

## EBOLA VIRUS DISEASE (EVD)

### REPORTING INFORMATION

- **Class A:** Report immediately via telephone the case or suspected case and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report immediately via telephone to the local public health department in which the reporting health care provider or laboratory is located. Local health departments should report immediately via telephone the case or suspected case and/or a positive laboratory result to the Ohio Department of Health (ODH).
- Reporting Form(s) and/or Mechanism:
  - Immediately via telephone.
  - For local health departments, cases should also be entered into the Ohio Disease Reporting System (ODRS) within 24 hours of the initial telephone report to the ODH.
  - The [CDC Ebola Virus Disease \(EVD\) Consultation Form](#) is available for use.
- Key fields for ODRS reporting include: import status (whether the infection was travel-associated or Ohio-acquired), date of illness onset, and all the fields in the Epidemiology module.

### AGENT

Ebola virus disease (EVD) is a severe, often fatal disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees) that has appeared sporadically since its initial recognition in 1976. The disease is caused by infection with Ebola virus, named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa, where it was first recognized. The virus is one of two members of a family of RNA viruses called the Filoviridae. A major outbreak of > 28,000 cases occurred in West Africa in 2014-2016. The 3 main countries involved were: Guinea, Liberia and Sierra Leone.

### CASE DEFINITION

#### Clinical Description

An illness with acute onset with ALL of the following clinical findings:

- A fever > 40°C (104°F)
- One of more of the following clinical findings:
  - Severe headache
  - Muscle pain
  - Erythematous maculopapular rash on the trunk with fine desquamation 3-4 days after rash onset
  - Vomiting
  - Diarrhea
  - Pharyngitis (arenavirus only)
  - Abdominal pain
  - Bleeding not related to injury
  - Retrosternal chest pain (arenavirus only)
  - Proteinuria (arenavirus only)
  - Thrombocytopenia

#### Laboratory Criteria for Diagnosis

One or more of the following laboratory findings:

- Detection of VHF viral antigens in blood by enzyme-linked Immunosorbent Assay (ELISA) antigen detection
- VHF viral isolation in cell culture for blood or tissues
- Detection of VHF-specific genetic sequence by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) from blood or tissues

- Detection of VHF viral antigens in tissues by immunohistochemistry

### **Criteria for Epidemiologic Linkage**

One or more of the following exposures within the 3 weeks before onset of symptoms:

- Contact with blood or other body fluids of a patient with VHF
- Residence in or travel to a VHF endemic area
- Work in a laboratory that handles VHF specimens
- Work in a laboratory that handles bats, rodents, or primates from endemic areas
- Exposure to semen from a confirmed acute or convalescent case of VHF within 10 weeks of that person's onset of symptoms

### **Case Classification**

Suspect: Case meets the clinical and epidemiologic linkage criteria.

Confirmed: Case meets the clinical and laboratory criteria.

Comment: VHF refers to viral hemorrhagic fever caused by Ebola, Lassa, Lujo, or Marburg virus, a new world arenavirus, or Crimean-Congo hemorrhagic fever.

Early recognition is critical to controlling the spread of Ebola virus. Healthcare providers should evaluate the patient's epidemiologic risk factor

<http://www.cdc.gov/vhf/ebola/exposure/risk-factors-when-evaluating-person-for-exposure.html>, including a history of travel to a country with widespread Ebola virus transmission or cases in urban settings with uncertain control measures

<https://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/distribution-map.html> or contact within the preceding 21 days with a person with Ebola while the person was symptomatic. Click here for an evaluation algorithm to determine if testing for Ebola is indicated <http://www.cdc.gov/vhf/ebola/pdf/ed-algorithm-management-patients-possible-ebola.pdf>.

If a diagnosis of Ebola is being considered, the patient should be isolated in a single room (with a private bathroom), and healthcare personnel should follow standard, contact and droplet precautions (<http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html>), including the use of appropriate personal protective equipment (PPE) (<http://www.cdc.gov/vhf/ebola/hcp/ed-management-patients-possible-ebola.html>). Infection control personnel should be contacted immediately.

If Ebola is suspected, the local or state health department should be immediately contacted for consultation to assess whether or not testing is indicated and the need for initiating identification of contacts.

### **SIGNS AND SYMPTOMS**

Ebola hemorrhagic fever symptoms include abrupt onset of fever, severe headache, muscle pain, fatigue and weakness, followed by diarrhea, vomiting, and stomach pain.

