Ebola

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Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever; Etiological agent – *Ebolavirus*; Five identified strains: Ebola virus (*Zaire ebolavirus*); Sudan virus (*Sudan ebolavirus*); Tai Forest virus (*Tai Forest ebolavirus*); Bundibugyo virus (*Bundibugyo ebolavirus*); Reston virus (*Reston ebolavirus*) causes disease in nonhuman primates (1).

Transmission:

Ebola is transmitted through direct contact with tissues and body fluids of infected animals or humans, and surfaces and materials contaminated with these fluids (2). These fluids include but are not limited to saliva, blood, mucus, sweat, urine, semen, and feces. Droplet transmission from respiratory secretions (coughing and sneezing) and sexual transmission from “contact from a man who has recovered from Ebola” is also possible (1). Reuse of needles previously used on infected patients spreads the disease as well as direct contact of deceased hosts (7).

Reservoirs:

Reservoirs include living and deceased animal and human hosts. Direct contact with bodily fluids and secretions of infected fruit bats, chimpanzees, gorillas, monkeys, and antelope transfers the disease (2). “Cave-dwelling fruit bats are the most likely probably natural host reservoir which are used as food and not acutely affected by the virus” (7).

General Characteristics of MO (specific):

Ebola is a member of the family Filoviridae and genera *Filovirus* which are enveloped, helical viruses (7). Variable in length but the “average infectious virion is 920 nm long and 80 nm in diameter containing a helical nucleocapsid, a membrane made of 10 nm projections and host cell membrane.” The virus contains single-stranded noninfectious RNA and is composed of 7 polypeptides, a nucleoprotein, a glycoprotein, a polymerase and 4 other proteins. Virus replication and host cell lysis is rapid (3).

Key tests for identification (specific):

Ebola virus can be identified in the blood through Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing, IgM ELISA tests, Polymerase chain reaction (PCR), or simple virus isolation (1). IgM and IgG antibody testing can detect the disease later in its development or after recovery, and Immunohistochemistry testing, PCR, and virus isolation may detect the virus in deceased hosts (4). Only after symptoms begin may the disease be detected in the blood (1).

Signs and symptoms of disease:

Early symptoms are nonspecific and include fever, headache, weakness, vomiting, diarrhea, and stomach discomfort. Through progression of the virus other signs and symptoms may develop, such as rash, eye redness, sore throat, cough, chest pain, internal and external bleeding, and difficulty breathing.
and swallowing (4). Symptoms occur from 2 to 21 days after exposure to the virus and the average is from 8 to 10 days after exposure (1).

**Historical information:**

The first outbreaks of EVD occurred in Sudan and the Democratic Republic of Congo in 1976 where its occurrence near the Ebola River provided its name (2). 88% of the patients diagnosed in the first outbreak died (4). Since its discovery, there have been reported cases in North America, Europe, Africa and Asia with the most severe appearing in Africa over the last year. The number of cases and casualties in the 2014 epidemic has trumped all previous cases combined (1).

**Virulence factors:**

The virus infects and alters cells in the immune system that fight infection, the liver that produces coagulation proteins, and the adrenal gland. As a result, organ failure persists, “blood vessels weaken and become permeable causing bleeding and swelling” and the antiviral response is suppressed (6). Ebola viral protein 35 (VP35) plays a key role in immune evasion and viral RNA synthesis (5). Virulence factors are currently being researched to learn more of their exact function (6).

**Control/Treatment:**

Hospitalization is required for sustained control. Proper balancing of electrolytes and providing intravenous fluids, maintenance of blood pressure and oxygen levels can improve patient prognosis (1). Treatment of specific symptoms is as they appear. Proper control and containment in healthcare facilities includes, hand and respiratory hygiene, use of personal protective equipment and safe injection practices. Safe burial practices are also required to control transmission (2).

**Prevention/Vaccine info, new trials?:**

Do not travel to endemic areas and avoid direct contact with bodily fluids of infected hosts through the use of masks, gloves, and goggles (4). Community awareness is significant for prevention and reducing the risk of wildlife-to-human transmission, human-to-human transmission, and possible sexual transmission. Use of gloves and personal protective equipment, safe burial of the deceased, and identification of people who may have come into contact with an infected host (human or animal) will help prevent transmission (2).

There is no FDA-approved antiviral drug for the Ebola virus (1). Successful vaccines have been developed on mice and guinea pigs and research is being done “to develop an effective vaccine utilizing genetically modified viruses, recombinant viruses, and inactivated Ebola viruses” (4). A vaccine produced from the adenovirus is being studied and altered to produce Ebola glycoprotein (6). “Currently, the Sierra Leone College of Medicine and Allied Health Sciences and the Centers for Disease Control and Prevention launched a candidate Ebola vaccine trial in Sierra Leone in April 2015” (1).

**Local cases or outbreaks (with incidence figures):**

In September and October of 2014 there were three diagnosed cases of Ebola in the State of Texas and one in New York City. The first report was a man who traveled from Liberia to Dallas, Texas and the following two weeks two healthcare workers who provided care for the diagnosed patient tested
positive for the virus. A reported case of Ebola also occurred in New York involving a medical aid worker who returned from Guinea. The CDC contained the incidences and there was no prevalence of the disease (1).

Global cases or outbreaks (with incidence figures):

Currently, there is an epidemic along the west coast of Africa that is affecting multiple countries including, Guinea, Liberia, and Sierra Leone. There have been an estimated 26,757 reported cases and 11,079 deaths (1). The outbreak of 2014 spread internationally to Nigeria, the United States, Senegal, and Mali (2). From August to November 2014 in the Democratic Republic of the Congo there was an outbreak of 66 human cases and 49 deaths among the reported cases. In November of 2008 there were 6 reported cases of the Reston virus strain of Ebola in the Philippines. These cases involved asymptomatic hosts (1). Also in 2008, 149 cases of Ebola outbreak occurred in Uganda (7). There was one case which lead to death of the patient in Russia involving the Zaire virus strain of Ebola in 2004 (1). “In 1989 and 1996, outbreaks among imported monkeys to the United States from the Philippines were not associated with human disease” (7).

References:


