Ebola Virus Disease

Traveler Summary

Key Points

- Ebola virus disease (EVD) is a rare, severe infection that occurs throughout sub-Saharan Africa and is mainly transmitted through direct skin or mucous-membrane contact with the blood or bodily fluids of infected patients or corpses or via contact with surfaces and objects contaminated with bodily fluids of infected persons.
- Risk is low for typical travelers but may be increased for persons with direct contact with infected persons or animals and for persons having sexual contact with recovered persons.
- Symptoms include fever, headache, muscle aches, sore throat, general discomfort, abdominal pain, diarrhea, vomiting, and blood loss (in some cases).
- Consequences of infection include death in 25% to 90% of cases.
- Prevention includes avoiding risk behaviors.
- Ebola virus vaccines are available only to certain researchers and health care workers (HCWs), designated first responders, deployed military personnel, and persons residing in risk areas.
- Vaccine side effects include injection-site reactions, fever, headache, and muscle pain.
- Duration of vaccine protection is unknown.

Introduction

EVD is a rare, severe, viral infection (mainly caused by ***Zaire ebolavirus***) that occurs throughout sub-Saharan Africa and is transmitted through direct contact with the blood or bodily fluids of infected persons or corpses or via contact with surfaces contaminated with bodily fluid of infected persons. Infection with Ebola virus often results in nonspecific symptoms that may, initially, be similar to other more common diseases (e.g., malaria), but may result in high death rates depending on the type of virus and level of supportive care available. Other species include ***Taï Forest ebolavirus***, ***Sudan ebolavirus***, and ***Bundibugyo ebolavirus***.

Risk Areas

EVD is rare, despite sporadic outbreaks in several African countries. Since the late 1970s, outbreaks have been reported in rural areas of Angola, Democratic Republic of the Congo (DRC), South Sudan, and Uganda. From March 2014 until mid-2016, more than 28,000 cases and 11,000 deaths occurred in Guinea, Liberia, and Sierra Leone, including locally acquired cases in Spain and the US, which were the first infections acquired outside of Africa. More recently, an outbreak has been ongoing in DRC since July 2018, with over 3,000 cases reported, of which more than 2,000 deaths have occurred.

Latent infection in recovered persons—due to long-term persistence (months to years) of the virus in certain organs (e.g., eyes, testes, placenta, and central nervous system)—has resulted in rare new outbreaks.

Transmission

EVD is mainly transmitted person to person via direct skin or mucous-membrane contact with the blood or bodily fluids (especially blood, feces, and vomitus) of acutely ill EVD patients or infected deceased persons (through burial practices), contact with surfaces and objects contaminated with bodily fluids of infected persons (live or deceased), or through the placenta. Infectious virus is also present in urine, vaginal fluid, semen, saliva, and breast milk, and may be detected in tears and sweat as well. Transmission to HCWs may also occur through contact with contaminated syringes, needles, and medical equipment. In recovered EVD patients, the virus can be detected for up to several months depending on the bodily fluids (e.g., more than 18 months in semen); Ebola virus breakdown products have been detected in vaginal and rectal swabs. In West Africa, evidence of sexual transmission (e.g., through semen) more than 12 months after recovery has been reported. Masturbation (through contamination of surfaces) is a possible risk.

Persons infected with EVD are not infectious to others until symptoms begin and as such cannot transmit the virus. After death, live virus remains for as long as 7 days on body surfaces, mucosa, and blood, and for 3 days in tissues. The virus survives for longer durations on inert surfaces.

Transmission also occurs through contact with or consumption of bush meat, contact with infected nonhuman primates, and bats; airborne transmission does not seem to occur.

Risk Factors

Risk is low for travelers and persons visiting friends and relatives, unless the traveler has direct physical contact with infected bodily fluids from sick persons, corpses, or sick animals during an epidemic. Risk is low for persons with direct contact with bodily fluids of recovered patients but may be increased for persons having sexual contact with recovered persons due to persistence of the virus in bodily fluids such as semen. Risk is high for HCWs and volunteers, especially those involved in caring for EVD patients. Implementation of recommended precautions reduces risk, although infections have occurred despite stringent precautions (including the use of modern personal protective equipment).

Symptoms

Not all persons infected with Ebola virus have symptoms; however, in most cases, symptoms most commonly develop about 2 to 21 days (average of 4-10 days) after exposure. During the incubation period, infected persons are usually symptom free and no risk of transmission exists. The initial stage after incubation is characterized by "dry symptoms" such as fever, headache, muscle aches, and joint pain. By the fourth day of illness, "wet symptoms" (e.g., nausea, vomiting, and severe diarrhea) may occur. In some cases, external and internal bleeding may begin on the fifth day, leading rapidly to shock and death. Survivors show gradual resolution of symptoms within 7 to 12 days and may have some protective immunity against the virus.

