SCIENCE LAB PREP WORK

LAB DATE: April 16, 2007

LAB TITLE: Biology of Flu

Source: This lab is taken from a lesson plan created by the WGBH Educational Foundation and posted on www.pbs.org/nova/sciencenow

INTRODUCTION:

Your chosen study topic, “The Future of Death”, is really about the causes of death and man’s ability to counter them through advances in medicine. Mortality on a large scale is often linked to the spread of diseases in the for of epidemics or pandemics. In 1918, a flu virus swept the world, killing an estimated 30–50 million people. How does a deadly infectious disease like avian flu spread? In a controversial move, scientists have recently revived this deadly virus in order to study it. It turns out that it’s a lot like the avian flu virus that’s cropping up in Asia.

PURPOSE:

To answer the following questions:

1) What is a virus?

I hypothesize that a virus is a microscopic living organism that can transmit from one living thing to another.

2) What is an epidemic?

I hypothesize that an epidemic is a widespread occurrence of an infectious disease at a particular time.

3) What do we mean when we talk about an “infection spreading”?

I hypothesize that when people talk about infection spreading they mean a infection transmitting between people.

4) What are some of the ways that infections spread?
I hypothesize that a few ways that infections can be spread are: Coughing, unsafe sex, bleeding and sneezing.

MATERIALS:

Sheets of stickers in two colors

PROCEDURE:

1. Ground rules for today's simulation of how a virus spreads through a population:
• In each round, move slowly, quietly, and calmly around the room.
• If someone puts a sticker on your arm or hand, make sure it stays in place.
• Don't actively avoid or seek out the virus carrier.
2. Fill in the Tables and Graphs handout with the data from rounds 1 and 2. Then, on each axis, sketch a line to represent how quickly you think a virus would spread through a population if there were just one virus carrier infecting people (i.e., Round 1) versus multiple virus carriers (i.e., Round 2). Take your best guess at what the shapes of these lines would be.

3. List some differences between Rounds 1 and 2. Write your answers on a separate piece of paper.

4 Does Round 1 or 2 more closely approximate the spread of a real-life epidemic? Explain your reasoning on a separate piece of paper.

5 Fill in the data table on the Tables and Graphs handout from Rounds 2-6. Then, on the axes, draw a bar graph of these data. Note that Round 2 serves as the control because no one was inoculated.

DATA TABLES:

Data Table for rounds one and two:

	Round 1	Round 2
Number Infected	17	20

Graphs of the general infection patterns in rounds one and two

Data Tables for rounds two through six

Round	Percent Inoculated	Number Inoculated	Number Infected	Infected 1
2	0%	0	20	0
3	20%	4	16	4
4	40%	8	10	4
5	60%	12	8	0
6	80%	16	4	0

Graph of Data from rounds 2-6

DATA ANALYSIS:

I measured how many people were infected by people that had different cases of a disease. For instance one person would go around the room and infect everyone they came in contact with. The people who were infected did not spread the disease more. We took information and observations from that round. Then we did another round were the first three people to get infected would infect other people as well, as to relate to real life. The problem with this way is that in real life everyone that got infected ran the risk of infecting someone else. And we did not do that in our lab. Then our class added a number of people who were inoculated against that disease and took the information of how many were infected. We added more and more percent of the class to be inoculated and took observations and data from that round again. This helped me to better understand how diseases spread in real life. And it helped me to understand how to prevent diseases to spread.

I was surprised to discover what inoculated means. I was very surprised to discover how easily diseases spread. I was even more surprised to discover how much affect the percentage of the population that is inoculated has on the way diseases spread.

I took the information that I gained from doing the lab and plotted a graph to better understand the data. I noticed from my data tables and graph (and pointed out in my questions to consider) that the overall people who get sick decreases as the number of people who are inoculated decreases but when most of the population is inoculated the minority that are not inoculated have a larger chance if getting sick.

It would be interesting to conduct further research to find out if what I observed from my graph is true in real life.

It is worth noting that my hypothesis that the overall people who get sick decreases as the number of people who are inoculated decreases but when most of the population is inoculated the minority that are not inoculated have a larger chance if getting sick, may not be true because when I observed it in my graphs, the graphs were of data from a simulation that was not including all the possibilities of real life. Such as, it did not include the fact that every single person that had the disease would spread it.

QUESTIONS TO CONSIDER:

1 Which of the game rounds more realistically represents an epidemic? Explain.

I think that game round two was more like an epidemic because in an epidemic it is not one person distributing the virus but everyone who has the virus is distributing it.

2 How do different levels of inoculation affect how a virus spreads through a population?

If most of the population is inoculated then there is more of a chance that the people that aren't inoculated will get sick. This is because the people that are inoculated might carry the virus and just not know it, and this is bad because they could spread it to other people and not know it. They would spread it more than a person who was not inoculated because someone who is sick would not go through out there daily lives, thus not coming in contact with as many people as someone who is inoculated and has the disease would.

The overall people who get sick decreases as the number of people who are inoculated decreases but when most of the population is inoculated the minority that are not inoculated have a larger chance if getting sick.

3 How could you change the game to make it more realistic?

We could have the people that are sick from the virus be less exposed to people. And we could have the people who are inoculated spread the disease as well.

4 List any methods that might help prevent an epidemic from spreading.

Have a test taken on everyone including the people who are inoculated to see if they have the current virus that they were inoculated against to help prevent unknown spreading.
5 How do inoculations compare to other preventive measures, such as wearing
a mask or washing hands, when it comes to reducing infections?

The reason of inoculations is to reduce the number of people who get sick. It does not reduce spreading, washing hands or wearing masks reduces risk of spreading. So if your best bet is to get inoculated and wash your hands!

6 This activity represents one kind of model used in science teaching—a simulation of how a virus spreads. List some other examples of models used in science. Why do people use models?

I would have to say the reason of using models is to better understand the problem or event, or in this case spreading a virus. Other examples of models include: A volcano model and that's all I can think of.

CONCLUSION:

I learned what a virus is, I learned what an epidemic is, I learned how an infection spreads. And I learned some ways infections can spread. I was surprised to discover what inoculated means. I was very surprised to discover how easily diseases can spread. And I was even more surprised to discover how much affect the percentage of the population that is inoculated has on the way diseases spread. I found this lab very effective.

WEB LINKS:

www.pbs.org/wgbh/nova/sciencenow/3318/02.html
www.cdc.gov/flu/avian
www.who.int/csr/don/2004_01_15/en/