

 **Activity 8.1.1 Who Was Infected First?****Purpose**

A contagious disease spreads from a diseased animal to a healthy animal through direct or indirect contact. Contagious diseases spread quickly through a population. Depending upon the transmission of a disease the number of infected animals can grow in an exponential fashion. There are two main ways diseases are transmitted, direct and indirect contact. Direct contact is animal-to-animal contact. Indirect contact occurs in two ways, vectors and fomites. A vector is an agent, such as a mosquito, which spreads disease from one plant or animal to another. A fomite is an inanimate object that transmits a disease, such as a straw in a drink or a shared water trough.

To cure, treat, or prevent a disease, the carrier or first person infected may need to be identified. Epidemiologists study the spread of diseases to determine the initial carrier and how the disease was introduced to a population. Can you track the transmission of a disease to the first carrier?

Materials**Per student:**

- 1 cup mystery liquid
- Disposable gloves
- Safety goggles
- Lab apron
- Pencil
- *Agriscience Notebook*

Procedure

In this activity, you will study the spread of a disease. Your teacher will provide you with a cup of mystery liquid. One person's cup of liquid in the class will be infected and can spread the disease to others. You will first play the role of a potentially exposed or infected person, and then you will play the role of the epidemiologist studying the spread of the disease.

Safety Precautions:

- Wear all personal protective equipment provided.
- Do not drink or sniff the solution.
- Do not allow any solution to come into contact with your skin or clothing.
- Notify your teacher immediately if a spill occurs.
- If you splash liquid on yourself, immediately flush the affected area with water.

Part One – Transmission

1. Put on your personal protective equipment.
2. Obtain a cup of liquid from your teacher.
3. Your teacher will announce each exchange. DO NOT exchange solutions with the same person more than once.
4. **Exchange One** – Find one class member at random and exchange solutions. Take care to avoid contact, such as touching hands, with your classmate.
 - Pour the contents of one cup into the other.
 - Swirl gently.

- Pour one-half of the solution into the empty cup.
 - Use caution to avoid spilling any of the solution.
5. Record the name of your contact in Exchange One in Table 1 of *Activity 8.1.1 Student Worksheet*.
 6. **Exchange Two** – Find a different classmate at random and WAIT for your teacher to announce the exchange.
 7. Repeat the exchange process in Step 4.
 8. Record the name of your contact in Exchange Two in Table 1 of *Activity 8.1.1 Student Worksheet*.
 9. **Exchange Three** – Find a third contact that you have not exchanged with and WAIT for your teacher to announce the exchange.
 10. Repeat the exchange process in Step 4.
 11. Record the name of your contact in Exchange Three in Table 1 of *Activity 8.1.1 Student Worksheet*.
 12. Answer the prediction questions in *Activity 8.1.1 Student Worksheet*.

Part Two – Identify the Carrier

1. Your teacher will test you and your classmates for “infection.” Infected solutions will turn pink in color. Uninfected solutions will remain colorless.
2. If you are infected, record your name and your contacts on the board.
3. Record the class results in Table 2 of *Activity 8.1.1 Student Worksheet*.
4. Using the class results, try to trace who is the original carrier of the “disease”.
5. Draw a diagram in Table 3 that shows the transmission route of the disease through all three exchanges.
6. Your teacher will identify the original carrier.
7. Answer the Analysis Questions in *Activity 8.1.1 Student Worksheet*.

Conclusion

1. Why might the observed number of infected individuals be lower than the maximum possible?
2. What methods of disease transmission were not simulated by this model?
3. Suppose that instead of one contact per exchange, you exchanged as many times as you wanted during a specified time. What differences might be seen in the outcome?
4. If your exchanges had been at will as in Question 3, how would this change in rules affect your ability to trace the spread of the disease.
5. Based on what you have learned, what do you think public health officials do to help control the spread of infectious diseases?

Name: _____

Activity 8.1.1 Student Worksheet

Directions: Record your contacts and class data in the tables below. Answer the prediction and analysis questions when instructed to do so in your activity procedures.

Table 1. *Contacts*

Exchange	One	Two	Three
Contact			

Prediction Questions:

1. If one of your classmates had a highly contagious disease, predict how likely it is that you have caught the disease.

2. What is the maximum number of infected individuals possible after three rounds?

Table 2. *Determining the Path of Transmission*

Student	Contact One	Contact Two	Contact Three

Table 3. *Diagramming the Transmission Route*

Carrier:

Analysis Questions

1. How did the actual results compare with your predictions?
2. How many students became infected?
3. Was direct contact with the original carrier needed?
4. Identify the method this disease was transmitted.