Consequences of Infection

Survivors of EVD may subsequently develop symptoms such as generalized weakness, headache, hair loss, hearing loss, muscle ache, eye pain, and sleeplessness, a few weeks or even many months after recovery. Ebola virus may persist in the semen or body organs for more than 1 year.

Death occurs in about 25% to 90% of cases depending on the virus subtype and level of supportive care available. If left untreated, death occurs in 70% to 90% of cases within 7 to 10 days of illness onset.

Need for Medical Assistance

Persons who have been exposed to or develop symptoms of EVD (e.g., abrupt onset of fever or extreme discomfort) within 2 to 21 days of return from an affected area should receive prompt medical care in a specialized infectious disease unit because accurate diagnosis requires specialized laboratory facilities and supportive care is complex. Travelers who develop symptoms consistent with EVD should observe physical distancing and avoid contact with other persons or animals and avoid the use of any form of public transportation.

Persons with unrelated medical problems who are traveling to or residing in areas undergoing a known EVD outbreak may not be accepted by hospitals in Europe or in countries elsewhere to which they would normally be evacuated.

Prevention

Nonvaccine

Personal protective measures (regardless of vaccination status) remain the key prevention strategy. Avoid the risk behaviors described above. No antivirals for self-treatment are available.

Additionally, if traveling to affected countries:

- Avoid direct contact with infected bodily fluids from persons with a current or recent EVD diagnosis, with surfaces or items that were contaminated by EVD patients (live or deceased), with corpses, nonhuman primates, bats (including caves and other places where bats congregate), and with health care environments that may have become contaminated.
- Avoid consumption of bush meat.
- Use condoms during sexual activity with survivors due to risk of transmission from those with latent infections.
- Use alcohol-based hand sanitizers for hand hygiene in health care settings (when hands are not visibly soiled with dirt, blood, or other bodily fluids). Ebola virus is susceptible to most common disinfectants and alcohol-based products (e.g., hand sanitizers) and can be inactivated by heating for 30 to 60 minutes at 60°C (140°F) or by boiling for 5 minutes. If alcohol-

based hand sanitizers or soap and water are unavailable, use of a 0.05% chlorine solution applied for a minimum of 40 to 60 seconds until hands are dry is appropriate and likely to be efficacious.

HCWs are at high risk when actively involved in an outbreak. Strict adherence to stringent procedures as defined by US CDC is necessary. Specialized personal protection equipment is unlikely to be found in standard hospitals throughout Africa.

Vaccine

Two Ebola virus vaccines are approved for the prevention of EVD caused by ***Zaire ebolavirus*** but may not protect all persons and vaccinees should continually adhere to the aforementioned personal protective measures to prevent infection and transmission. Breakthrough infections in previously vaccinated persons have been reported. Ebola virus vaccines do not protect against other Ebola virus species. Ervebo, a live vaccine, is approved in the US and Europe for persons 18 years and older who are actively responding to an EVD outbreak, HCWs at federally designated Ebola treatment centers in the US, and laboratory personnel working with the virus. Zabdeno-Mvabea, a 2-component, inactivated vaccine regimen, is approved in Europe for persons 1 year and older residing in risk areas as well as for other at-risk groups such as HCWs, deployed military personnel, and visitors in such areas.

Other vaccines are in development to provide protection against the other Ebola species.

Side Effects

The most common vaccine side effects of Ervebo include injection-site reactions (pain, swelling, and redness), headache, fever, muscle pain, tiredness, mild or severe joint pain, nausea, and swollen joints, rashes, and abnormal sweating.

The Zabdeno-Mvabea vaccine regimen has milder side effects and may be better tolerated than Ervebo; the most common site effects include injection-site reactions (pain, warmth, swelling), fatigue, fever, headache, chills, muscle aches, irritability, and decreased appetite.

Timing

A single dose of Ervebo is given to persons at risk; a booster dose is not recommended. The Zabdeno-Mvabea regimen is given as 1 dose of Zabdeno followed by 1 dose of Mvabea approximately 8 weeks later. A subsequent booster dose of Zabdeno is recommended for persons at imminent risk of exposure to Ebola virus who were previously vaccinated with the Zabdeno-Mvabea regimen more than 4 months previously. Duration of vaccine protection following a single dose of Ervebo or a completed primary series with the Zabdeno-Mvabea regimen is unknown.