



Pandemic Plan for the Church

Ministering to the Community in a Time of Crisis

What is Ebola?

Ebola is a hemorrhagic disease that has appeared intermittently since 1976. It can cause disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees). The Ebola virus is named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa, where it was first recognized. It can be found in other areas of Africa and the Philippines.

The Ebola virus is a non-segmented, single stranded RNA virus that is part of the Filoviridae classification of viruses, similar to the Marburg virus. It resembles a long, thread-like filament. The capsid which contains the genetic materials is enclosed in the membrane.

Case fatality rates vary from 25% to 90%. Due to its highly pathogenic nature, scientific research conducted on Ebola must be performed in a Biosafety Level 4 laboratory (AIDS/HIV is a Biosafety Level 2 virus).

Ebola is an RNA virus, which means it is possible for it to mutate for the same reasons as an influenza virus mutates. See the section “RNA vs. DNA” in the chapter titled, “Influenza Viruses” for more information. As it invades a host cell, the Ebola virus changes its genetic material, adding extra RNA building blocks. These changes may produce new proteins that may affect how the virus transmits, binds, and grows in animals and humans.

Perhaps the most feared potential Ebola mutation is it becoming transmittable through airborne particles. Since the 1980’s, researchers have known that this is a possibility. Although the Centers for Diseases Control (CDC) concedes that all Ebola viruses have displayed the ability to spread by airborne transmission, there is no evidence that this is happening.

Where is Ebola?

By far, the largest outbreak of Ebola virus disease ever recorded was in West Africa with the Zaire species of the virus. Although most previous Ebola outbreaks occurred in Central Africa, this outbreak started in the West African nation of Guinea in late 2013 and was confirmed by the World Health Organization (WHO) in March, 2014. The outbreak subsequently spread to Liberia, Sierra Leone, Nigeria, Senegal, and Mali. Researchers have confirmed that this epidemic has resulted from sustained person-to-person transmission without additional introductions from other animal sources.

The Ebola outbreak in West Africa has been the deadliest occurrence of the disease since its discovery in 1976. Since December 2015, the number of total suspected cases is 28,616, out of that, the number of laboratory-confirmed cases is 15,227, and the total deaths are 11,310. Case counts are updated in conjunction with WHO updates and are based on information reported by the Ministries of Health (CDC, 2016).ⁱ WHO admits the figures are underestimated, given the difficulty collecting the data.

Sierra Leone was the last battle ground for Ebola and was declared free of Ebola on November 7, 2015. However, another case was diagnosed in January 2016. After the death of the young victim, her family prepared her body performing unsafe burial practices. Consequently, another twenty-seven people were exposed. Even after dealing with such a large outbreak, authorities were disappointed that this case was not only overlooked by the hospital that she visited, but also by the unsafe burial.

Since this exposure and death, the last deaths reported in Sierra Leone were March 17, 2016. Although considered free of Ebola, authorities and health officials remain vigilant in watching for new cases.

Efforts to treat and eradicate Ebola have been hindered by resistance from local communities with a history of distrust towards outside governmental intervention. In addition to resistance, the people continue to hunt and eat the bush meat that carries the virus due to the local needs of the communities. Burial customs that include touching and bathing the deceased, also add in the spread of the disease. These practices have enabled new outbreaks to occur. One of the biggest challenges in investigating and containing these outbreaks is the remoteness of the affected areas.

The Democratic Republic of Congo simultaneously experienced its' seventh outbreak of Ebola that began August 24, 2014. Although this was of the Ebola Zaire virus as in West Africa, it was determined that it was not of the same strain circulating in West Africa.

There were three diagnosed cases of Ebola in the United States. The first was a man visiting from Liberia, and after being admitted to the hospital in Texas, he died of the disease. Two nurses who cared for the victim also contracted the disease but recovered. No other cases were reported from this exposure. Other patients have been flown into the United States for care; however, these cases occurred while still in Africa serving as health care providers

Where did the Ebola Outbreak Start?

Ebola virus is a zoonosis, meaning an infectious agent that lives unnoticed in a non-human animal. These are referred to as reservoir hosts. These viruses occasionally infect a human – causing the disease. It has long been believed that the virus's reservoir hosts were fruit bats, which are relatively large and meaty. However, researchers have not been able to culture live viruses from the tissues or blood of this type of bat.

Following the path back to the original victim, clues were found that indicated the origin of the virus is more likely the Angolans free-tailed bat. These are small insect eating bats that are hunted by children. This poses a problem because these bats are sometimes kept as pets by children and live within the areas of villages.

