

8033 cases      4461 Lab-test confirmed cases      3865 confirmed deaths (as of 10-05-14)

**Ebola Virus Disease**, which belongs to the Family of Filoviruses, is a severe, often fatal viral illness in humans. Ebola first appeared in 1976 in two simultaneous outbreaks in Nzara, Sudan, and in Yambuku, Democratic Republic of Congo (formerly Zaïre). The latter was in a village situated near the Ebola River, from which the disease takes its name. Bats are considered to be a plausible reservoir for the virus. Evidence of infection with ebolavirus has been reported in fruit bats collected from woodland and forested areas near Ghana and Gabon, with reduced frequency of isolation from bats collected in mainland China and Bangladesh. The largest recorded ebolavirus outbreak to date began in March 2014, with initial cases reported in Guinea and then additional cases identified in the surrounding regions (Liberia, Sierra Leone, Nigeria). A new strain of the ZEBOV (Zaire-strain of Ebolavirus) species was identified as the causative agent of the outbreak.

**SYMPTOMS** – Incubation period (lasts 2-21 days after contact) characterized by acute onset of fever, \*malaise, \*\*myalgia, headache, and pharyngitis. This is followed by a period characterized by vomiting, diarrhea, \*\*\*maculopapular rash, limited renal and hepatic involvement and hemorrhagic diathesis. The case fatality rate (CFR) varies from 50 – 90%.

\* Malaise - a feeling of general discomfort or uneasiness, of being "out of sorts", often the first indication of an infection or other disease.

\*\* Myalgia - Muscle pain

\*\*\* Maculopapular rash - Macules usually appear as flat, small, non-elevated and discolored regions of the epidermal layer of the skin; whereas, papules are small and swollen bumps on the skin.

\*\*\*\* Hemorrhagic diathesis – A tendency to bleed due to any one or a combination of clotting defects.

Translated: Incubation period exhibits fever (up to 101.5F), muscle ache, headache, sore throat, generally feeling bad. Afterwards, the person typically exhibits vomiting, diarrhea, skin rashes, impaired kidney and liver function, internal and external bleeding.

**VIRUS TRANSMISSION** - Ebola was introduced into the human population through contact with the blood, secretions, organs, or other bodily fluids of infected animals. In Africa, infection has been documented through the handling of infected chimpanzees, gorillas, fruit bats, monkeys, forest antelope, and porcupines found ill or dead or in the rainforest. One canine study has shown that canines are able to contract Ebola and remain non-symptomatic.

It is very well accepted that Ebolavirus is transmitted by large droplets formed during the process of coughing or sneezing. There is presently discussion that aerosol transmission of Ebolavirus (via tiny particles measured in millionths of an inch) is possible but this is still debated heavily.

Ebola is spread in a community through human-to-human transmission, with infection resulting from direct contact through broken skin or mucous membranes or with the blood, secretions (sweat, saliva, urine, sputum, semen, and vaginal fluids), organs, or other body fluids of infected, symptomatic persons, and by indirect contact with environments contaminated with such fluids. Infection may result from contact with by contaminated instruments such as needles, pins, razors blades.

Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola. It is also documented that a high concentration of the virus is secreted on the skin of the dead cases.

Men who have recovered from the disease can still transmit the virus through their semen for up to 3 months after recovery.

**INCUBATION PERIOD:** Two to 21 days, most commonly 8-10 days

**COMMUNICABILITY:** Ebolavirus is communicable as long as blood, body fluids or organs, contain the virus. Ebolavirus has been isolated from semen 61 to 82 days after the onset of illness, and transmission through semen has occurred 7 weeks after clinical recovery.

**FIRST AID/TREATMENT:** There is no effective antiviral treatment. Instead, treatment is supportive, and is directed at maintaining organ function and electrolyte balance and combating hemorrhage and shock.

**IMMUNIZATION:** None

**\*PROPHYLAXIS:** None. Management of the Ebola virus is solely based on isolation and barrier-nursing providing symptomatic and supportive treatments.

\*Action taken to prevent disease, especially by specified means or against a specified disease.

**SUSCEPTIBILITY TO DISINFECTANTS:** Ebolavirus is susceptible to 3% acetic acid (Vinegar!), 1% glutaraldehyde, alcohol-based products, and dilutions (1:10-1:100 for  $\geq 10$  minutes) of 5.25% household bleach (sodium hypochlorite), and calcium hypochlorite (bleach powder).

WHO recommendation: For cleaning up spills of blood or body fluids, flood the area with 1:10 dilutions of 5.25% household bleach for 10 minutes for surfaces that can tolerate stronger bleach solutions (e.g., cement, metal). For surfaces that may corrode or discolor, they recommend careful cleaning to remove visible stains followed by contact with a 1:100 dilution of 5.25% household bleach for more than 10 minutes. ALWAYS WEAR appropriate PPE when cleaning up contaminated material...a splash will likely infect you!

