

Mutation Nation



Overview:

The *Influenza – Mutation Nation* lesson is designed to encourage participants to practice habits that reduce the chance of contracting the influenza virus and transmitting it to friends and animals as well as habits that avoid the spread of the virus among their animals. This lesson features a hands-on component to help reinforce the idea of how the influenza virus mutates between species and how the virus spreads between individuals of a population.

Objectives:

After completing this activity, participants will be able to:

- ▶ Recognize influenza can be a zoonotic virus.
- ▶ Describe how influenza is passed between individuals and species.
- ▶ List methods for preventing the spread of influenza.

Skill Level:

Beginner to intermediate

Life Skills:

Critical thinking, problem solving, communication, personal safety and disease prevention

Setting:

An outdoor or indoor space where participants can easily hear; seating is optional

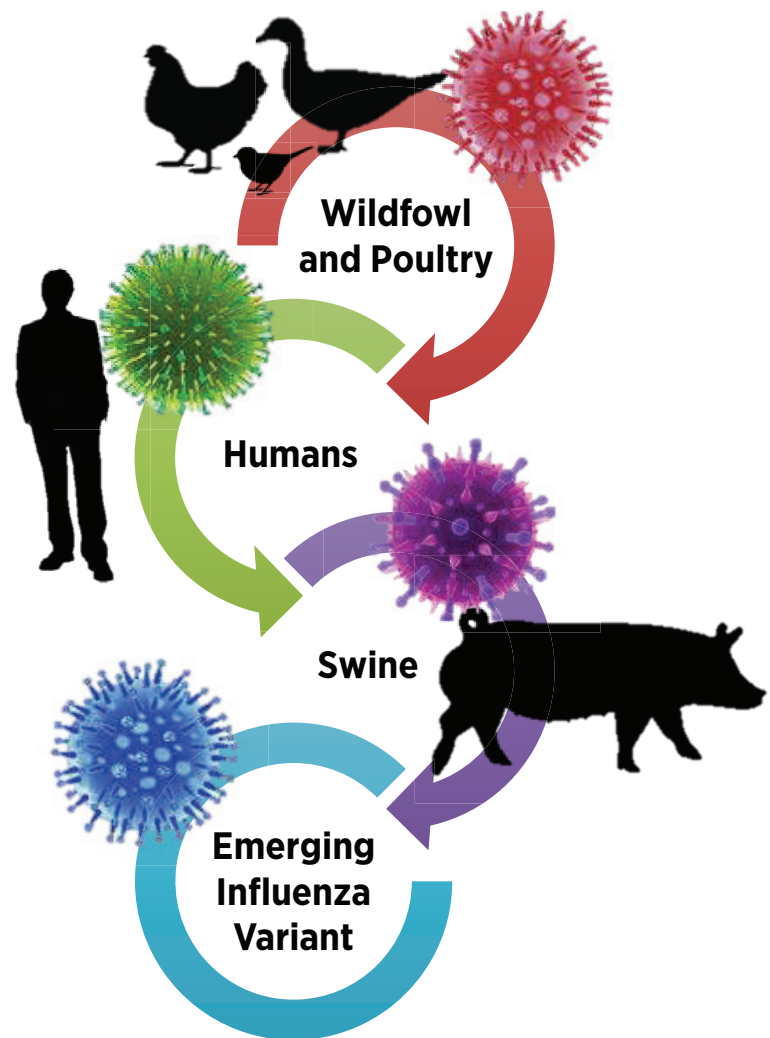
Time:

15–20 minutes

Materials:

- ❑ 5 *Influenza – Mutation Nation* message cards

Figure 1: The diagram illustrates an example of how the influenza virus can pass between species. Additionally, the color changes signify the different strains of the virus that are caused by mutations.



PROCEDURE:

Before the meeting:

1. Review the lesson and verify you have all the message cards.
2. If you do not have a prepared set of message cards, prepare them by cutting apart the cards provided at the end of this lesson.

Table 1. How the Influenza – Mutation Nation Message Cards Connect Concepts

Item	What it represents	How it relates to influenza
Message card	The initial influenza virus before it spreads and mutates	Influenza is a zoonotic disease that mutates to infect other species.
Participants	Animal vectors	Animal vectors can be infected with zoonotic viruses and transfer them to other species. Example: pigs, poultry (chickens and turkeys), waterfowl (ducks and geese), and humans

During the meeting:

1. Introduce the activity by reading aloud or paraphrasing the following:

Nearly every animal and human gets sick at some point in life. In humans, the flu, or influenza, is a common virus that often occurs seasonally. People usually think of it as something that happens in the winter, but outbreaks can happen throughout the year. When an individual animal contracts influenza, it can spread quickly through a herd or flock, but it can also spread from animal to human or human to animal. Influenza is a “zoonotic disease,” which means that it has the ability to spread between humans and animals. Influenza can spread through the air (sneezing or coughing), direct contact (touching), or contact with “fomites” (inanimate objects such as toys or food that can be contaminated by the virus).

You can follow a variety of management practices to help prevent the spread of influenza. Today, we’ll discuss some of the biosecurity measures you should follow. We will begin with an activity. Please line up in a single file line.

2. Have the participants arrange themselves in a single file line. Depending on the size of your group, you may wish to have as many as five sets of lines. Each line should have no more than ten participants. If your group is larger than 50 participants, read the same message to more than one line.