Many questions and concerns must still be answered such as: how does the virus jump between species of bats; and if the bat population were to be culled, would fatalities increase due to an increase in mosquito borne malaria?

The Pathophysiology of Ebola

Ebola can be spread through direct contact with blood or bodily fluids including but not limited to: feces; saliva; sweat; urine; vomit; and semen of an infected person. The virus can enter through broken skin or unprotected mucous membranes such as the eyes, nose, or mouth. Once the virus has entered the blood stream, it then finds receptors in the lymph nodes to replicate. For more information about receptors please see the section on “Entrance and Receptors” under the heading of “Pathogenesis of Viral Diseases,” in the chapter titled, “Overview of a Virus.”

Once Ebola is in the lymph nodes, it is able to spread rapidly in the blood to other areas. It first attacks the lymphatic tissues (a part of the body’s immune system). The Ebola virus then attacks the fibroblastic reticular cells. These are cells that form the supportive framework of tissue or an organ. The virus can also be found in the loose connective tissue under the skin.

Endothelial cells (a layer of cells lining the closed internal spaces of the body such as the inside of blood vessels and lymphatic vessels) become infected after the connective tissue around them is infected. Then the epithelial cells that line the cavities of the body are attacked. Epithelial cells make up one of the four major tissue types found in the body, they are: connective tissue; epithelial tissue; muscle tissue; and nervous tissue.

Signs and Symptoms of Ebola

The incubation period, that is, the time interval from infection with the virus to onset of symptoms is two to twenty-one days. Humans are not infectious until they develop symptoms.

Early signs and symptoms may include:

- Sudden onset of fever
- Fatigue
- Muscle pain
- Headache
- Sore throat
- Passive behavior

These are followed by:

- Vomiting
- Diarrhea
- Rash
- Symptoms of impaired kidney and liver function
- Seizures
- Loss of consciousness

- Death

Some cases include:

- Internal bleeding may be seen with blood in the stool
- External bleeding from the gums, nose, eyes, anus, and IV sites
- Laboratory findings of low white blood cell and platelet counts

Treatment of Ebola

It can be difficult to distinguish the Ebola virus from other infectious diseases such as malaria, typhoid fever, and meningitis. Lab testing must be done to confirm the disease. Samples from patients are an extreme biohazard risk; laboratory testing on samples should be conducted under maximum biological containment conditions.

Symptoms of Ebola and complications are treated as they appear. The following basic interventions, when used early, can significantly improve the chances of survival:

- Providing intravenous fluids (IV) and balancing electrolytes (body salts)
- Maintaining oxygen status
- Maintaining blood pressure
- Treating other infections if they occur

Recovery from Ebola depends on good supportive care and the patient's immune response. People who recover from an Ebola infection develop antibodies that can last up to ten years; possibly longer. It is not known if people who recover are immune for life or if they can become infected with a different species of Ebola. Some people who have recovered from Ebola have developed long-term complications, such as joint and vision problems. Because Ebola can persist in some tissues and bodily fluids of survivors for months, there is still the danger of passing on the virus to others. It has been documented that the virus can be passed on by the survivor's semen.

Potential Ebola drugs exist yet there is little evidence that they work. Two of the most promising are brincidofovir and favipiravir. Tests in tissue samples suggest the anti-virals have the potential to stop Ebola replicating once it infects cells. Brincidofovir has been tried on some patients in the U.S. and both drugs have entered clinical trials in West Africa. The use of blood of survivors carrying antibodies is being researched. Treatments, vaccines and drugs are all being tested with hopes of a cure or definitive treatment for this disease.

Is There a Vaccine for Ebola?

The first human trial of an experimental Ebola vaccine has produced promising results. 20 healthy adults who received the vaccine in a trial run by researchers from the National Institutes of Health (NIH) in Maryland produced an immune response and developed anti-Ebola antibodies. The vaccine is being developed by the National Institute of Allergy and Infectious Diseases (NIAID) and British pharmaceutical company GlaxoSmithKline. Trials of the vaccine

in Guinea have proven to be very promising and continue to be tested. If further clinical trials result in 100% efficacy, health care workers on the front line of the fight against Ebola are likely to be the first to receive the vaccine.

ⁱ 2014 Ebola Outbreak in West Africa-Case Counts, Ebola Virus Disease, Centers for Disease Control Web site. Last modified March 17, 2016, accessed June 25, 2016. <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>.