Diseases Fact Sheet - Ebola

South Dakota Department of Health

Office of Disease Prevention Services - 605-773-3737 -(1-800-592-1861 in South Dakota only)

This material is provided for informational purposes only and is not a substitute for medical care. We are not able to answer personal medical questions. Please see your health care provider concerning appropriate care, treatment or other medical advice.

What is it?

Ebola disease is the term for a group of deadly diseases in people caused by four ebolaviruses within the genus *Ebolavirus*. There are occasional Ebola disease outbreaks in people, occurring primarily on the African continent.

The name of each of the four ebolaviruses that cause illness in people, with their associated viral species1 and disease name2 can be found below:

- Ebola virus (species *Zaire ebolavirus*) causes Ebola virus disease
- Sudan virus (species *Sudan ebolavirus*) causes Sudan virus disease
- Taï Forest virus (species *Taï Forest ebolavirus*, formerly *Côte d'Ivoire ebolavirus*) causes Taï Forest virus disease
- Bundibugyo virus (species *Bundibugyo ebolavirus*) causes Bundibugyo virus disease

There are two additional ebolaviruses that are not known to cause disease in people. Reston virus (species *Reston ebolavirus)* is known to cause illness in nonhuman primates and pigs, but not in people. Bombali virus (species *Bombali ebolavirus*) was recently identified in bats, but it is unknown if it causes illness in either animals or people.

Learn More About Ebola

Transmission

Scientists think people are initially infected with an ebolavirus through contact with an infected animal, such as a fruit bat or nonhuman primate. This is called a spillover event. After that, the virus spreads from person to person, potentially affecting many people.

Ebolaviruses spread through contact (such as through broken skin or mucous membranes in the eyes, nose, or mouth) with:

- Blood or body fluids (urine, saliva, sweat, feces, vomit, breast milk, amniotic fluid, and semen) of a person who is sick with or has died from Ebola disease.

- Objects (such as clothes, bedding, needles, and medical equipment) contaminated with body fluids from a person who is sick with or has died from Ebola disease.
- Infected fruit bats or nonhuman primates (such as apes and monkeys).
- Semen from a man who recovered from Ebola disease (through oral, vaginal, or anal sex). Ebolaviruses can remain in certain body fluids (including semen) of a patient who has recovered from Ebola disease, even if they no longer have symptoms of severe illness. There is no evidence that ebolaviruses can spread through sex or other contact with vaginal fluids from a woman who has had Ebola disease.

When people become infected with an ebolavirus, they do not start developing signs or symptoms right away. This period between exposure to an illness and having symptoms is known as the incubation period. **A person can only spread an ebolavirus to other people after they develop signs and symptoms of Ebola disease.**

Additionally, ebolaviruses are not known to be transmitted through food. However, in certain parts of the world, ebolaviruses may spread through the handling and consumption of wild animal meat or hunted wild animals infected with an ebolavirus. There is no evidence that mosquitoes or other insects can transmit ebolaviruses.

Risk

- Health workers and family members who do not use proper infection control while caring for patients with suspected or confirmed Ebola disease are at the highest risk of getting sick. Ebolaviruses can spread when people come into contact with infected blood or body fluids.
- Ebolaviruses pose little risk to travelers or the general public who have not cared for or been in contact with someone sick with Ebola.

Persistence of Ebolaviruses

Ebolaviruses can remain in areas of the body that are immunologically privileged sites after acute infection. These are sites where viruses and pathogens, like ebolaviruses, are shielded from the survivor's immune system, even after being cleared elsewhere in the body. These areas include the testes, interior of the eyes, placenta, and central nervous system, particularly the cerebrospinal fluid. Whether an ebolavirus is present in these body parts and for how long varies by the survivor. Scientists are now studying how long ebolaviruses stay in these body fluids among Ebola disease survivors.

The virus can spread quickly within healthcare settings (such as clinics or hospitals) during an Ebola outbreak. Clinicians and other healthcare personnel providing care should use dedicated, preferably disposable, medical equipment. Proper cleaning and disposal of instruments such as

needles and syringes are important. If instruments are not disposable, they must be sterilized before using again.

