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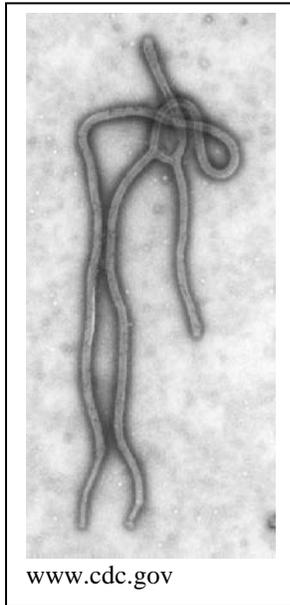
Ebola Virus Disease

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Hemorrhagic fever is a syndrome that can be caused by viruses in five different families and rarely by other agents such as bacteria. Ebola virus, a filovirus, is probably the most commonly known agent of viral hemorrhagic fever, and is currently causing an outbreak in Western Africa.

Background

Ebola virus infection results in sudden onset of fever and malaise, along with symptoms such as severe headache, muscle and joint aches, vomiting, diarrhea, and abdominal pain. There may be an erythematous rash, conjunctival injection, shortness of breath, confusion, or seizures. The disease can progress to organ failure affecting the kidneys, liver, adrenal glands, and spleen, resulting in coagulopathy, hemorrhage, and shock. The case fatality rate is 40-90%. Medical management is limited to supportive care and various experimental treatments.



Animals such as fruit bats are likely the reservoirs for many of the filoviruses. Once humans are infected, there is person-to-person transmission through direct contact with infected body fluids such as blood, urine, feces, sweat, semen, and breast milk or by medical devices such as contaminated syringes. There is not airborne

transmission. The usual incubation period is 8–10 days (range 2–21 days). Patients can transmit the virus while febrile, through later disease stages, and postmortem, such as handling of a body during funeral rites.

The first filovirus was recognized from a 1967 outbreak in a primate-handling laboratory facility in Marburg, the eventual source of its name. There have been two large Marburg hemorrhagic fever outbreaks, in Democratic Republic of Congo in 1999 and Angola in 2005. Outbreaks of Ebola virus were first identified in 1976 in the Democratic Republic of Congo (formerly Zaire, location of the Ebola River) and in southern Sudan, involving two different strains. Around 90% of Zairian cases and

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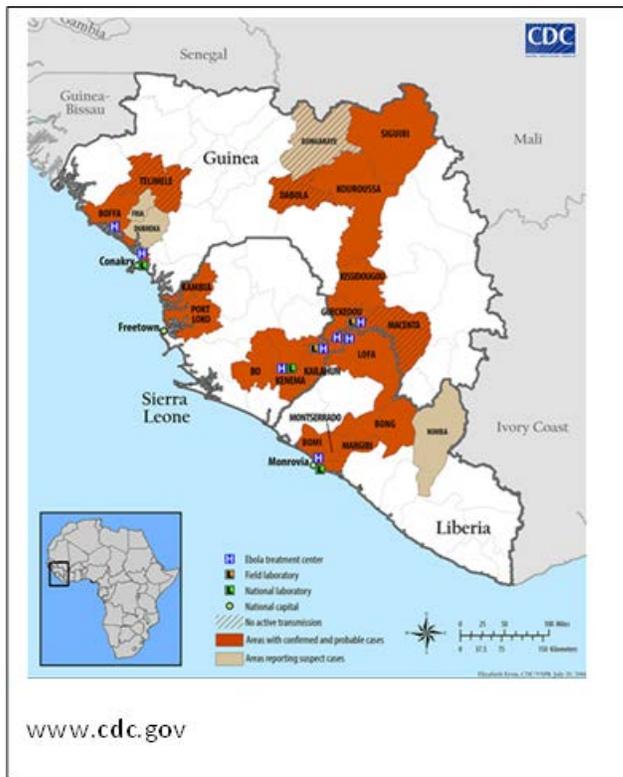
50% of Sudanese cases were fatal. Other outbreaks of Ebola virus disease were in Democratic Republic of Congo (1995, 2012) and in Uganda (2000, 2008).

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The current Ebola outbreak, the first occurrence in urban areas, is much larger than previous outbreaks, with over 1,800 cases (1,176 laboratory confirmed) and over 1,000 deaths reported March through mid-August, 2014. There are three affected countries in West Africa (Guinea, Liberia, and Sierra Leone), as well as a few cases in Nigeria that occurred among returning travelers and their contacts. At present, Centers for Disease Control and Prevention (CDC) travel alerts for the region recommend deferring nonessential travel to affected countries:

http://wwwnc.cdc.gov/travel/notices/?s_cid=cdc_homepage_topmenu_003

Patient Evaluation

Healthcare providers with a suspected case of Ebola virus disease should immediately initiate appropriate infection control measures (see details below) and notify the local health jurisdiction (<http://www.doh.wa.gov/AboutUs/PublicHealthSystem/LocalHealthJurisdictions>) or Department of Health, Office of Communicable Disease Epidemiology 206-418-5500 or 877-539-4344. Evaluation of suspected cases is based on consistent symptoms and risk factors for exposure.

