

Ebola Virus Disease



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435 Lecture Notes

Original Content | [Titles](#) | Additional Notes | **Important**

Objectives:

- ▶ Epidemiology of Ebola infection (reservoir)
- ▶ Clinical picture
- ▶ Mode of transmission
- ▶ Risk factors
- ▶ Prevention and control

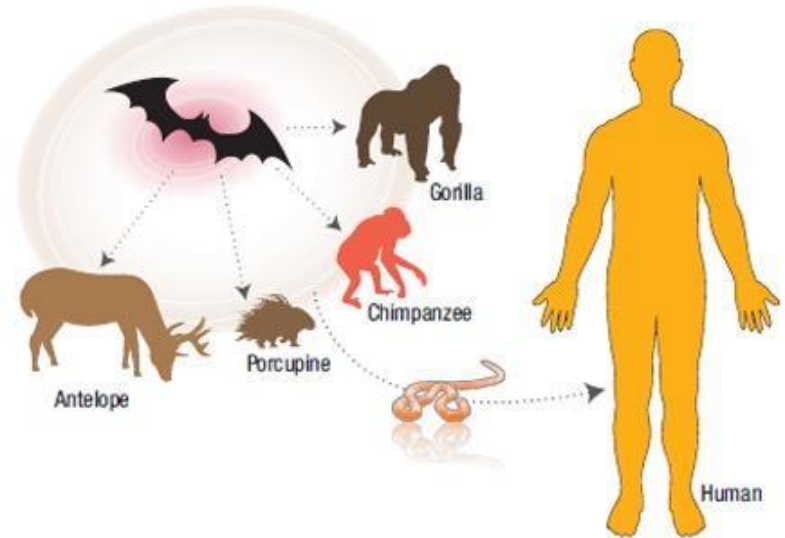
Important note: In red are the most important points for communicable diseases lectures. For epidemiology you won't be asked about specific numbers but e.g. if it's Endemic or outbreak or decreased as in malaria

▶ Ebola is a rare and **deadly** disease caused by infection with one of the **Ebola virus** species.

▶ Ebola virus is from the family **Filoviridae**, genus **Ebolavirus**.

▶ Ebola virus is **animal-borne** and that **bats** are the most likely reservoir.

▶ Transmitted From bats to different animals then to humans, and human-human contact

