

# EBOLA VIRUS DISEASE

## Essential Information for Workers

(Current as of October 27, 2014)

### What is Ebola?

Ebola virus disease (EVD), also known as Ebola hemorrhagic fever (EHF), is a usually fatal disease that can affect humans and some animals. It is caused by infection with the Ebola virus. The first case of Ebola in the U.S. was confirmed in September 2014. The first case of transmission of Ebola to a health care worker in the U.S. was confirmed in October 2014.

### How dangerous is Ebola?



Fifty to ninety per cent of patients with Ebola have died during the African Ebola outbreaks. Most Ebola fatalities are caused by dehydration. Researchers do not yet know why some people recover while others do not. Immediate treatment is essential to survival.

### What is the Difference between an “infected person” and an “infectious person”?

A person who is infected with Ebola is not infectious (contagious) until symptoms, such as fever, begin. Ebola infection cannot be detected during the incubation period; that is, it cannot be detected before symptoms appear.

### How does Ebola virus spread?

Government and medical experts agree that Ebola virus is spread by direct contact with an infectious person’s skin, blood, or body fluids such as urine, saliva, sweat, feces, vomit, breast milk, or semen. (Body fluids may contain blood even if blood is not visible.) Ebola infection may occur via liquid contact, splash contact, droplet contact, or hand contact with your mouth or nose, with the mucous membranes of the eye or eyelid, with punctures on the skin (scabs, scrapes, cuts, injections, etc.) or through sexual acts. Because the virus can survive on surfaces for several days, people can also be infected by direct contact with objects (like needles or bed sheets) that contain infectious blood or body fluids.

Both the Centers for Disease Control (CDC) and the World Health Organization (WHO) state that EVD is a bloodborne and not an airborne infectious disease. Airborne transmission of EVD among humans has not been documented. However, a small number of articles in the scientific literature indicate that EVD *may potentially* be transmitted via inhalation of infectious airborne particles.<sup>i,ii,iii,iv</sup> As a precautionary measure against possible airborne transmission (droplet and/or aerosol), CDC, OSHA, and other experts recommend respiratory protection in certain health care settings.

### Who is at risk?

To be at risk, you must have close contact with an infectious person (or animal). Close human contact means caring for or living with an infectious person with Ebola or having a high likelihood of direct contact with blood or body fluids from an infectious person. Direct contact means contact between an

infectious body fluid and your mouth, nose, eyes or mucous membranes, or non-intact skin (cuts, scrapes, etc.).

Those most at risk include:

- Residents of central and west Africa.
- Persons traveling from Sierra Leone, Guinea or Liberia, who may have had contact with an infectious person or animal and/or with the blood or body fluids of an infectious person or animal.
- Any other person who has close contact with an infectious person and/or with blood or body fluids from an infectious person.

The workgroup that are at highest risk of exposure in the course of performing their work duties include:

- Health care workers who may have contact with an infectious person and/or infectious waste
- Emergency medical technicians and other first responders who may have contact with an infectious person and/or infectious waste
- Hospital laundry personnel who may have contact with infectious material
- Laboratory personnel who may handle infectious samples.
- Hazardous waste and other workers who clean up or transport infectious materials
- Airline flight crews and airline and airport ground crews who may have contact with an infectious person or with infectious surfaces or materials.

Other groups that are at lower but still at elevated risk of exposure include customs and transportation security personnel; mass transit workers; sewage and wastewater treatment workers; sanitation workers; and others.

## What are the symptoms? When do symptoms appear?

Symptoms usually appear 8 to 10 days after exposure. However, symptoms can appear as early as 2 days or as long as 21 days after exposure. A person who is infected with Ebola is not infectious (contagious) until symptoms, such as fever, begin. Early symptoms include sudden fever, chills, and

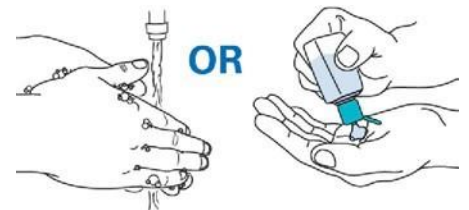
muscle aches. Around the fifth day, a skin rash may develop. Nausea, vomiting, chest pain, sore throat, abdominal pain, and diarrhea may follow. Symptoms become increasingly severe and may include jaundice (yellow skin), severe weight loss, mental confusion, bleeding inside and outside the body, shock, and multi-organ failure.

