 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Determining how a virus is spread is crucial in preventing the spread of a virus. Finding patient zero, the first person known to become infected, is a critical part of this process. After scientists determine patient zero it can help them determine the origin of a virus and allow them to inform the public to prevent future infection.

In this activity, you will be simulating an outbreak and then figure out who was patient zero. You will receive a test tube or cup with simulated bodily fluids in it. One or more people in the room have bodily fluids that are infected. It could be you or someone else. To simulate how some viruses like SARS-CoV-2 (the virus that causes COVID-19) spread, you will use a pipette to exchange droplets from your test tube to another person’s test tube.

**Directions:**

1. Obtain a test tube or cup and a pipette from your teacher.
2. When directed by your teacher, you will move around the room and when told you will exchange 4 drops of simulated bodily fluids from your test tube to the other persons test tube.

-This simulates the exchanging of bodily fluids from a simple handshake, sneeze or cough.

1. Repeat until you have exchanged “bodily fluid” with 5 people.
2. When everyone is done you will take you test tube to your teacher to test whether you have become infected using a chemical indicator. If your sample turns pink, you are infected.

**Results (completed after you have been tested for the pathogen):**

Did you become infected? Yes or No

Who did you have contact with?

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The term used to describe the first person infected is “patient zero”. Working with your classmates, determine who you think patient zero is. Record your notes below. You may attach extra paper if needed.

Who did you determine to be patient zero? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Explain how you came to this conclusion?

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What challenges did you encounter when trying to determine “patient zero?”

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Why do you think it is important for scientists who study disease (epidemiologists) to determine patient zero?

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What can be done to help prevent the spread of infection?

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Research and answer the following questions from reliable sources. Record your sources if they are different from those that have been provided for you. We will discuss your responses.

Here are great sources to get you started:

<https://www.cdc.gov/coronavirus/2019-ncov/about/index.html>

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>

1. What is the Corona Virus Disease?
2. What are the symptoms?
3. What is the name of the virus that causes COVID-19?
4. What percentage of people who contract it die?
5. What percentage of people who contract influenza die?
6. What precautions could you take to prevent getting COVID-19?
7. What should you do if you think you have it COVID-19?
8. What questions do you still have about the COVID-19?

Teacher notes and Setup:

Recommended materials:

* Phenolphthalein indicator solution
  + To make the solution from powered you use .5 gram of powder phenolphthalein for 50ml of 95% ethanol (1g for 100ml) If the solution is pink add a diluted acid until the solution becomes clear and colorless.
* .1M NaOH (Sodium Hydroxide) or other base that will result in a positive test for phenolphthalein indicator solution
* Distilled water
* Test tube (recommend plastic) for each student
* Pipette for each student

Setup:

* Fill all except one test tube with 2ml-4ml distilled water. (Tap water may work but test it with the indicator solution to ensure it does not result in a positive test first.)
* Fill one test tube (patient zero) with 2ml-4ml sodium hydroxide.
* When you distribute the test tubes remember who patient zero is!
* You may choose to organize students into groups to solve the problem.

**Modifications:**

If you do not have the materials listed above, you can creatively substitute materials. For example, you may choose to use an acid for patient zero and an indicator like bromothymol blue or even pH strips to test each patient. Try to stay away from acid or bases that have a scent as they may be easily recognized by students.

**Increase the challenge:**

* Add two infected people from the start. This will only work with larger class sizes. Five exchanges with one patient has worked fine for classes as low as 18 and high a 30. For two infected patients I stick with my higher level (honors classes) and larger classes.
* Do not give students the handout until they are done. Then ask them to record the names of the people they interacted with. Many students will find it to be a challenging task to list the names even though it happened only minutes earlier. This helps students understand some of the challenges that come with identifying who people they encountered.