

1. Perform glove disinfection of outer gloves with ABHR or soap and water.

2. a. Untie or break apron strap from the back/waist. b. Remove apron leaning forward and keeping it away from the body. If disposable apron place in waste bin. If reusable/heavy duty apron place in bucket for decontamination.



3. Perform glove disinfection of outer gloves with ABHR or soap and water.

4. Remove outer pair of gloves and dispose of them safely in waste bin. If heavy duty gloves used place in bucket for decontamination.

5. Perform glove disinfection of inner gloves with ABHR or soap and water.

6. Remove head and neck covering from back to front and dispose of it safely in waste bin.



7. Perform glove disinfection of inner gloves with ABHR or soap and water.

8. Remove the gown from back to front rolling it from inside to outside and dispose of it safely in waste bin.



9. Perform glove disinfection of inner gloves with ABHR or soap and water.

10. Remove eye protection by lifting the strap from behind the head and dispose of it safely in waste bin.



OR

11. Perform glove disinfection of inner gloves with ABHR or soap and water.

12. Remove mask from behind the head by first lifting the bottom strap above the head and leaving it hanging in front; and then lift the top strap from behind head and dispose of it safely in waste bin.



13. Perform glove disinfection of inner gloves with ABHR or soap and water.



15. Step into 0.5% chlorine foot bath. Step out of the foot bath and remove rubber boots without touching them.

16. Perform hand hygiene with ABHR or soap and water.

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# Summary

- For contact (direct/indirect) with patients the following PPE should be used: fluid resistant coverall (or gown and head and neck cover if coverall not available), eye protection (face shield or goggles), two pairs of gloves, medical mask and either disposable or reusable apron and rubber boots
- The outer pair of gloves for those who are part of environmental services (e.g. hygienists) or burial teams should be heavy duty gloves
- It is important to have a buddy watching the putting on and taking off of PPE
- Most risk of contamination occurs during the steps for taking off PPE

# References

1. World Health Organization. (2023). Infection prevention and control guideline for Ebola and Marburg disease, August 2023. World Health Organization. <https://iris.who.int/handle/10665/372261>.
2. Willet V, Dixit D, Fisher D, Bausch D G, Ogunsola F, Khabisa J et al. Summary of WHO infection prevention and control guideline for Ebola and Marburg disease: a call for evidence based practice *BMJ* 2024; 384 :p2811 doi:10.1136/bmj.p2811.



On behalf of WHE IPC & WASH team

**THANK YOU!**