A rash, red eyes, hiccups and internal and external bleeding may be seen in some patients. Symptoms may appear anywhere from 2 to 21 days after exposure to Ebola, but the average is 8 to 10 days. The fatality rate in the 2014-2016 West Africa outbreak was 39%.

Recovery from Ebola depends on good supportive clinical care and the patient's immune response. People who recover from Ebola infection develop antibodies that last for at least 10 years.

## **DIAGNOSIS**

Ebola virus disease is diagnosed through virus isolation, antigen-capture enzyme-linked immunosorbent assay (ELISA) testing, IgM ELISA and polymerase chain reaction (PCR). Virus isolation can be used to diagnose a case of EVD within a few days of the onset of symptoms. Persons tested later in the course of the disease or after recovery can be tested for IgM and IgG antibodies. The disease can also be diagnosed retrospectively in deceased patients by using immunohistochemistry testing, virus isolation, or PCR.

Local hospitals and laboratories should not attempt to culture any specimens. These viruses are highly pathogenic and require handling in special laboratory facilities designed to contain them. The hospital should hold on to any blood, serum, CSF, respiratory secretions and other tissue collected. The local health department and ODH will coordinate the shipment of all laboratory specimens for testing. The ODH Bureau of Infectious Diseases Outbreak Response and Bioterrorism Investigation Team (614) 995-5599 will follow up on the laboratory specimens.

## **EPIDEMIOLOGY**

### **Occurrence**

Ebola virus disease was first identified in 1976 near the Ebola River in Zaire, now known as the Democratic Republic of the Congo. Since then, isolated human outbreaks have occurred in central African countries such as Côte d'Ivoire (Ivory Coast), the Democratic Republic of the Congo, Gabon, the Republic of the Congo, Sudan and Uganda. In March 2014, the largest outbreak of Ebola virus disease in history began in West Africa, with widespread transmission occurring in Guinea, Liberia and Sierra Leone. A total of 28,616 cases were reported when the outbreak ended in April 2016. Infected travelers contributed to limited transmission in several other countries as well: Nigeria, Mali, Senegal, Spain and the United States.

### **Mode of Transmission and Source**

People can be exposed to Ebola virus from direct contact with the blood and/or secretions, organs or semen of an infected person. Thus, the virus is often spread through families and friends because they come in close contact with such secretions when caring for infected persons. People can also be exposed to Ebola virus through contact with objects, such as needles, that have been contaminated with infected secretions. Ebola can also be acquired while handling infected dead mammals in Africa, or through contact with the blood or organs of infected cynomolgus monkeys. Nosocomial transmission is common in African healthcare facilities through the previously stated contact means. Growing information suggests Ebola virus can persist in some survivors for more than 18 months (CDC).

### **Incubation Period**

Ebola virus disease: 2-21 days (average 8-10 days)

## **PUBLIC HEALTH MANAGEMENT**

### **Case**

#### Investigation

The patient should be kept in strict isolation. Obtain information about the patient's occupation, history of travel outside the United States, contact with wild animals or lab animals, contact with a suspected or confirmed case of EVD, or close contact with an ill individual who traveled to an EVD-endemic area.

#### Treatment

There is no standard treatment for Ebola virus disease. Patients receive supportive therapy. This consists of balancing the patient's fluids and electrolytes, maintaining

oxygen status and blood pressure, and treating for any complicating infections.

#### Isolation

Ohio Administrative Code (OAC) 3701-3-13 (DD) states:

“Viral hemorrhagic fever (VHF): a person with confirmed or suspected viral hemorrhagic fever shall be placed in airborne isolation until no longer considered infectious.”

Clinicians evaluating suspect cases should use standard (e.g., hand hygiene), airborne droplet (e.g., N-95 respirator) and contact (e.g., gowns and gloves) precautions.

Standard, contact, and droplet precautions are recommended for management of hospitalized patients with known or suspected Ebola virus disease (EVD).