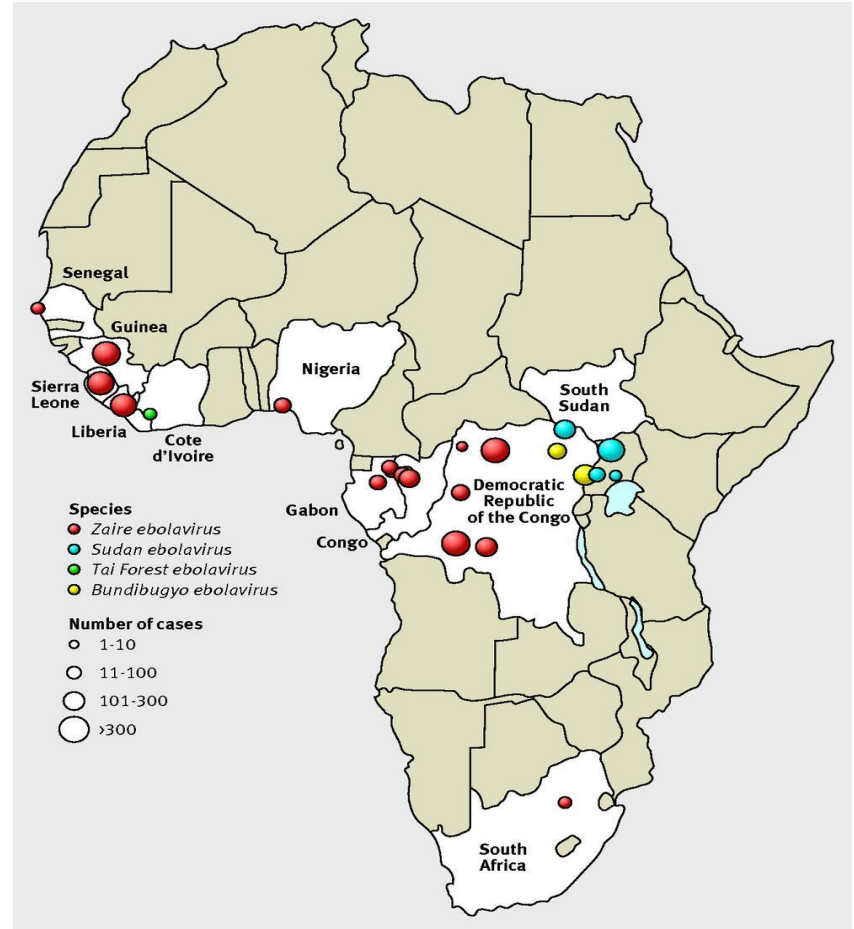


Epidemiology:

First case was found in 1976 near the Ebola River in the Democratic Republic of the Congo.

Then, outbreaks have appeared sporadically in **Africa**.

High fatality disease: 50% and even reaching 90%



Map of Ebola virus outbreaks 1976-2014 (CDC)

Largest Ebola Outbreaks Chronologically Since 1976

Year	Country	Reported Cases	Deaths Reported (%)
1976	Democratic Republic of the Congo – DRC (Zaire)	318	280 (88%)