Ebolaviruses can survive on dry surfaces, like doorknobs and countertops for several hours; in body fluids like blood, ebolaviruses can survive up to several days at room temperature. Cleaning and disinfection should be performed using a hospital-grade disinfectant.

Prevention and Vaccine

In the areas where Ebola disease is most common, ebolaviruses are believed to spread at low rates among certain animal populations. Ebolaviruses can spread to a person when they come in contact with an infected animal. Once infected, a person can become sick with Ebola disease and spread the virus to other people who come in contact with them.

When living in or traveling to a region where ebolaviruses are potentially present, there are several ways to protect yourself and prevent the spread of Ebola disease.

- Avoid contact with blood and body fluids (such as urine, feces, saliva, sweat, vomit, breast milk, amniotic fluid, semen, and vaginal fluids) of people who are sick.
- Avoid contact with semen from a man who has recovered from Ebola disease, until testing shows that the virus is gone from his semen.
- Avoid contact with items that may have come in contact with an infected person's blood or body fluids (such as clothes, bedding, needles, and medical equipment).
- Avoid funeral or burial practices that involve touching the body of someone suspected or confirmed to have had Ebola.
- Avoid contact with bats, forest antelopes, nonhuman primates (such as monkeys and chimpanzees), and the blood, fluids, or raw meat prepared from these or unknown animals.

These same prevention methods should be used when living in or traveling to an area affected by an Ebola outbreak. After returning from an Ebola-affected area, people should monitor their health for 21 days and seek medical care immediately if they develop symptoms of Ebola disease.

Ebola Vaccine

The U.S. Food and Drug Administration (FDA) approved the Ebola vaccine rVSV-ZEBOV (called Ervebo®) on December 19, 2019. This vaccine is given as a single dose vaccine and has been found to be safe and protective against Ebola virus (species *Zaire ebolavirus*) only, which has caused the largest and most deadly Ebola outbreaks to date. This is the first FDA-approved vaccine for an ebolavirus.

On February 26, 2020, the Advisory Committee on Immunization Practices (ACIP) recommended pre-exposure prophylaxis vaccination with rVSV-ZEBOV for adults ≥ 18 years of age in the U.S. population who are at potential occupational risk of exposure to *Zaire ebolavirus*. This recommendation includes adults who are

- Responding or planning to respond to an outbreak caused by Ebola virus;
- Laboratorians or other staff working at biosafety-level 4 facilities that work with live Ebola virus in the United States; or
- Healthcare personnel working at federally designated Ebola Treatment Centers [PDF – 1 MB] in the United States.

For healthcare providers looking for information about the Ebola vaccine and vaccinating ACIP recommended groups, visit Ebola Vaccine: Information about Ervebo®.

A two-dose vaccine regimen of a different vaccine that was also designed to protect against the *Zaire ebolavirus* species of Ebola was used under a research protocol in 2019 during an Ebola outbreak in the Democratic Republic of the Congo. The two doses of this vaccine use two different vaccine components (Ad26.ZEBOV and MVA-BN-Filo) and the regimen requires an initial dose and a "booster" dose 56 days later. This vaccine has not yet been approved by the FDA for routine use.

Treatment

There are currently two treatments* approved by the U.S. Food and Drug Administration (FDA) to treat EVD caused by the Ebola virus, species *Zaire ebolavirus*, in adults and children. The first drug approved in October 2020, Inmazeb™, is a combination of three monoclonal antibodies. The second drug, Ebanga™, is a single monoclonal antibody and was approved in December 2020. Monoclonal antibodies (often abbreviated as mAbs) are proteins produced in a lab or other manufacturing facility that act like natural antibodies to stop a germ such as a virus from replicating after it has infected a person. These particular mAbs bind to a portion of the Ebola virus's surface called the glycoprotein, which prevents the virus from entering a person's cells.