#### Sequelae

Data on the pathogenesis of sequelae in EVD survivors and complications related to viral persistence are very limited. U.S. healthcare providers should be aware that in most cases, persons who have completely recovered from EVD do not experience a relapse of Ebola virus associated with systemic illness. However, survivors can experience complications after surviving acute EVD. The timing of onset, severity, and duration of complications among EVD survivors are variable. Reported complications among EVD survivors include non-specific fatigue, joint pain, muscle aches, headaches, suppurative parotitis, pericarditis, orchitis, sexual dysfunction, hair loss, vision loss (including uveitis and permanent blindness), hearing loss, tinnitus, paresthesia or dysesthesia, memory loss, insomnia, depression, anxiety, and post-traumatic stress disorder<sup>1</sup>). The Ebola virus can persist for several months after acute infection in organs that are considered “immunologically privileged sites” - sites that are shielded from the survivor’s immune system (e.g., testes, eye, central nervous system). The risk of infectivity from patients with persistent infection is unknown but appears to be low and is likely to decrease over time. Because patients who recover from acute EVD and later become ill with neurological or ocular symptoms might have persistent viral replication, [appropriate infection control](#) practices such as those recommended for evaluating persons under investigation for EVD, should be adhered to until Ebola testing is negative.

EVD survivors who have any new or recurrent ocular or neurologic symptoms should seek care for complications associated with potential viral persistence. EVD survivors with fever should be assessed for both common community-acquired infections (e.g., malaria, influenza, common cold, typhoid fever, gastroenteritis, etc.) as well as possible complications related to EBOV persistence.

For additional guidance for clinical assessment of EVD survivors see:

<https://www.cdc.gov/vhf/ebola/healthcare-us/evaluating-patients/guidance-for-management-of-survivors-ebola.html>

#### **Contacts**

##### Investigation

Currently there is no post-exposure prophylaxis available for individuals exposed to these agents. Investigation of contacts and source of infection: Identify all close contacts in the three weeks after the onset of illness. Initiate quarantine and active surveillance of contacts by having contacts take and maintain record of body temperature twice a day for 3 weeks after last exposure. If temperature is greater than 100.4°F (38°C), hospitalize patient immediately and initiate appropriate isolation precautions.

When a suspect case is reported, the local health department needs to start identifying

close contacts. Often this starts with the family. The emergency room chart or the medical record may provide names of emergency contacts or family members.

The local health department needs to identify all persons who had “close contact” with the patient for the 21 days prior to the onset of the patient’s illness, and thereafter until the patient is released from isolation.

Consult the CDC website for the latest information about Ebola virus disease:  
<http://www.cdc.gov/ebola>

The 2014 Ebola outbreak was the largest Ebola outbreak in history and the first in West Africa. It began in March 2014 and was declared over in January 2016. The 3 West African countries mainly affected were Guinea, Liberia and Sierra Leone. When the outbreak ended in 2016, there were a total of 28,616 cases and 11,310 deaths. The Centers for Disease Control and Prevention (CDC) worked with other U.S. government agencies, the World Health Organization, and other domestic and international partners and activated its Emergency Operations Center to help coordinate technical assistance and control activities with partners. CDC also deployed teams of public health experts to West Africa.

**What is Ebola?**

Ebola, also known as Ebola virus disease (EVD), is a rare and deadly disease caused by infection with one of the Ebola virus strains (Zaire, Sudan, Bundibugyo, or Tai Forest virus). Ebola viruses are found in several African countries. Ebola was discovered in 1976 near the Ebola River in what is now the Democratic Republic of the Congo. Since then, outbreaks have appeared sporadically in several African countries.

**What are the signs and symptoms of Ebola?**

Signs and symptoms of Ebola include fever (greater than 100.4°F or 38°C) and severe headache, muscle pain, vomiting, diarrhea, stomach pain, or unexplained bleeding or bruising. Signs and symptoms may appear anywhere from 2 to 21 days after exposure to Ebola, although 8 to 10 days is most common.

**How is Ebola spread?**

The virus is spread through **direct contact** (through broken skin or mucous membranes) with blood and body fluids (urine, feces, saliva, vomit or semen) of a person who is sick with Ebola, or with objects (like needles) that have been contaminated with the virus. Ebola is not spread through the air or by water or, in general, by food; however, in Africa, Ebola may be spread as a result of handling bushmeat (wild animals hunted for food), and contact with infected bats.

**Who is most at risk of getting Ebola?**

Healthcare providers caring for Ebola patients and family and friends in close contact with Ebola patients are at the highest risk of getting sick because they may come in direct contact with the blood or body fluids of sick patients.

In some places affected by an outbreak, care may be provided in clinics with limited resources (for example, no running water, no climate control, no floors, inadequate medical supplies), and workers could be in those areas for several hours with a number of Ebola infected patients. Additionally, certain job responsibilities and tasks, such as attending to dead bodies, may also require different personal protective equipment (PPE) than what is used when providing care for infected patients in a hospital.

**Can I get Ebola from a person who is infected but doesn't have fever or any symptoms?**

No. A person infected with Ebola is not contagious until symptoms appear.

