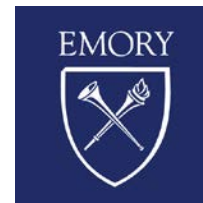


# Viral Hemorrhagic Fevers

## Personal Protective Equipment

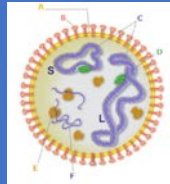


# Arenaviridae

Host = Rodents

**Lassa**

Junin, Machupo, Guanarito,  
Sabia



# Filoviridae

Host = Bats (?)

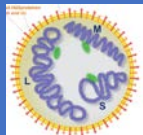
**Ebola, Marburg**



## VHFs

Zoonotic

Lipid enveloped RNA



# Bunyaviridae

Hosts = Ticks, rodents, mosquitos

**CCHF** (Crimean Congo Hemorrhagic Fever),  
Hantaviruses (Sin Nombre, **Andes**), Rift  
Valley Fever



# Flaviviridae

Hosts = Ticks, mosquitos

**Yellow Fever, Dengue**

Kyasanur, Omsk

## Symptoms

Fever  
Headache  
Nausea/vomiting  
Diarrhea  
Muscle/joint pain  
Fatigue/malaise

## Disinfection

Their lipid envelope makes these viruses susceptible to many cleaning agents.

## Treatment

Supportive care  
May try some antivirals  
Some vaccines but limited

## Diagnosis

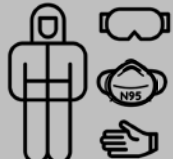







Rapid testing available for some, many require specimens to be sent to the CDC

## Prognosis

Ranges from asymptomatic to severe illness, organ failure, and death

## Transmission

Not all are known to be transmissible person-to-person. PPE differs

Virus Family	Illness Caused	Common Geography	Vector or Source	Person-to-person spread	Precautions	PPE	Comments
Filoviridae	Ebola Virus Disease	Central, sub-Saharan Africa	? Presumed bat	YES	Contact, Droplet/Airborne, Eye		Full body coverage for acute (wet) phase
	Marburg virus		Fruit bat				
Arenaviridae	Lassa fever	West Africa	Rodents	YES	Contact, Droplet/Airborne, Eye		Full body coverage for acute (wet) phase
	Junín Machupo (Bolivian HF) Guanarito (Venezuelan HF) Sabia (Brazilian HF)	South America					
Bunyaviridae	CCHF – Crimean Congo Hemorrhagic Fever	Europe, Mediterranean, Middle East, Africa, India, China	Tick, infected livestock	YES	Contact, Droplet*, Eye		*Add respiratory protection (N95 or ↑) for centrifugation 
	Hantaviruses (HPS/HFRS*) (Sin Nombre, Andes virus)	Worldwide	Rodent	Possible	Standard Precautions unless Andes virus suspected		Contact, Droplet/Airborne, Eye for potential Andes virus or contact/clean-up of rodent droppings
	Rift Valley Fever	All of sub-Saharan Africa	Mosquito	No	Standard Precautions		
Flaviviridae	Yellow Fever	Tropics	Mosquito	Blood*	Standard Precautions		*Potential risk of Yellow Fever transmission in blood transfusion, immediately post vaccination
	Dengue	Tropics	Mosquito	No			
	Kyasanur	India	Tick	No			
	Omsk	Siberia					

A patient is considered “wet” when they have fever, vomiting, and/or diarrhea.

Because the infectious dose for some VHF is very small and because most body fluids of infected patients may harbor the virus, full body coverage is required for Ebola Virus Disease, Lassa Fever, and Marburg Virus Disease, and should be considered with CCHF and Andes Virus (Hantavirus)



Full body coverage = Coverall or Gown  
Shoe or boot covers  
Head cover, hood, or shroud

Blood and viral penetration resistance:  
Gown – ANSI/AAMI PB70 Level 4  
Coverall – ASTM F1671 or EN14126



Eye protection = full face shield  
or goggles with circumferential  
protection



Respiratory protection by N95 or  
higher  
Filtering face piece respirator or  
PAPR (powered air purifying  
respirator)



Isolation gown = choose level of  
gown based on risk.  
AAMI PB70 Level 1 – 3 have  
increasing levels of resistance to  
fluids



Medical or surgical mask for droplet  
or source protection only. Does not  
provide respiratory protection.



Gloves = non-sterile medical  
exam gloves. Double gloving and  
the use of extended cuff gloves  
may be advised.



Complex PPE ensembles require practice and training to use and remove correctly.

Remember:

**Dirtiest First!**

And protect your mucous membranes (eyes, nose, mouth) until you are outside the danger zone.

# Donning

Step by step protocols should include:

- Designation of a clean space where donning can occur
- Staff preparedness to use PPE (restroom, hair pulled back, eyeglasses secured, jewelry removed)
- Inspection of PPE
- Correct order for donning
- Chair, stool, or assistive device if needed
- Assistant or trained observer



# Doffing

Doffing is our last chance to leave contamination behind. Any visible contamination or areas where contamination is suspected, should be cleaned using either “One wipe, one swipe” or ABHR.

The doffing process may extend from inside the room or patient care area to the hallway or anteroom. Which pieces of the PPE ensemble are removed where should be based on a risk assessment done with your Infection Prevention & Control department.

Protecting YOU from contamination, splashes, and sprays as well as other staff, patients, and your environment from the spread of infectious particles requires careful, methodical doffing!







**Identify** – symptoms may be vague and common, so early identification of travel history or exposure risk is key.



**Isolate** – protect yourself and others by placing suspect patients into private rooms when available and using the appropriate PPE for the tasks at hand.



**Inform** – know your internal stakeholders and public health partners; involve them early for PPE, IPC, testing, treatment, and transfer options.

“We can either let our actions be guided by misunderstandings, fear and self-interest, or we can lead by knowledge, science and compassion. We can fear, or we can care.”

Susan Grant, former Emory Chief Nursing Officer



# Resources

Emory PPE Resources: <https://med.emory.edu/departments/medicine/divisions/infectious-diseases/serious-communicable-diseases-program/ebola-resources/index.html>

NETEC Viral Hemorrhagic Fevers Matrix: <https://repository.netecweb.org/items/show/1693>

WHO Course on CCHF: <https://openwho.org/courses/crimean-congo-haemorrhagic-fever-introduction>

NETEC Course on Special Pathogens: <https://courses.netec.org/courses/special-pathogens-of-concern>

CDC information about CCHF: <https://www.cdc.gov/vhf/crimean-congo/index.html>