Both of these treatments, along with two others, were evaluated in a randomized controlled trial during the 2018-2020 Ebola outbreak in the Democratic Republic of the Congo. Overall survival was much higher for patients receiving either of the two treatments that are now approved by the FDA. Neither Inmazeb™ nor Ebanga™ have been evaluated for efficacy against species other than *Zaire ebolavirus*.

Supportive Care

Whether or not other treatments are available, basic interventions can significantly improve chances of survival when provided early. These are referred to as supportive care and include:

- Providing fluids and electrolytes (body salts) orally or through infusion into the vein (intravenously).
- Using medication to support blood pressure, reduce vomiting and diarrhea, and to manage fever and pain.
- Treating other infections, if they occur.
- **Disclaimer:** The mention of any product names or non-United States Government entities on CDC Ebola websites is not meant to serve as an official endorsement of any such product or entity by the CDC, the Department of Health and Human Service, or the United States Government.

Outbreaks

Current and Recent Outbreaks

- September 2022 Uganda, Mubende District

Past Outbreaks

- History of Ebola Disease Outbreaks

Outbreak Preparedness

- Early Surveillance and Detection and Response

Signs and Symptoms

Symptoms may appear anywhere from 2 to 21 days after contact with an ebolavirus, with an average of 8 to 10 days. The course of the illness typically progresses from “dry” symptoms initially (such as fever, aches and pains, and fatigue), and then progresses to “wet” symptoms (such as diarrhea and vomiting) as the person becomes sicker.

Primary signs and symptoms of Ebola disease often include some or several of the following:

- Fever
- Aches and pains, such as severe headache and muscle and joint pain
- Weakness and fatigue
- Sore throat
- Loss of appetite

- Gastrointestinal symptoms including abdominal pain, diarrhea, and vomiting
- Unexplained hemorrhaging, bleeding or bruising

Other symptoms may include red eyes, skin rash, and hiccups.

Many common illnesses can have the same symptoms as Ebola disease, including influenza (flu), malaria, or typhoid fever.

Ebola disease is a rare and often deadly illness. Recovery depends on good supportive clinical care and the patient's immune response. Studies show that survivors of an ebolavirus infection have antibodies (proteins made by the immune system that identify and neutralize invading viruses) that can be detected in the blood up to 10 years after recovery. Survivors are thought to have some protective immunity to the species of ebolavirus that sickened them.

Diagnosis

Diagnosing Ebola disease shortly after infection can be difficult. Early symptoms of Ebola disease such as fever, headache, and weakness are not specific to infection with ebolaviruses and often are seen in patients with other more common diseases, like malaria and typhoid fever.

To determine whether Ebola disease is a possible diagnosis, there must be a combination of symptoms suggestive of Ebola disease **AND** a possible exposure to an ebolavirus within 21 days before the onset of symptoms. An exposure may include contact with:

- Blood or body fluids from a person sick with or who died from Ebola disease,
- Objects contaminated with blood or body fluids of a person sick with or who died from Ebola disease,
- Infected fruit bats and nonhuman primates (apes or monkeys), or
- Semen from a man who has recovered from Ebola disease.

If a person shows signs of Ebola disease and has had possible exposure, he or she should be isolated (separated from other people) and public health authorities notified. Blood samples from the patient should be collected and tested to confirm infection. Ebolaviruses can be detected in blood after the onset of symptoms. It may take up to three days after symptoms start for the virus to reach detectable levels.

Polymerase chain reaction (PCR) is a commonly used diagnostic method for Ebola disease because of its ability to detect low levels of an ebolavirus. PCR methods can detect the presence of a few virus particles in small amounts of blood, but the ability to detect the virus increases as the amount of virus increases during an active infection. When the virus is no

longer present in great enough numbers in a patient's blood, PCR methods will no longer be effective. The detection of antibodies is another method used to confirm a person's exposure to and infection by an ebolavirus.

A positive laboratory test means that an ebolavirus infection is confirmed. Public health authorities will conduct a public health investigation, including identifying and monitoring all potentially exposed contacts.