**If someone survives Ebola, can he or she still spread the virus?**

Once someone recovers from Ebola, they can no longer spread the virus. However, Ebola virus has been found in semen of some men who have recovered from Ebola. Until more information is known, avoid contact with semen from a man who has had Ebola.

### **If someone survives Ebola, do they become immune?**

People who recover from Ebola infection develop antibodies that last for at least 10 years, possibly longer. It is not known if people who recover are immune for life or if they can become infected with a different strain of Ebola.

Many survivors of EVD have health problems after they recover from Ebola. Unfortunately, information is limited about these health problems and how long they last. The onset, severity, and how long these health problems last varies by survivor. Commonly reported health problems include tiredness, headaches, muscle and joint pain, eye and vision problems (blurry vision, pain, redness, and light sensitivity), weight gain, and stomach pain or loss of appetite.

Other health problems can include memory loss, neck swelling, dry mouth, tightness of the chest, hair loss, hearing problems (ringing in the ears and hearing loss), pain or tingling in the hands and feet, inflammation of the pericardium (tissue around the heart), inflammation of one or both testicles, changes in menstruation, impotence, decreased or lost interest in sex, difficulty falling or remaining asleep, depression, anxiety, and post-traumatic stress disorder.

In rare cases, survivors of Ebola might develop new neurologic complications, which could include confusion, seizures, meningitis-like signs and symptoms, or loss of consciousness.

### **Can Ebola be spread through mosquitos?**

There is no evidence that mosquitos or other insects can transmit Ebola virus. Only mammals (for example, humans, bats, monkeys and apes) have shown the ability to spread and become infected with Ebola virus.

### **Could Ebola be brought to the U.S. through imported animals?**

Because of the restrictions the U.S. government has in place for importing animals from Africa, it is highly unlikely for Ebola to be brought into the U.S. through imported animals. The animals most commonly associated with Ebola are nonhuman primates (for example, apes and monkeys) and bats. Both the CDC and the U.S. Fish and Wildlife Service regulate importation of nonhuman primates and bats. These animals, products made from these animals, and research samples from these animals may only be imported into the United States with a permit. The permit specifies that the animals, animal products, or research samples are arriving ONLY for scientific, educational, or exhibition purposes. It is illegal to import these animals into the United States as pets or bushmeat.

### **How is Ebola treated?**

No specific vaccine or medicine has been proven to cure Ebola. Signs and symptoms of Ebola are treated as they appear. The following basic interventions, when used early, can increase the chances of survival.

- Providing fluids and electrolytes
- Maintaining oxygen status and blood pressure
- Treating other infections if they occur

Early recognition of Ebola is important for providing appropriate patient care and preventing the spread of infection. Healthcare providers should be alert for and evaluate any patients suspected of having Ebola.

### **How do I protect myself against Ebola?**

If you are in or traveling to an area affected by the Ebola outbreak, protect yourself by doing the following:

- Wash hands frequently.
- Avoid contact with blood and body fluids of any person, particularly someone who is sick.
- Do not handle items that may have come in contact with an infected person's blood or body fluids.
- Do not touch the body of someone who has died from Ebola.
- Do not touch bats and nonhuman primates or their blood and fluids and do not touch or eat raw meat prepared from these animals.
- Avoid hospitals where Ebola patients are being treated. The U.S. Embassy or consulate is often able to provide advice on medical facilities.
- Seek medical care immediately if you develop fever (temperature of 100.4°F/ 38°C) and any of the other following symptoms: headache, muscle pain, diarrhea, vomiting, stomach pain, or unexplained bruising or bleeding.
- Limit your contact with other people until and when you go to the doctor. Do not travel anywhere else besides a healthcare facility.

### **What do I do if I'm returning to the U.S. from an area where an Ebola outbreak is occurring?**

After you return, pay attention to your health.

- Monitor your health for 21 days if you were in an area with an Ebola outbreak, especially if you were in contact with blood or body fluids, items that have come in contact with blood or body fluids, animals or raw meat, or hospitals where Ebola patients are being treated or participated in burial rituals.
- Seek medical care immediately if you develop fever (temperature of 100.4°F/ 38°C) and any of the following symptoms: headache, muscle pain, diarrhea, vomiting, stomach pain, or unexplained bruising or bleeding.
- Tell your doctor about your recent travel and your symptoms before you go to the office or emergency room. Advance notice will help your doctor care for you and protect other people who may be in the office.