Ebola

New Mexico Adventures in Supercomputing Challenge

Final Report

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Team 070

Shiprock High School

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Executive Summary

Our project is to figure out and discover what the Ebola virus is and how it is spread. We would like to figure out where it originated. We will do research using the internet.

First, we would like to look over several sites on the internet to see how this Flavivridae virus came to be and why it's important to know what it is. In our research we found that the virus was named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa. The origins of the virus are unknown, but scientists believe the virus is zoonotic. The virus is often fatal in humans and nonhumans primates. The virus is 90% fatal in humans. In other species, the virus is 100% fatal. We would also like to find out if there is a cure for this virus. We would also like to discover how many cases there have been to see if this virus is something about which we need to be knowledgeable.

In our research, we found out that the first case of Ebola was in Zaire in 1976. Since that initial outbreak, there have been many recorded cases in the Congo, Gabon, Sudan, the Ivory Coast and Uganda. Our research shows that the virus seems to be increasing 2% yearly. Over the years United States and Italy have been importing monkeys to their facilities for research, there has never been a death or an outbreak but there have been accidental needle stick. Symptoms that show after being infected within a few days include high fever, headache, muscle aches, stomach pain, fatigue, and diarrhea. Some patients show symptoms such as sore throat, hiccups, rash, red and itchy eyes, vomiting blood, and bloody diarrhea. Within one week most patients show symptoms of

chest pains, shock, and death, and some patients show some symptoms of blindness and bleeding.

There are five known types of Ebola virus; four out of five can be harmful to humans. First, the Ebola-Zaire was discovered first, and it is the most deadly, with a 90% fatality rate. Second, the Ebola-Sudan was first found in the natural reservoir of a cotton factory. Third, the Ebola-Ivory Coast is unknown about its form due to lack of information since only one person was infected with this virus. Fourth, the Ebola-Reston virus was transported into the U.S but does not affect humans. Last, the Ebola hemorrhagic fever virus is transmitted by direct contact with infected body fluid. Death or recovery occurs within six to ten days.

There are no known cures for all the Ebola viruses, but there are antibiotics available.

Introduction

Ebola is a virus that will affect humans, monkeys, and apes, but it most often affects humans. It can also be spread by sexual contact between an infected person. They might not know that they have the virus, but the virus may be present in a human's body seven weeks after being treated. Any person with close physical contact should be under strict surveillance. The Ebola virus is highly contagious and is not airborne. It was discovered in 1976 in Africa and was named after a river in Zaire where the virus originated.

Symptoms of the Ebola virus begin four to sixteen days after the person is infected. Beginning symptoms are headaches, fevers, chills, muscle aches, and loss of appetite. When the disease progresses, symptoms can include rash, sore throat, vomiting, abdominal pain, and chest pain. There is also limited kidney and liver functions, and victims may have external bleeding. The blood doesn’t clot which can cause some serious problems such as some bleeding into surrounding tissue. The death of a patient occurs from eight to seventeen days after an infection.

Project Description

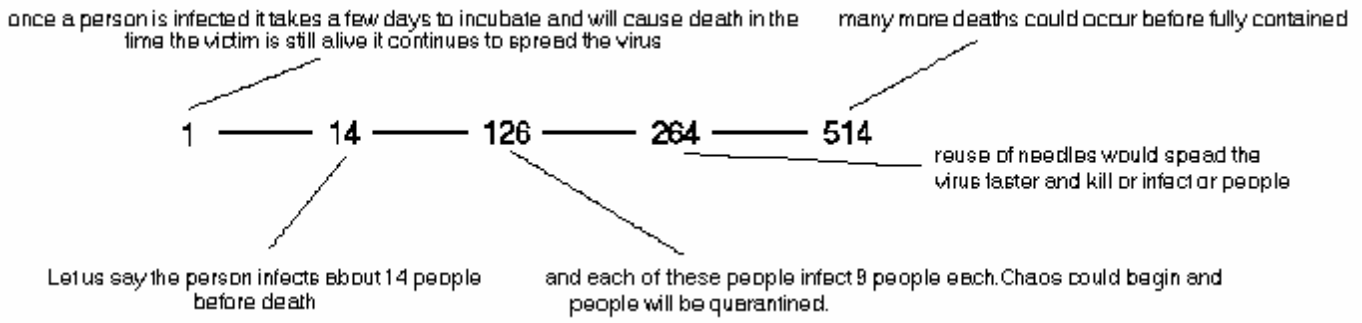
We have researched and gained knowledge about this deadly disease and we plan to find out how fast the virus can spread if an infected person with Ebola is not taking measures to take care of his/her own illness.

Hypothesis

Our hypothesis is to create a computer program using Starlogo. We can then monitor the virus in a closed environment. With this example of how the virus works, the virus will spread to others. Once infected, the turtles will have a limited time to live. In this time they will infect many others before they expire, causing a chain reaction, and without a known cure for Ebola and no way of containing it, the virus it could possibly wipe out all the turtles in the area. We will then take all gather data and evaluate it all, and also try to see if any results change due to changed factors.