1976	Sudan (South Sudan)	284	151 (53%)
1995	Democratic Republic of the Congo	315	250 (81%)
2000-2001	Uganda	425	224 (53%)
Dec 2002 – Apr 2003	Republic of Congo	143	128 (89%)
2007	Republic of Congo	264	187 (71%)
March 2014 - Present	Multiple Countries in West Africa	8,033*	3,865 (48%)*

*Laboratory confirmed cases as of October 8, 2014

CDC / WHO

Just know that it's mostly in africa

Transmission:

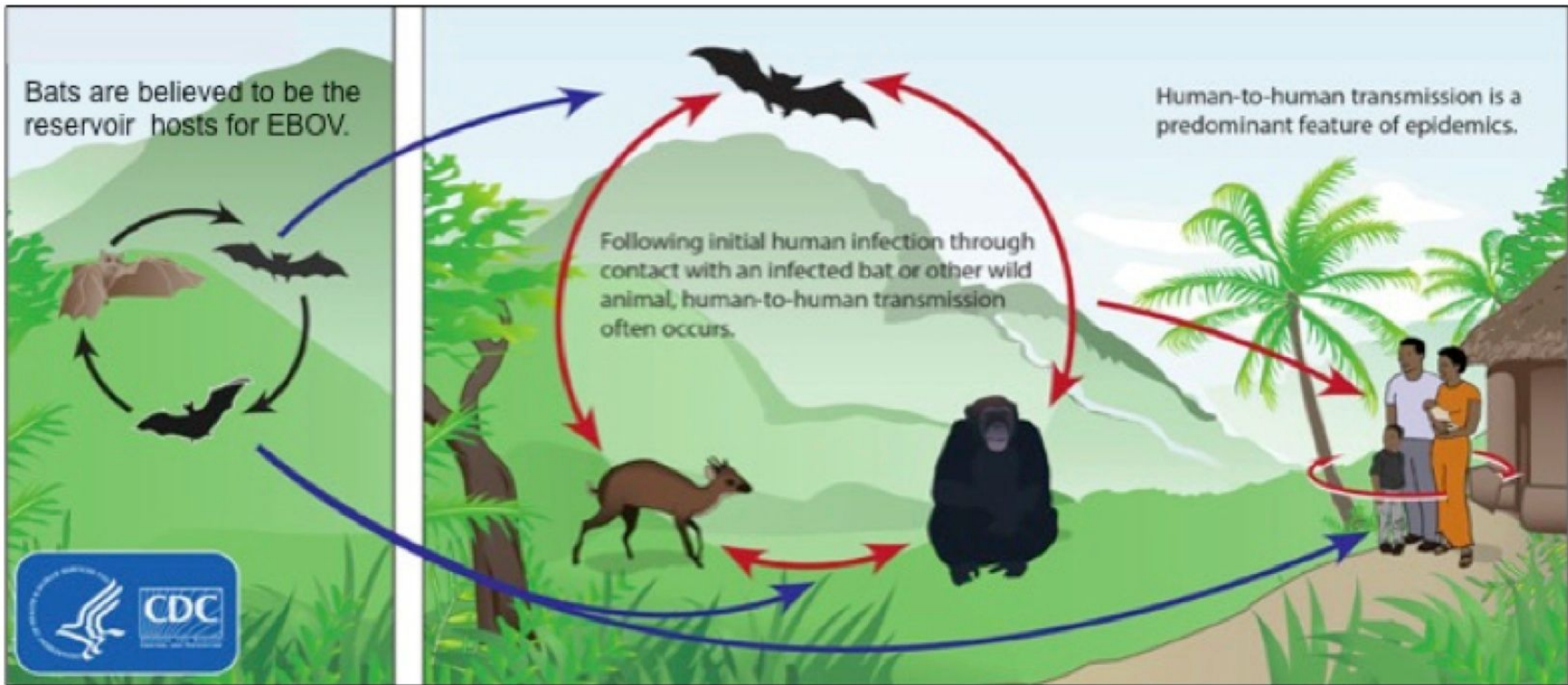
Direct contact (through broken skin or mucous membranes) with:

- ▶ Blood or body fluids of a person who is sick with Ebola
 - ▶ Objects contaminated with the virus e.g. utensils
 - ▶ Infected fruit bats or primates (apes and monkeys)
 - ▶ Semen from a man who has recovered from Ebola (possibility as virus can be excreted in semen **even after recovery**) & breast milk (for months)
- ❖ A person infected with Ebola virus is **not contagious until symptoms appear**. Symptomatic = infectious

Bats are believed to be the reservoir hosts for EBOV.

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

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



- Ebola is **not** an airborne virus.
- Only direct contact (which is good)
- Can **not** be transmitted through food or water

You **can't** get Ebola through



Air



Water



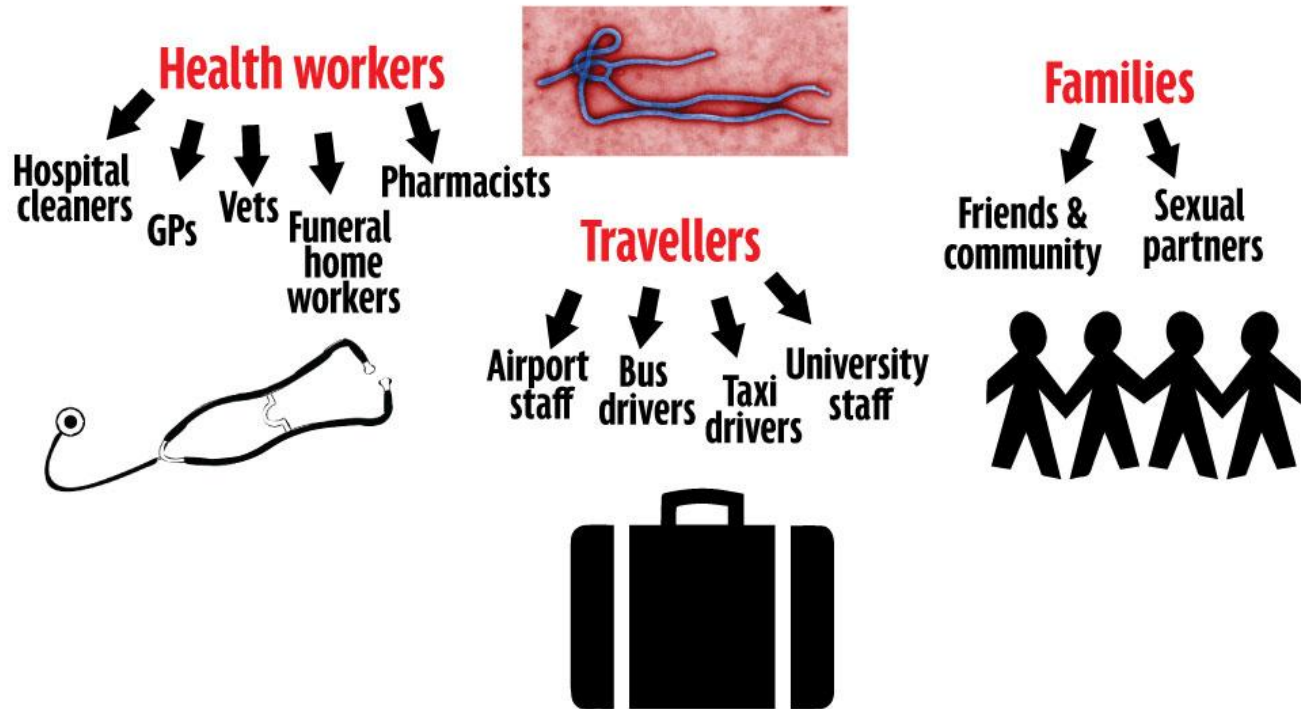
Food

Ebola virus can persist after recovery in many body fluids such as

- Breast milk
- Semen

This is very important.

WHO IS MOST AT RISK OF GETTING EBOLA?



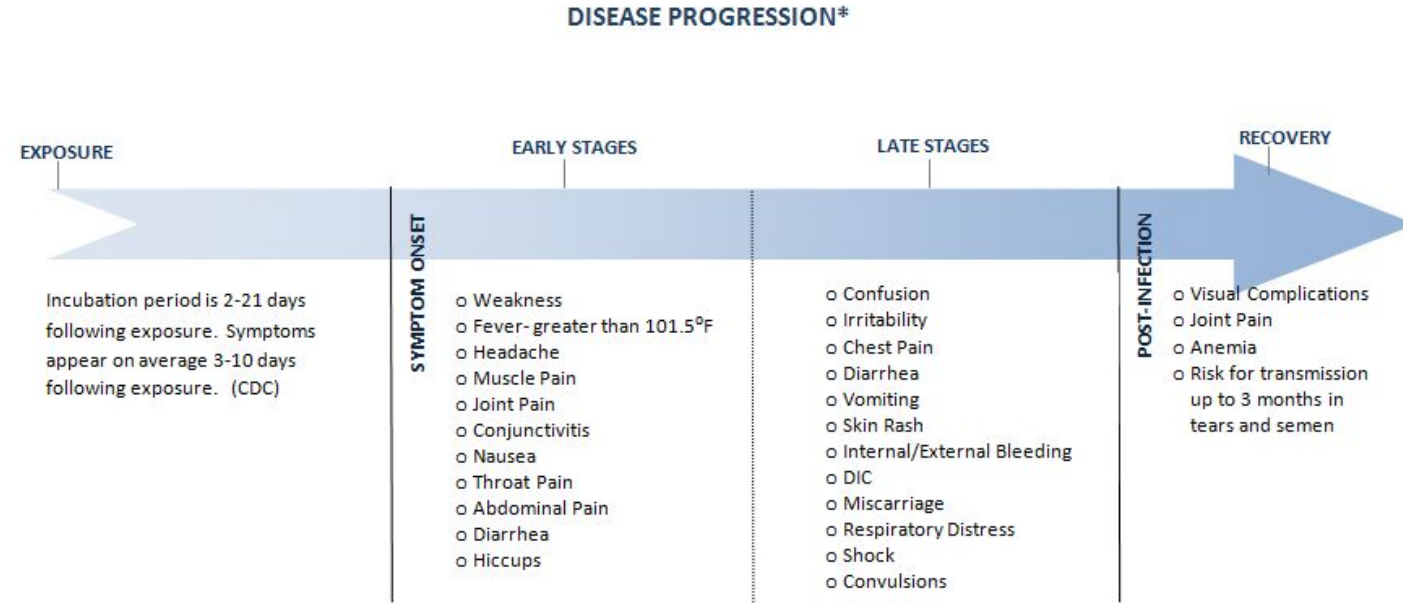
Signs and symptoms:

Early symptoms are not specific, just like any febrile illness with GI symptoms. Be suspicious if there was contact history

- Fever
- Fatigue
- Weakness
- Vomiting
- Severe headache
- Muscle pain
- Diarrhea
- Stomach pain
- **Unexplained bleeding or bruising (hemorrhagic fever) in later stages not early symptoms**

Incubation period: Symptoms may appear anywhere from **2 to 21** days after exposure to the virus.

