CLINICALUpdate

A Publication of the ECI Healthcare Partners Education Department

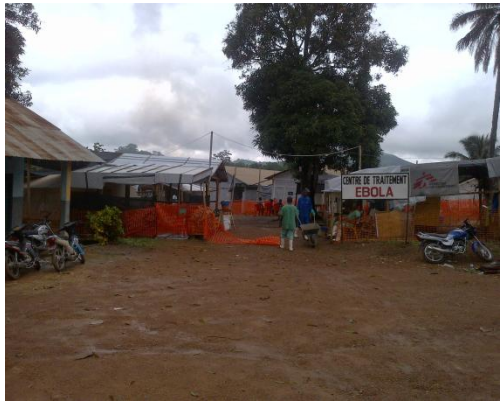
Ebola Hemorrhagic Fever

Ebola hemorrhagic fever (Ebola HF) is one of many viruses in which multiple organ systems in the body are affected. This group of viruses is often referred to as Viral Hemorrhagic Fevers (VHF). When these viruses infect humans, the result can be severe and often fatal.

In fact, early on this organism was so virulent, associated with 90% mortality, that transmission was ineffective. The current strain, associated with 50 – 60% mortality, theoretically has adapted to improve likelihood of transmission as more people survive.

FACTS

- The Ebola virus is named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa, where it was first recognized.



- The exact origin, locations, and natural habitat (known as the "natural reservoir host") of the Ebola virus remains unknown. Although, variant virus has been identified in mammalian species, “Patient Zero” has supposedly been identified in this most recent outbreak.
- There are five identified subspecies of *Ebolavirus*. Four of the five have caused disease in humans: Ebola virus (*Zaire ebolavirus*), Sudan virus (*Sudan ebolvirus*), Taï Forest virus (*Taï Forest ebolavirus*, formerly Côte d’Ivoire ebolavirus or Ebola-Ivory Coast), and Bundibugyo virus (*Bundibugyo ebolavirus*).

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Key Points

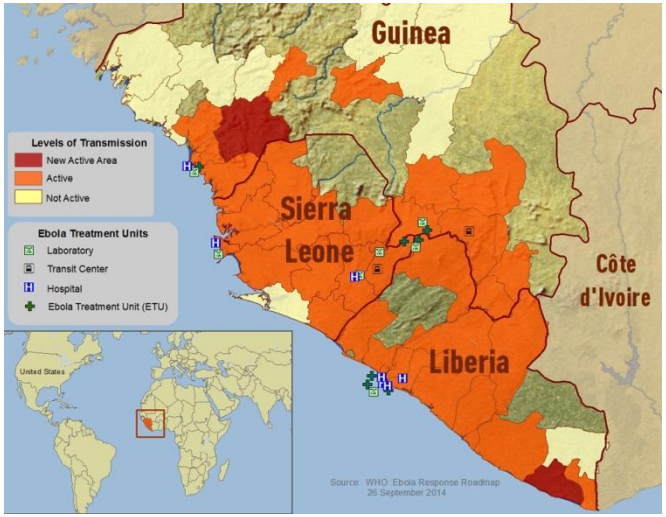
- The primary mode of transmission is person-to-person contact with contaminated blood, secretions, or body fluids of an infected person.
- Diagnosing Ebola HF in the early stages of the illness is difficult as most of the symptoms mirror other nonspecific viral illness.
- Travel history to an affected area, fever, and viral symptoms mandate evaluation and isolation until the disease is excluded.

- During outbreaks of Ebola HF, the disease can spread quickly within a health care setting.
- In the past, Ebola rarely spread outside of a small geographic region; however, with frequent air travel and the ease of transmission, once symptomatic the illness can be spread from one country to another without following patterns demonstrated in the past.
- On September 30, 2014 the Centers for Disease Control and Prevention (CDC) confirmed the first endogenous case of Ebola in the United States (U.S.) in a person who had traveled from West Africa to the U.S.

TRANSMISSION

There are several ways in which the virus can be transmitted:

- The primary mode of transmission is person-to-person contact with contaminated blood, secretions, or body fluids of an infected alive or deceased person.
- The highest concentration of virus particles is found in the blood, but is present in all bodily fluids.
- The Ebola virus can also spread from human-to-human by needle-sharing. As well as through contact with contaminated medical equipment that had not been properly sterilized or disposed of, which has been cited in less developed countries.



- Viral particles are able to survive from one to six days on inanimate objects, although the ability to infect decreases with time.

Strict surveillance and isolation for 21 days post exposure to monitor for symptom development should be done for people who have:

1. Traveled to West Africa, contiguous Central Africa, or to an area where confirmed cases of Ebola HF have been reported, or
2. Family members, or those who have had close physical contact with someone with a recent history of travel within 21 days of symptom onset.

SYMPTOMS

The previous version of this virus was so virulent that it killed those infected within a very short time-frame. This strain of the virus may have mutated, allowing less virulence with the host surviving longer, therefore being infectious for longer periods of time. According to the CDC some people who become sick with Ebola HF are able to recover, while others do not. The reasons are not fully understood, but it is known that patients who die have not developed a significant immune response to the virus at the time of death.