Model

Our math model is the rate of infection through our subjects and the time in which it happens. Transmission from ape to man is a possibility and the human could transfer the disease to other humans. The corpse of the first victim can still transfer the disease to other humans and in the process of burial, others could become infected. Exposure to this people will infect others, leading to a wide range of spreading. Hospitals and disease control centers will then become aware of the disease and will attempt to contain it. When the disease is finally contained, the town or city will have lost quite a few people, depending on how fast the virus traveled and/or how fast it was contained.


once a person is infected it takes a few days to incubate and will cause death in the time the victim is still alive it continues to spread the virus
many more deaths could occur before fully contained
1
14
126
264
514
reuse of needles would spead the virus faster and kill or infect or people
Let us say the person infects about 14 people before death
and each of these people infect 9 people each. Chaos could begin and people will be quarantined.

Results

The Ebola Virus is in the Filoviridae family. The Ebola virus is very similar to the Marburg virus. The virus got its name from the Ebola River which is located in Zaire, Africa where the first outbreak occurred which was recorded by Dr. Ngoy Mushola in 1976 after a significant outbreak in the Democratic Republic of Congo. In this outbreak, out of 602 cases, 397 died. Since then, there have been several cases and outbreaks in nearby areas of the first case, and it has spread throughout many parts of the world. We also discovered that humans do not carry the virus, but the virus spreads by blood or any other body fluids. It transfers only from one host to another by injections of the blood or other body fluids. We also learned that there is no cure or treatments that have been discovered for the virus. Prevention and symptoms are other subjects we have found out.

Conclusion

Our results show that the Ebola virus is possibly the most deadly virus in the world. Although its origin is unknown and there is no known cure, we have calculated how long it would take Ebola to spread and kill everyone before it is contained.

The statues of hospitals in Africa are exceedingly high, meaning that they are much higher than what we just researched. Hospital records consist of a 2% decrease since the beginning of the twenty-first century. This means that although the person infected by the virus has dropped slowly, many people are still contracting the virus. Many scientists are still trying to find a cure.

In addition, since we have not found any foundations giving monetary help to determine the cause of infectious or deadly diseases, we would like to send antibiotics to third world countries that are possibly struggling, like Africa. It would be a good idea to fund raise money to donate to the medical centers located in Africa. We would also like to inform them how to sterilize their equipment because we discovered out of all infected people, half of them catch this virus because of poor sterilization. Isolating the patient who has this virus is one of the main ideas we have, and we would like to inform the staff in the medical centers disease preventive measures that could be applied to prevent this virus from spreading. We also believe that we found different or new types of symptoms; therefore, we will inform them about what we have found.

Recommendations

The Ebola virus is spread through contact of blood from humans, through inflictions, contact with contaminated needles, syringes, and other medical instruments. Therefore, the three best ways to prevent one from contracting this virus is first, the clinical samples of people suspected of an infection by this virus need treatment in an installation of containment at level 4; on the ground, to take the universal precautions relating to blood and the body liquids. Secondly, although there is no specific treatment for patients who have Ebola, many books have been published about how they could prevent transferring their disease to others. Another way to prevent from catching this virus is to make advanced preparations for Ebola and other viral hemorrhagic fevers, also known as VHF. Choosing a coordinator to observe preparations for VHF activities:

- Serving as the main point for information and leadership when a VHF case is suspected.
- Informing all health facility staff about VHF's and the risks associated with them.
- Organizing training in VHF Isolation Precautions for staff who will work with VHF patients or infectious body fluids.

Maintaining a minimum standard of cleanliness in hospitals is another preventive step, including all employees' hands to be constantly washed, all needles sterilized, and any other tool that is used. All staff must be informed about the different types of symptoms and VHF's. VHF's symptoms include are severe fatigue or weakness, and a fever for more than three days and less than three weeks. This could involve the patient to have unexplained bleeding from the mucous membranes, skin, eyes, or gastrointestinal tract.

As of this writing, a development (discovered) treatment has yet to be created to treat patients who have this virus. The Ebola virus is capable of existing in humans and a very small amount in some monkeys. Tests are done mostly on monkeys. Although the cure for this virus is close, the cost of it and transportation to poor nations would have to be carefully evaluated.

Acknowledgements

We would like to thank your team members for working hard on this project in school and after school. We would like to thank the teachers Mrs. Noble and Mrs. Hayes for helping us out with the project and leading us through the difficult times during our project. We want to give a big (big) thanks to Mrs. Hines for generously and graciously helping us out during our research and for revising our project. This is all for you Mrs. Hines.

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www.loserkids.com

http://translate.google.com

http://www.cdc.gov

http://www.ebola.com/

http://www.williamtclosemd.com/ebola.html

Appendix A:

{CODE}

```
to patch-setup
 repeat 2 [ seth random 360 jump random 200 stamp yellow]
end

to go
  check-patches
  fd random 1 wait .2
end

to check-patches ;turn based on patch color
  if pc-ahead = yellow [rt 90 step fd 1]
end

to infect ;turn green turtles into red turtles
  if color = green []
end
```