

Ebola Virus Disease – What Ophthalmologists Need to Know

Introduction

First identified in 1976 in Zaire, Africa, Ebola disease is caused by infection with a virus of the family *Filoviridae*, genus *Ebolavirus*.¹ Researchers think that the virus is animal-borne and that bats are the most likely reservoir. The Ebola virus causes severe viral hemorrhagic fever with a high fatality rate. The 2014 Ebola epidemic is the largest in history spanning several countries in Africa, primarily Liberia, Sierra Leone, and Guinea, affecting a total of 13,042 individuals in the world as of November 2, 2014. The World Health Organization declared the Ebola epidemic as a Public Health Emergency of International Concern on August 8, 2014.² Two imported cases, including one death and two locally acquired cases in healthcare workers, have been reported as of November 2, 2014 in the United States.

Currently, the U.S. Centers for Disease Control and Prevention (CDC) define a person under investigation for Ebola virus disease as someone who has the following consistent symptoms and risk factors:

1. Elevated body temperature (>38.6°C or 101.5°F) or subjective fever or symptoms, including severe headache, fatigue, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; **AND**
2. An [epidemiologic risk](#) factor within the 21 days before the onset of symptoms.

Transmission to Health Care Personnel

Ebola virus disease among healthcare personnel and other persons is associated with direct contact with persons exhibiting symptoms (or the bodies of persons who have died from Ebola virus disease) and direct contact with body fluids from these patients. Ebola is spread through

direct contact (through broken skin or mucous membranes in the eyes, nose, or mouth for example) via:

- blood or body fluids (including saliva, mucus, vomit, feces, sweat, tears, breast milk, urine, and semen) of a person who is sick with Ebola
- objects (like needles and syringes) that have been contaminated with the virus

Airborne transmission of Ebola virus among humans has never been demonstrated in investigations of human-to-human transmission, but has been hypothesized. The risk of Ebola virus disease transmission from direct skin contact with an Ebola virus disease patient is lower than the risk from exposure to blood or body fluids, and may be more likely in cases of severe illness. Indirect exposure to blood and body fluids (via fomites) has also been implicated in transmission, but is not a common means. Ebola virus is killed with hospital-grade disinfectants, such as household bleach. Ebola virus dried on surfaces, such as doorknobs and countertops, can survive for several hours. However, the virus in body fluids, such as blood, can survive up to several days at room temperature.

Course of Disease

Patients with Ebola generally have an abrupt onset of fever and symptoms that typically occurs 8 to 12 days after exposure, but can range from 2 to 21 days after exposure. Early signs and symptoms are nonspecific and can include fever, chills, myalgias, and malaise. Patients can then proceed from these initial symptoms, after about 5 days, to develop gastrointestinal symptoms, e.g., severe watery diarrhea, nausea, vomiting, and abdominal pain. Other symptoms, such as chest pain, shortness of breath, headache or confusion, can develop. Seizures can occur and there have been reports of cerebral edema. Bleeding is not always present, but can be present later as petechiae, ecchymosis/bruising, and mucosal hemorrhage. Patients may develop a diffuse erythematous maculopapular rash by days 5 to 7, usually involving the neck, trunk, and arms. The most common signs and symptoms during the current outbreak in West Africa from onset of symptoms to the time of diagnosis include: fever (87%), fatigue (76%), vomiting (68%), diarrhea (66%), and loss of appetite (65%).

Patients with fatal disease usually develop more severe clinical signs early during infection and die between days 6 and 16, and experience multi-organ failure and septic shock. In non-fatal cases, patients may have a fever for several days and improve, typically around day 6. Patients who survive can have a prolonged convalescence. The case fatality proportion among patients in West Africa is 71%; ranging from 46% in Nigeria to 69–72% in Guinea, Sierra Leone, and Liberia. Risk factors associated with a fatal outcome in the recent outbreak in West Africa include: age >45 years old, unexplained bleeding, and other signs and symptoms (diarrhea, chest pain, coughing, difficulty breathing, difficulty swallowing, conjunctivitis, sore throat, confusion, hiccups, and coma or unconsciousness).

Eye-Related Manifestations

One study of clinical observations of 103 patients in the 1995 Ebola outbreak found an early sign to be conjunctival injection.³ The CDC notes that patients often have conjunctival injection.¹ Another study of the same outbreak found that four survivors experienced uveitis, with ocular pain, photophobia, reduced visual acuity, and hyperlacrimation.⁴ These surviving patients responded to a topical treatment of 1% atropine and corticosteroids.

Infection Control Precautions

The CDC recommends the following infection control precautions:

Healthcare workers who may be at risk of exposure to persons infected with Ebola should follow these steps:

- Wear personal protective equipment (PPE), including masks, gloves, gowns, and eye protection, based on the [CDC PPE guidance and procedures](#). The PPE Guidance recommends that:
 - All healthcare workers undergo rigorous training and are practiced and competent with PPE, including putting it on and taking it off in a systemic manner,
 - No skin is exposed when PPE is worn, and

- All workers are supervised by a trained monitor who watches each worker put on and take off their PPE.
- Practice proper infection control and sterilization measures. Dedicated medical equipment should be used by healthcare personnel, preferably disposable equipment whenever possible. Appropriate cleaning and disposal of instruments, such as needles and syringes, is important. If instruments are not disposable, instruments must be sterilized before reuse. (See the [CDC's Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus.](#))
- Isolate infected Ebola patients from other patients.
- Avoid direct contact with the bodies of people who have died from Ebola.
- Notify health officials if you have had direct contact with the blood or body fluids of an infected patient.

Conclusion

The 2014 Ebola virus disease outbreak in Africa has affected primarily Liberia, Sierra Leone, and Guinea. The CDC and other organizations are working to prevent the further spread of Ebola virus within the United States. There are no approved treatments and vaccines, although investigational vaccines are in development. Health care personnel need to use appropriate PPE, including masks, gowns, gloves, and eye protection, to avoid exposure to any body fluids of patients with Ebola virus disease.

References

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Approvals

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