Typical symptoms are listed below, but they will most likely be mild in the initial stages of the illness, making early diagnosis difficult:

- Fever (greater then 38.6 C or 101.5 F)
- Headache
- Joint and muscle aches
- Weakness
- Vomiting
- Diarrhea
- Stomach pain
- Unexplained bleeding or bruising

The bottom line, any patient who presents with fever, weakness and fatigue or accompanied by any of the other symptoms listed above, should been screened for recent travel to a county or close contact with an individual who has traveled to an area where Ebola HF has been confirmed.

The virulence of this organism dictates that those with significant Ebola exposure, within the 21 day incubation period should be isolated even without symptoms.

The time line is crucial with most presentations occurring 8 – 10 days post exposure with a range of 2 – 21 days.

Those with significant Ebola exposure, within the incubation period should be isolated for 21 days even if asymptomatic.

DIAGNOSIS

Diagnosing Ebola HF in the early stages of the illness is difficult because most of the symptoms mirror other nonspecific viral illnesses. The key is travel history, fever, and viral symptoms that mandate evaluation and isolation until the disease is excluded.

Although, antibodies can be detected and the virus can be isolated in cell culture, rapid diagnostic tests are not currently available. Tests on samples present an extreme biohazard risk and should be conducted under maximum biological containment conditions. New developments in diagnostic techniques include non-invasive methods of diagnosis (testing saliva and urine samples) and testing inactivated samples to provide rapid laboratory diagnosis.

The key is travel history, fever, and viral symptoms that mandate evaluation and isolation until disease is excluded .

Timeline of Infection	Diagnostic Tests Available
Within a few days after symptoms begin	• Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing • IgM ELISA • Polymerase chain reaction (PCR) • Virus isolation
Later in disease course or after recovery	• IgM and IgG antibodies
Retrospectively in deceased patients	• Immunohistochemistry testing • PCR • Virus isolation

TREATMENT

There is no effective FDA approved direct treatment for Ebola HF. Patients receive supportive therapy. This consists of balancing the patients' fluids and electrolytes, monitoring coagulation state, maintaining oxygen status and blood pressure, and treating for any complicating infections.

- Severe cases require intensive supportive care, as patients are frequently dehydrated and need intravenous fluids or oral rehydration with solutions containing electrolytes.
- No specific vaccine or medicine has been proven to be effective against Ebola. Some experimental treatments developed for Ebola have been tested and proven effective in animals; however, these have not been tested in randomized trials in humans.
- Standard virology and immunologic treatment principles still apply. The high virulence of Ebola until now has impeded development of a successful vaccination, and interventional active immunity strategy. Recovery from Ebola depends on the health of the individual and their immune response. Naturally occurring active immunity has developed in disease survivors, it is anticipated that these antibodies last for at least 10 years (possibly even longer). Passive immunity therapies with administration of preformed antibodies to viral antigens have been utilized selectively. Standard antiviral therapy strategies interfering with RNA synthesis are currently being explored as well.

No specific vaccine or medicine has been proven to be effective against Ebola HF.

HEALTHCARE WORKER PRECAUTIONS

Healthcare providers need to maintain a high index of suspicion for illnesses not commonly seen in the past. As demonstrated with other outbreaks of new and emerging illnesses, such as SARS, H1N1, and MERS, patients should be routinely asked about travel history in the triage process. Appropriate infection control measures, such as those you would institute with any other highly contagious virus, should be implemented with the slightest concern. Healthcare providers should follow standard, contact, and droplet precautions and strict infection control practices should be implemented. This includes:

- Patient isolation.
- Appropriate personal protective equipment (PPE) should be used at all times. Including face shield, N95 respirator or duckbill style mask, liquid impervious gowns, and resistant shoe covers.
- Visitor restrictions should be maintained.
- Aerosolized-generating procedures should be avoided. Although, airborne transmission has not been described to date, saliva and other droplet secretions can cause infection if contacted.
- Strict environmental infection control measures should be implemented. All disposable materials, including but not limited to, PPE, cleaning cloths, food service items, and contaminated cloth products (linens, etc.) should be placed in a leak-proof container and discarded as regulated medical waste. Incinerating waste as a treatment process is effective; however, each facility must be aware of their states regulated medical waste program.

CONCLUSION

As viruses continue to mutate their symptomology at initial presentation may continue to evolve. Maintain a high level of suspicion for uncommon diseases, maintain standard universal precautions for all patients, and isolate the patient immediately if there is a threat.

Be ever vigilant for viral illness and complex patient symptom presentations, where a travel history to Western and contiguous Central Africa within 21 days of symptom onset exists.

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Original Course Created by Ivy K. O'Rourke, RN, BSN, MBA, CEN and Rade B. Vukmir, MD, JD, FCCP, FACEP, FACHE on August 3, 2012 See Original References Used Below

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