Clinical progression of Ebola



**Early and late stage symptoms may overlap; all symptoms may not manifest in all infected patients*

Source: Jonathan B. Perlin, MD, PhD and HCA Clinical Excellence Knowledge Center, 2014

Don't memorize it just know that early stages = nonspecific symptoms, late stages= severe symptoms e.g. respiratory distress and bleeding, after recovery remains chronic symptoms but not infectious except in body fluids e.g. semen

Diagnosis:

- ▶ Blood tests can identify **antibodies** of the Ebola virus
 - Either unusually low or high white blood cell counts
 - Low platelet counts
 - Elevated liver enzymes
 - Abnormal coagulation factor levels

Treatment:

- There is **no approved treatment** for Ebola (no specific antiviral drug)
- Mainly **treat Symptoms and complications** as they appear (conservative treatment):
 - Providing intravenous fluids (rehydration) and balancing electrolytes (body salts)
 - Maintaining oxygen status and blood pressure
 - Treating other **secondary infections** if they occur

Prevention and control *

There is **no FDA-approved vaccine** available for Ebola



Prevention and control *

1. Patient

- ▶ Place patient in **isolation** unit in a single room or if not feasible shared with patients with the same disease only (doors closed, restricted movement in/out unit e.g. use portable x-ray machine).

2. Contact

- ▶ **Restrict entry** of relatives & health care workers to only those considered essential .
- ▶ All persons entering the patient room should wear **personal protective equipment (PPE)**: gloves, gown, eye protection, face mask (minimum coverage: no skin or mucous membrane is exposed).
- ▶ **Limit** the use of **needles** and sharp objects then dispose appropriately in containers.

3. Environment

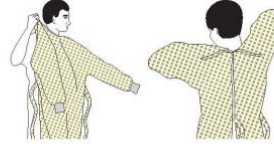
- ▶ Diligent **environmental cleaning and disinfection** and safe handling of potentially contaminated materials.

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator



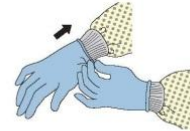
3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit



4. GLOVES

- Extend to cover wrist of isolation gown



USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene



This is for your information

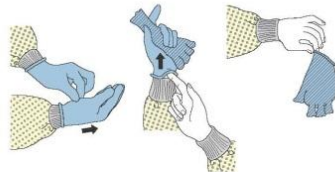
Note that if exposed to virus, disinfection is not enough, you have to thoroughly wash your hands

HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 1

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in an infectious* waste container



2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in an infectious* waste container



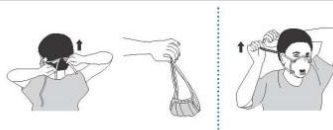
3. GOWN

- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in an infectious* waste container

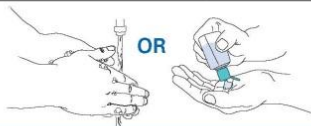


4. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in an infectious* waste container



5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.

PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE

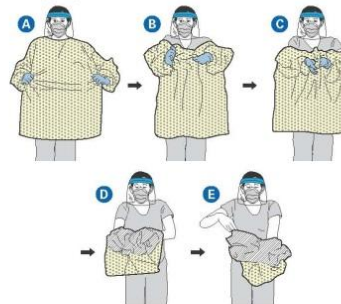


HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into an infectious* waste container



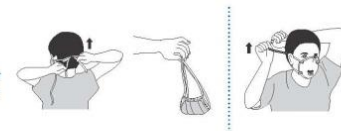
2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in an infectious* waste container

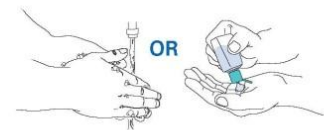


3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in an infectious* waste container



4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.

PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE



References:

- ▶ Ebola (Ebola Virus Disease). Centers for Disease Control and Prevention website <http://www.cdc.gov/vhf/ebola/>. Updated October 18, 2017. Accessed November 20, 2017.
- ▶ WHO, 2015. Ebola virus disease. *World Health Organization*, p. 1. <http://www.who.int/mediacentre/factsheets/fs103/en/>