Clinical criteria for Ebola virus disease are:

- Fever of greater than 38.6° C or 101.5° F AND
- Additional compatible symptoms such as severe headache, muscle pain, vomiting, diarrhea (may be watery), abdominal pain, or unexplained signs of hemorrhage (petechiae, bruising, oozing from venipuncture site)

Epidemiologic exposure risk factors within 3 weeks of symptom onset are:

- High risk exposure to a confirmed or suspected case: percutaneous or mucous membrane exposure to a case, direct skin contact with a case (including participation in funeral rites or direct contact with human remains in an affected region), or laboratory processing of case's body fluids
- Low risk exposure: spent > 3 hours in a healthcare facility where a case of Ebola virus disease was treated (including providers who used recommended personal protective equipment [PPE] or personnel not providing direct care, or other patients in the facility and their family caregivers), resided in or traveled to an area with active Ebola virus transmission, or directly handled bats, rodents, or primates (or bush meat) from disease-endemic areas

Testing is appropriate for the following patients:

- Persons with onset of fever within 21 days of a high risk exposure to Ebola virus
- Persons with a high risk exposure but without fever only if 1) other compatible symptoms are present and 2) blood test results are abnormal (i.e., thrombocytopenia <150,000 cells/ μ L and/or elevated transaminases) or unknown
- Persons with low risk exposures who develop fever and abnormal blood test results, or fever and compatible symptoms with blood test results abnormal (as above) or unknown

Note that malaria, typhoid, and other endemic conditions should be considered as part of initial testing as other potential causes of febrile illnesses.

Asymptomatic persons with any risk exposures should be monitored daily for fever and symptoms for 21 days from last exposure and evaluated medically at first indication of illness. Notify the designated facility that it may be asked to evaluate the person. Healthcare providers evaluating such patients or obtaining specimens for testing should use appropriate PPE.

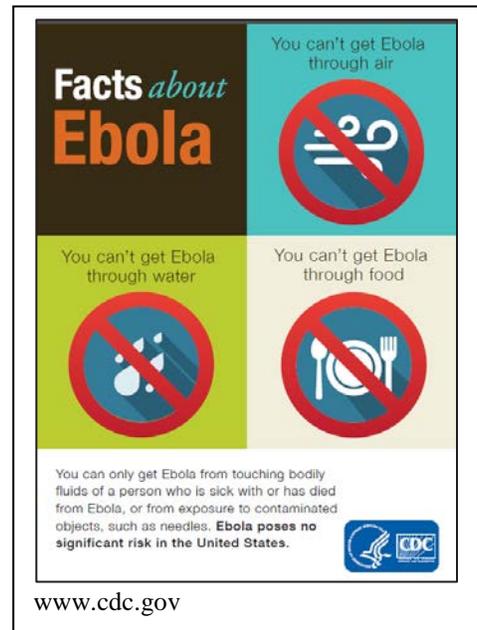
Infection Control

Healthcare providers with hospitalized suspect or confirmed Ebola virus disease cases should follow standard, contact, and droplet precautions: CDC's *Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Hemorrhagic Fever in U.S. Hospitals* (<http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html>). Recommendations to prevent transmission of Ebola virus include:

- **Patient placement** – place in a single patient room (with a private bathroom) with the door closed. Log all healthcare providers entering the room. Use only dedicated medical equipment, if possible disposable items, including blood pressure cuff and stethoscope.



- **Healthcare provider protection** – wear gloves, gown (fluid resistant or impermeable), shoe covers, eye protection (goggles or face shield), and a facemask while in the patient room or doing laboratory testing of patient specimens. All providers should be fully trained in correct use, removal, and disposal of PPE. Additional PPE might be required in certain situations (e.g., for copious amounts of blood, other body fluids, vomit, or feces), including but not limited to double gloving, disposable shoe covers, and leg coverings.
- **Aerosol-generating procedures** – minimize aerosol-generating procedures. PPE for such procedures includes respiratory protection (N95 filtering facepiece respirator or higher) and an airborne isolation room.
- **Environmental infection control** – disinfect material potentially contaminated with body fluids such as blood, sweat, urine, vomit, feces and other body secretions. Appropriate disinfectants include 10% sodium hypochlorite (bleach) solution, or hospital-grade quaternary ammonium or phenolic products. Use autoclaves or incineration as appropriate. Personnel doing environmental cleaning and disinfection should wear recommended PPE (described above) and consider additional barriers (e.g., double gloving, disposable shoe covers, leg coverings, and face protection like face shield or facemask with goggles for liquid waste disposal that could generate splashes. Standard procedures, per hospital policy and manufacturers' instructions, should be followed for cleaning and/or disinfecting environmental surfaces, equipment, textiles, laundry, utensils and dishware.



The local health jurisdiction should initiate monitoring for asymptomatic persons with high or low risk exposures for 21 days, and recommend they not travel by commercial conveyances during that time. There should be a plan in place for patient transport, medical evaluation, and laboratory testing if a fever or other consistent symptoms develop during the monitoring period.

Although Ebola virus causes severe disease with a high case-fatality rate, the virus does not have the characteristics of a potential pandemic agent. The disease is not airborne, like influenza or Middle East Respiratory Syndrome coronavirus. Transmission is occurring among family members and healthcare providers having direct contact with body fluids of a symptomatic case where infection prevention measures are insufficient. Meticulous infection control measures and established healthcare and public health systems can allow safe management of patients in modern healthcare facilities.

Resources:

CDC has considerable resources. For newest material see:

<http://www.cdc.gov/vhf/ebola/outbreaks/guinea/whats-new.html> which includes patient evaluation guidances <http://emergency.cdc.gov/han/han00364.asp> and hospital infection control recommendations: <http://www.cdc.gov/vhf/ebola/hcp/patient-management-us-hospitals.html>

APHA pre-release of Ebola CCDM chapter: http://www.apha.org/NR/rdonlyres/8B97B424-F204-4527-B5B9-A3D1C21D96DC/0/CCDM_EBOLA.pdf