

Answers to students' questions about Ebola from Dr. Eden Wells, MD, MPH

1. Origin of Ebola virus and why it is in the news now

Questions from Sheridan, Cayleigh, Kelsey, Sydney, Reed, Brandon and Abby:

Dr. Wells: Ebola is one of numerous viruses that cause a Viral Hemorrhagic Fever (VHF), and since its discovery in the Democratic Republic of the Congo in Africa in 1976, it is known to be the VHF associated with the highest case high fatality rates (CFR). These rates are the number of deaths/ number of cases; which was 50-90% prior to current W. Africa outbreak.

There are five identified Ebola virus species, four of which are known to cause disease in humans: Ebola virus (Zaire ebolavirus); Sudan virus (Sudan ebolavirus); Taï Forest virus (Taï Forest ebolavirus, formerly Côte d'Ivoire ebolavirus); and Bundibugyo virus (Bundibugyo ebolavirus). The fifth, Reston virus (Reston ebolavirus), has caused disease in nonhuman primates, but not in humans.

The suspected reservoir (an animal that can carry the virus but not get sick) for Ebola infection in humans is the fruit bat, which are known to be infected with the Ebola virus in some areas of Africa. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest.

Outbreaks before this one were in isolated rural villages away from the city setting, and the outbreaks were relatively small. However, this outbreak began in Guinea (which had not experienced Ebola before) and spread quickly to more populated areas and cities in the W. African countries of Guinea, Sierra Leone and Liberia, and thus spread more easily person-to-person. Unfortunately, it really did not catch the attention of the rest of the world until March 2014, and particularly when American healthcare workers began to come home sick.

2. Nature of Ebola infection

Questions from Abigail, Bryce, Veronica, Reed, Taylor, Audrae, Sydney, Nadine and Carson

Dr. Wells: Ebola virus enters the human body through mucous membranes, breaks in the skin, or through blood. The virus is spread human-human by direct contact to direct contact with the blood or body fluids (including but not limited to feces, saliva, urine, vomit and semen) of a person who is sick with Ebola; or, contact with objects (like needles and syringes) that have been contaminated with the blood or body fluids of an infected person or with infected animals.

Direct contact from droplets potentially expelled by an ill Ebola-affected person (cough, for example) could affect a person within 3 feet radius if the droplet were to be in contact with mucous membranes or breaks in the skin. This is considered a risk in the healthcare setting given the ill state of the patient, and in people who are in contact with an infected individual in the community setting where Ebola is

circulating, as in W. Africa. **Currently Ebola is not circulating in the community outside of Western Africa.**

There is no evidence that the disease is airborne (which can be spread to people within 6 feet from the infected person) in a non-healthcare setting. The book, “The Hot Zone” was written about an Ebola virus, Ebola-Reston, that only infects primates, (like monkeys) and not humans, and is thought to be able to be airborne, although some controversy exists on this matter.

Under Investigation: There may be chances **in the healthcare setting** that aerosolization (spraying of micro droplets of infected fluids) could occur during medical procedures (placing breathing tubes, breathing treatments, etc.), increasing transmission to the healthcare worker.

- **Disease and Symptoms**

Ebola affects causes severe disease in humans and nonhuman primates. After infection due to an exposure, it takes 2-21 days (average 8-10 days) for the infected person to develop symptoms. The virus travels through the bloodstream, can infect many cells. Initial symptoms include sudden onset of fever fatigue, muscle pain, headache and sore throat, followed by vomiting, diarrhea, rash, symptoms of impaired kidney and liver function, and in some cases, both internal and external bleeding (e.g. oozing from the gums, blood in the stools). If disease progression occurs, the virus can affect every organ and become fatal.

Humans are not infectious (contagious) until they develop symptoms.

The course of infection, including signs and symptoms and incubation period, is similar to that reported in previous outbreaks of EVD.

Some people can recover from Ebola infection, some do not; some of the reasons for this are not yet fully understood. Early diagnosis and treatment with supportive intravenous fluids and care have shown improved recovery rates than past outbreaks.

3. Containing Ebola, cure and vaccine

Questions from Coyie, Lilli, Trey, Claire, Courtney, AJ, Alissia, Olivia, Annabelle, and Austin

Dr. Wells:The current outbreak which emerged in March 2014 is the largest outbreak since the Ebola virus was first discovered. It started in Guinea then spread across land borders to Sierra Leone and Liberia, by air (1 traveler only) to Nigeria, and by land (1 traveler) to Senegal.

On August 8, the WHO declared the epidemic to be a “public health emergency of international concern.”

Outbreak activity is located at and continues in Guinea, Sierra Leone and Liberia due to poor public health infrastructure, fear and mistrust, and lack of beds. The heaviest toll is occurring in Liberia. Nigeria and Senegal were able to interrupt the chain of transmission from their one

case by using effective public health measures such as contact tracing, isolation and quarantine.

4. Travel

Questions from Bryanna, Maddy, and Sharon

Dr. Wells: Ebola cannot be tested for until a person has had symptoms for several days, so we are unable to screen for it. We are sending people to help W. African patients because the only way to prevent spread is to contain the outbreak and care of the patients there. When doctors and nurse come back here, with can care for them if they get sick, and our public health restructure will be able to keep the Ebola from transforming into a community outbreak.

As of October 17, 2014, CDC has issued a Warning, Level 3 travel notice for U.S. citizens to avoid nonessential travel to Guinea, Liberia, and Sierra Leone.

CDC has downgraded the travel notice for Nigeria to a Watch, Level 1 because of the decreased risk of Ebola in Nigeria. Travelers to Nigeria should practice usual precautions.

CDC has also issued an Alert, Level 2 travel notice for the Democratic Republic of the Congo (DRC) due to an unrelated Ebola outbreak.

This means that, if you are not traveling to these affected areas, that traveling in a plane or a train or a bus is considered safe here in the United States and other unaffected countries. Of course, it is flu season, so wash your hands a lot (or use alcohol sanitizer) and be careful not to touch dirty surfaces!

5. Other: Questions on concern and fear of virus from Devin, Coyie and AE

Dr. Wells: Fear and worry is not necessary, but being informed so that you can educate yourself and others about what is going on in W. Africa or in the US is a good thing. Good information and an understanding about what is really going on (keep tabs at cdc.gov!) will allow you to keep things in perspective.

6. The Hot Zone

Questions on airborne transmission of Ebola as discussed in the book, The Hot Zone by Richard Preston – see separate article on the Ebola SLOG.