## Treatment

Currently there is no approved vaccine to prevent or treat the disease. Severely ill patients require intensive care, including hydration, electrolytes, and monitoring of blood pressure. People that are suspected or confirmed to have the disease should be isolated from other patients and treated by health care workers using strict infection control measures.

## Worker protection

Use “universal precautions” – treat any body fluid as if it is infectious. Proper hand hygiene and proper use of personal protective equipment (PPE) are essential. Wear impermeable, disposable gloves. Gloves and other personal protective equipment must be put on and taken off properly to avoid contaminating skin or clothing (see [www.cdc.gov/HAI/pdfs/ppe/ppeposter1322.pdf](http://www.cdc.gov/HAI/pdfs/ppe/ppeposter1322.pdf)). Do not reuse soiled gloves. Wash hands vigorously with soap and water after removing gloves or after close contact with an ill person or with body fluids or surfaces that



may be contaminated. Avoid touching your mouth, eyes, and nose with unwashed or gloved hands. (Note: these are basic precautions. Additional protections are usually required, especially in health care settings. These include respiratory protection, eye protection, additional protective clothing, and decontamination.)

## Infection control measures in health care settings

Patients should be isolated in single patient rooms with private bathrooms. Mechanical ventilation should be used to maintain isolation areas under negative pressure. Health care workers should wear impermeable gloves, gown, and shoe covers, goggles or face shield, and respiratory protection. NYCOSH recommends that the *minimum* level

of respiratory protection in isolation areas should be a disposable N95 respirator.

**Medical procedures that stimulate coughing or generate aerosols (microscopic airborne liquid particles) increase health care worker risk of infection and should be avoided if possible.**

These procedures, if performed, should occur only in an airborne isolation room. CDC recommends using a disposable N95 respirator or better ([www.cdc.gov/vhf/ebola/index.html](http://www.cdc.gov/vhf/ebola/index.html)). Expert commentary published by the Center for Infectious Disease Research and Policy recommends using more protective a powered air-purifying respirator (PAPR) for any activity that may aerosolize body fluids. ([www.Cidrap.umn.edu/news-perspective/2014/09/commentary-health-workers-need-optimal-respiratory-protection-ebola](http://www.Cidrap.umn.edu/news-perspective/2014/09/commentary-health-workers-need-optimal-respiratory-protection-ebola)).



Bio level C PPE, including PAPR

Environmental cleaning and disinfection are essential. Disinfectants for Ebola virus include 10% sodium hypochlorite (bleach) solution or hospital-grade quaternary ammonium or phenolic products. Note that these products have their own health and safety concerns and should be used only with appropriate precautions.

CDC “tightened” guidance for healthcare worker PPE issued on October 20, 2014 ([www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html](http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html)) includes:

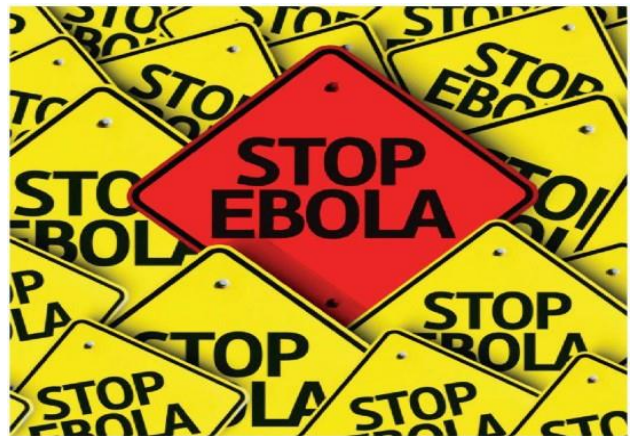
- Any item or healthcare worker exiting an Ebola patient room should be considered potentially contaminated.
- Before working with Ebola patients, healthcare workers must receive *repeated training* and must *demonstrate competency* in Ebola infection control practices and procedures, especially in donning/doffing proper PPE.
- While wearing PPE, no skin should be exposed.