**SURVIVAL OUTSIDE HOST:** Filoviruses have been reported capable of surviving for weeks in blood and can also survive on contaminated surfaces, particularly at low temperatures (4°C) (39° F).

A study on transmission of Ebolavirus via \*fomites in an isolation ward concludes that the risk of transmission is low when recommended infection control guidelines for viral hemorrhagic fevers are followed. Infection control protocols included decontamination of floors with 0.5% bleach daily and decontamination of visibly contaminated surfaces with 0.05% bleach as necessary.

\*Fomites are inanimate objects (as a dish, toy, book, doorknob, or clothing) that may be contaminated with infectious organisms and serve in their transmission.

In another study, Ebolavirus dried onto glass, silicone rubber, or painted aluminum alloy is able to survive in the dark for several hours under ambient conditions (between 20 and 25°C and 30–40% relative humidity) (the amount of virus reduced to 37% after 15.4 hours).

When dried in tissue culture media onto glass and stored at 39° F, Zaire Ebolavirus survived for over 50 days. This information is based on experimental findings only and not based on observations in nature. This information is intended to be used to support local risk assessments in a laboratory setting.

One study could not recover any Ebolavirus from experimentally contaminated surfaces (plastic, metal or glass) at room temperature.

**PHYSICAL INACTIVATION:** Ebola can be inactivated by heating for 30 minutes to 60 minutes at 140°F, boiling for 5 minutes, or gamma irradiation. Ebolavirus has also been determined to be moderately sensitive to Ultraviolet C radiation.

**PROTECTIVE CLOTHING:** Personnel entering the potentially contaminated area must remove street clothing, including undergarments and jewelry, and change into dedicated full coverage protective clothing (i.e., completely covering all street clothing).

Additional protection may be worn over laboratory clothing when infectious materials are directly handled, such as solid-front gowns with tight fitting wrists, gloves, and respiratory protection. Eye protection must be used where there is a known or potential risk of exposure to splashes.

In-adequate and poor quality of protective materials, especially at the beginning of the outbreak, was a big problem and contributed to transmission of the Ebola virus within the health care setting. *The quality of protective materials especially masks and goggles, in future outbreaks, need to be taken into consideration.*

Gloves – nitrile material (**KleenGuard Powder-free Blue Nitrile** (\$9.45 per 50 pair)

Remove gloves carefully following CDC recommendations to prevent contamination <http://www.cdc.gov/HAI/pdfs/ppe/ppeposter148.pdf>

Gown (fluid resistant or impermeable) - DuPont *Tychem* (best in class) (\$25-\$900 each) or

DuPont Tyvek (best affordable alternative, *put duct tape over seams*) (p/n TY122SWH-3XL \$5.00 each)

Remove suit carefully following CDC recommendations to prevent contamination <http://www.cdc.gov/HAI/pdfs/ppe/ppeposter148.pdf>

Eye protection (full goggles or face shield that fully covers the front and sides of the face) that allow proper fit respirator while wearing the goggles. (**Allsafe Respirator goggles p/n 3005057 \$9.15 each**)

Remove goggles carefully following CDC recommendations to prevent contamination <http://www.cdc.gov/HAI/pdfs/ppe/ppeposter148.pdf>

Facemask – Disposable N100 respirator mask (**3M #8233 \$6.50 each**) or full-face mask with N100 replaceable cartridge.

Remove goggles carefully following CDC recommendations to prevent contamination <http://www.cdc.gov/HAI/pdfs/ppe/ppeposter148.pdf>

- PPE should be worn upon entry into the scene and continued to be worn until personnel are no longer in contact with the patient. Many times a wash-down with bleach solution is required before suit removal.
- PPE should be carefully removed without contaminating one's eyes, mucous membranes, or clothing with potentially infectious materials.
- PPE should be placed into an approved medical waste container or double bagged and held in a secure location.
- Re-useable PPE should be cleaned and disinfected according to the manufacturer's reprocessing instructions. Do not try to clean and re-use disposable masks!

Instructions for putting on and removing PPE have been published online at <http://www.cdc.gov/HAI/prevent/ppe.html> and <http://www.cdc.gov/vhf/ebola/pdf/ppe-poster.pdf> [PDF - 2 pages] (<http://www.cdc.gov/vhf/ebola/pdf/ppe-poster.pdf>).

Hand hygiene should be performed immediately after removal of PPE.

## What's the Big Problem Here?



PPE is recommended for people assisting with disinfection.

No eye protection for the disinfecting worker.

No respiratory protection for the worker.

No body protection for the worker.

For additional documents which provide credible information concerning protection against the Ebolavirus, see:

<http://www.cdc.gov/>