Outbreak Preparedness

Outbreaks in nonhuman primates and antelope often precede or happen at the same time as, human cases of Ebola Virus Disease (EVD) in the same or nearby areas.[1]

For example:

- Before **Taï National Forest outbreak** (1994), the chimpanzee population in the area decreased by half.
- Before and during **Gabon outbreak** (2001), 64 dead gorillas, chimpanzees, and antelope were discovered.

  [2]

Cases of EVD in people typically emerge following the handling and butchering of these infected animals. Once the virus spreads to people, it can spread quickly from person to person within families and other close contacts, as well as in healthcare settings. Rapid identification of cases is critical to prevent large-scale epidemics.

Detection and Response

Prompt identification of cases, contact tracing, and monitoring of high-risk individuals are essential to stopping Ebola virus from spreading.

Early Detection

Early recognition of EVD is critical for infection control. However, because early symptoms are not specific to EVD, it can be hard to distinguish it from other illnesses, including malaria, leptospirosis, influenza (flu), yellow fever, dengue and other viruses spread by insects, or viral or bacterial infections of the intestines, like typhoid fever.

EVD should be considered when clinical illness is combined with an epidemiologic risk factor, like direct contact with a suspected or confirmed case or travel to an Ebola-affected area.

Contact Tracing

Once a case of EVD is identified, everyone who has come in direct contact with the sick patient is found. This is called contact tracing. Contacts are watched for signs of illness for 21 days from the last day they came in contact with the Ebola patient. If the contact develops a fever or other EVD symptoms, they are immediately isolated, tested, and provided care. Then the cycle starts again until all of the new contacts are found and watched for 21 days. The World Health Organization (WHO) declares an Ebola outbreak over after 42 days (or two incubation periods) have passed without any newly reported infections.

References

[1] Kaner J, Schaak S. Understanding Ebola: the 2014 Epidemic. *Globalization and Health* (2016) 12:53.

[2] Gonzalez J.P., Herbreteau V, Morvan J, Leroy É.M. Ebola virus circulation in Africa: a balance between clinical expression and epidemiological silence. *Bull Soc Pathol Exot*, 2005, 98, 3, 210-2017

Resources:

South Dakota follows CDC guidance for monitoring of persons with potential Ebola virus exposure. There have been no cases of Ebola in South Dakota.

Centers for Disease Control and Prevention Resources

- Countries with active Ebola transmission
- Ebola Virus Disease
- Infographic — Is it Flu or Ebola?
- Information for Healthcare Workers and Settings

South Dakota Department of Health Resources

- Information for Schools and Day Care Centers
- 21-day Temperature Monitoring Log
- Slide set for 12-3-2014 health care conference call | Audio recording
- Slide set from 10-29-2014 health care provider webinar

Personal Protective Equipment (PPE) Resources

- South Dakota Department of Health PPE Checklists

  - N95 and Coverall Checklists: Donning | Doffing
  - N95 and Gown Checklists: Donning | Doffing
  - PPAR and Coverall Checklists: Donning | Doffing
  - PPAR and Gown Checklists: Donning | Doffing
- Web-based Training for Putting On and Removing Personal Protective Equipment (PPE) - CDC, Johns Hopkins Medicine, Salesforce Foundation, Miami University, Association for Professionals in Infection Control and Epidemiology, Society for Healthcare Epidemiology of America

University of Nebraska Medical Center Biocontainment Unit Resources

- Slide set | Shelly Schwedhelm, MSN, RN, NEA-BC, Director, ED, Trauma, IC, Emergency Preparedness & Nebraska Biocontainment Unit

Additional Resources

- Waste Management and Private Property Cleanup - South Dakota Department of Environment and Natural Resources
- Disinfectants for Use Against the Ebola Virus - Environmental Protection Agency
- Information for Hospitals and Critical Access Hospitals Concerning Possible Ebola Virus Disease - Center for Medicare and Medicaid Services