- Each step of the PPE donning/doffing procedure must be supervised at all times by a trained observer to ensure proper worker protection.
- Signs and physical barriers (such as plastic enclosures) should be used to provide clear separation between clean areas and contaminated or potentially contaminated areas. They should be a one-way flow of care moving from clean areas (where PPE is donned and unused equipment is stored) to the patient room and to the PPE removal area (where PPE is removed and discarded).
- Healthcare workers should have access to showers after doffing of PPE.

## Occupational safety and health regulations

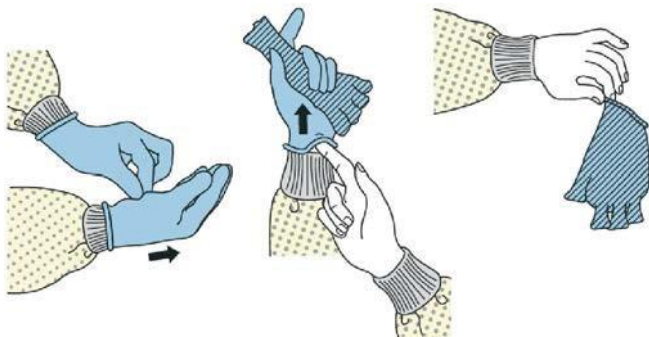
Employers are required to protect workers against exposure to Ebola.

**The OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030)** requires an employer to have a written Exposure Control Plan to determine which work tasks might be “reasonably anticipated” to expose employees to infectious or potentially infectious materials. The plan must also describe the measures the employer will take to prevent or reduce exposure. These measures must include annual training of workers and providing appropriate personal protective equipment (PPE) such as impermeable gloves. Employers must provide access to hand washing facilities, or if not feasible, to antiseptic hand cleaners.



**The OSHA Personal Protective Equipment/General Requirements Standard (29 CFR 1910.132)** requires the

employer to conduct a job hazard assessment to determine whether hazards are present that require the use of PPE. If PPE is required, the employer must provide it at no cost. The employer must train employees who are required to use PPE. Training must cover when and where to use PPE, how to use PPE, the limitations of relying on PPE, and how to maintain and dispose of PPE.



## Stopping Ebola at the source

The precautions outlined in this fact sheet are essential to limiting or stopping the spread of Ebola in the U.S. Ultimately, perhaps the most important measure to stop Ebola here is to stop it at its source in west and central Africa and then to improve health systems in the affected region. This can only be accomplished if the global community, including the U.S., provides increased economic, material, and human assistance.

For more information, see:

- <http://www.cdc.gov/vhf/ebola/>
- <https://www.osha.gov/SLTC/ebola/index.html>

**The OSHA Respiratory Protection Standard (29 CFR 1910.134)** requires the employer to implement a written respiratory protection program where respirators are required to protect worker health. The employer must medically evaluate and annually train and fit-test workers who will use respirators.

<sup>i</sup> Borio L, Inglesby T, Peters C, Schmaljohn A, et. al. 2002. Hemorrhagic fever Viruses as biological weapons: medical and public health management. *JAMA* 287(18): 2391-2405.

<sup>ii</sup> Jaax N, Jahrling P, Geisbert T, Steele K, et. al. 1995. Transmission of Ebola virus (Zaire strain) to uninfected control monkeys in a biocontainment laboratory. *Lancet* 346: 1669-1671.

<sup>iii</sup> Johnson E, Jaax N, White J, Jahrling P. 1995. Lethal experimental infections of rhesus monkeys by aerosolized Ebola Virus. *Int. J Exp Path* 76:227-236.

<sup>iv</sup> Piercy T, Smither S, Steward L, Eastbaugh L, Lever M. 2010. The survival of filoviruses in liquids, on solid substrates and in a dynamic aerosol. *J Appl Microbiol.* 109:1531-1539.