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Ebola Hemorrhagic Fevers

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Abstract

Ebola virus disease (EVD), commonly known as Ebola hemorrhagic fever (EHF), is a viral infection that is highly dangerous and lethal and impacts both humans and non-human primates. It is an infection caused by viruses of the genus Ebola virus. Symptoms, in most cases, will appear 2 to 21 days after exposure, starting with fever, sore throat, headache, and muscle pain. In the course of the infection, the patient may experience vomiting, and diarrhea, failure of the liver and kidneys, skin rashes, and in many cases, bleeding either internally or externally. In terms of case fatality, EVD is highly lethal, with estimated case fatality rates of 25 to 90 percent and an average of 50 percent. Dehydration and hypovolemic shock are the most common causes of death. For patients that receive early supportive management, survival is far more likely, while outcome tends to worsen with delay. EVD case management is simpler with early intervention. A milestone in prevention was reached when vaccines for Ebola virus were approved by the US FDA in December of 2019. EVD is transmitted by direct exposure to blood, secretions, and other body fluids of infected people or animals, through fomites, and through contact with contaminated surfaces. Importantly, airborne transmission between humans or primates has not been documented in and out of the laboratory setting. The Ebola virus can remain in semen and breast milk for several weeks to months after recovery, posing a risk for post-recovery transmission. It is believed that fruit bats are the primary asymptomatic carriers of the virus. Clinically, the Ebola virus infection is indistinguishable from malaria, typhoid, meningitis, cholera, and other hemorrhagic fevers which necessitates laboratory confirmation through detection of viral RNA, antigens, or antibodies for accurate diagnosis.

Keywords: Ebola, hemorrhagic fever, viral RNA, antibodies, bleeding.

Symptoms

The initial stage of Ebola virus disease (EVD) is indistinguishable from other viral infections and is often characterized by fever, significant fatigue, marked weakness, myalgia, arthralgia, nausea, vomiting, and diarrhea. Often, there is rapid progression to multi-organ involvement.[1, 2]

Hemorrhagic Manifestations

During the first and second weeks of the disease, a significant number of patients suffer from bleeding and coagulopathy. The more common forms of mucocutaneous bleed are epistaxis, conjunctival bleeding, and venipuncture bleeding. Hemorrhagic manifestations such as hematemesis and hemoptysis, as well as melena and petechial, purpuric, or ecchymotic changes may occur in approximately 40–50% of patients. Although massive hemorrhagic manifestations are rare, when they do occur, they are most often confined to the gastrointestinal system. [3, 4]

Severe and Life-Threatening Complications

Severe internal and external bleeding, including from mucosal surfaces (e.g., mouth, eyes, ears). Altered mental status (e.g., confusion, delirium, even advanced stages of coma). Respiratory collapse. Liver and kidney failure. Multi-organ failure leading to death. The most common range is 8–10 days. A severely deficient immune response to viral antigens is the primary cause of death. [5, 6]

Causes

EVD is a subtype of hemorrhagic fevers and is caused by Ebolavirus, a virus with zoonotic origins. Transmission occurs through direct or indirect contact with infected wild fruit bats, primates, and other mammals. Other arthropods like mosquitoes and ticks additionally contribute to the spread of other hemorrhagic viruses. [7, 8]

Transmission

Although the exact reservoir host has not been conclusively documented, fruit bats remain the top suspects. Primary human cases are believed to derive from spillover zoonoses involving infected animal contact. Ebola is introduced to human populations and then spreads through direct contact with infected blood, secretions, and other body fluids, or through contact with fomites such as needles and syringes, and other medical equipment. Caregiving in households or healthcare facilities with inadequate infection control heightens the outbreak potential. Health workers face illness risk particularly high in exposure without use of appropriate protective clothing and proper sterilization practice. [9, 10]

Risk Factors

Enhanced risk behavioral populations include: Residents or visitors to the endemic region. Health workers attending to Ebola cases. People venturing to bushmeat, including hunting of certain animals. Persons in sexual relations with affected persons. Employees in places where exposure to rodents or bats exists. [11,12]

Complications

Severe Ebola virus infection can progress to septic shock, multiple organ failure, and ultimate death. [13]

Diagnosis

Early diagnosis is difficult as the presenting symptoms overlap with a number of other febrile illnesses. Isolation of suspected patients is essential, and is accompanied by specimen collection to confirm the diagnosis. Early in the course (first few days) of the disease, diagnostic measures include: antigen detection with ELISA, ELISA for IgM, PCR, and viral culture. In the later phase of illness and after recovery: detection of IgM and IgG. Post-mortem immunohistochemistry, PCR, and viral culture testing. [14, 15]

Laboratory tests used in diagnosis include: [16]

Stage of Infection	Diagnostic tests
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

Management Treatment currently consists of maintaining hydration, electrolyte balance, oxygen levels, and blood pressure, and managing secondary infections. Antiviral and monoclonal antibody therapies, although not widely accessible, have shown promise in clinical trials. [17, 18]

Prevention

Prevention There is limited zoonotic transmission; therefore, preventive strategies remain ambiguous. In contrast, human case identification necessitates immediate infection control. These include: Barrier nursing Protective clothing, gloves, masks, gowns, and goggles. Proper sterilization of reusable equipment and safe disposal of contaminated materials. Isolation of confirmed cases. Physical contact avoidance with deceased Ebola victims. The overarching goal is to limit exposure to infected fluids and reduce the risk of transmission, including nosocomial and community spread. [19, 20]

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