3. After participants line up, read aloud or paraphrase the following:

I am going to read the message on the card aloud to the first person in each line. Then the first person in line should then repeat the message to the next person

in line to the best of his or her ability. Then continue with the next person in line repeating what he or she heard to the next person until the message reaches the end of the line. Make sure that you speak softly so only the person you are giving the message to can hear you. You may not ask for the message to be repeated at any time during the activity. I ask that everyone be quiet until it is your turn to repeat the message you were just told.

4. Softly read the *Influenza – Mutation Nation* message card to the first person in each line. Make sure that the individual cannot read the message as you say it and that the person next to him or her cannot hear what you are saying. Have participants repeat the message down the line as instructed.
5. When the message reaches the end of the line, then have the last person in the line state what they heard.
6. Ask a person in approximately the middle of the line to repeat what they heard.
7. Ask the first person in line to repeat what they heard.
8. Read the *Influenza – Mutation Nation* message card to the group. If there were numerous lines, repeat steps 5-8 until all lines have shared the message they heard.

Participants will probably be surprised by the changes that occurred to the message. Ask participants the following questions:

- Why did the message change between individuals? (*couldn’t hear, too long to remember, larger words used*)
 - Did you intentionally change the message at all to make it easier to remember? If so, why? (*Answers may vary*)
9. Allow participants to return to where they were previously sitting or standing. Read aloud or paraphrase the following:

As you probably already know, messages change as they are repeated. “Viruses” are small infectious agents that can only reproduce inside the host cell they infect. Just like the message you repeated, these viruses can change from host to host to get past each species defense system, which is their immune system. As it was easier for you to change the message, viruses change to better fit the host they’re infecting. When the changes are made, this is considered a “mutation.”

If you think back to our activity, not only did the message spread as we instructed you to repeat the message to the person next to you, the message also changed, or mutated. At the same time, you served as a “vector,” transferring the message to each other, just as viruses are able to do. Animal vectors carry viruses and transfer them to other species.

10. Ask participants the following questions to reinforce understanding.

- Relating the activity to influenza, what could each of you represent? *(The animal vectors such as swine, poultry, waterfowl, humans or other species)*
- How can we relate this activity back to the spread of influenza between individuals and species? *(The influenza virus often mutates to allow it to get past each species defense system [immune system]. It can spread between individuals of a species by coming into contact with feeding surfaces, sleeping areas, drinking areas and shared equipment or toys.)*

11. Read aloud or paraphrase the following:

As a reminder, influenza is a common pathogen that can be found anywhere, such as around livestock or out in public. Prevention is the best strategy to reduce the risk of spreading influenza.

12. Ask participants the following questions to aid in understanding prevention strategies. If participants are not able to think of ideas, share the examples included.

- What are some ways that we can prevent the spread of influenza among **humans**? *(Wash your hands; clean common surfaces; disinfect; don’t share items such as hairbrushes, silverware or cups if someone is showing signs of illness; get vaccinations)*

- What are some ways that we can prevent the spread of influenza among **animals**? *(Separate new animals, wear different shoes or boots at the fair than you do around your own barn, ask questions about any animals you’re considering buying before you purchase them, disinfect equipment between animals, require all visitors to wear disposable boots you provide, wash your hands between working with uninfected and infected animals, disinfect common areas, separate sick animals from healthy animals, vaccinate your animals)*
- What are some ways that we can prevent the spread of influenza between **humans and animals**? *(Take advantage of vaccination programs for both livestock and ourselves, wearing different clothes when working with animals, wash hands with soap and water after working with animals, wash hands before eating, disinfect common areas, don’t trek barn boots through the house, don’t use animal equipment for humans, don’t eat around animals, stay home and away from animals when you are sick)*

13. Read aloud or paraphrase the following:

Humans need to be aware of their surroundings and take precautions to avoid viruses. The influenza virus reproduces and can mutate relatively quickly, so taking precautions is important to keep humans and animals safe and healthy. The immune system works by activating the natural defenses in a body to fight off infection. When a person or animal is vaccinated, it is exposed to a weakened version of the virus. This helps build an army of cells to better protect the body against invaders such as pathogens and viruses. Building “herd immunity” or where a majority of the “herd” (group of animals) is protected against the virus helps protect the entire population from becoming ill. Specifically, it helps individuals who are not vaccinated by decreasing their chances of coming into contact with the virus. The same approach is effective with human medicine. If able, it is important to get vaccinated and to vaccinate your animals to build up immunity to diseases. Keep in mind, there are factors that increase the chance of becoming severely ill and special attention should be taken with those at higher risk.

14. Ask participants the following questions. If participants are not able to think of ideas, share the examples included.
- What are some factors that make **humans** more susceptible to severe illness? (*Elderly, youth under the age of 5, pregnant women, those with pre-existing health conditions and other factors*)
 - What are some factors that make **animals** more susceptible to illness? (*Baby animals, those with previous illness or depressed immune systems, animals coming into contact with other animals, animals traveling to new or different environments frequently, older animals, those animals not on a routine health program and other factors*)

15. To summarize, read aloud or paraphrase the following:

By using the prevention strategies we've discussed, we can minimize the risk of spreading influenza to animals and humans. By cleaning and disinfecting areas and equipment, and separating new and sick animals, we can reduce exposure to viruses such as influenza.

Areas that the influenza virus can be more commonly found include animal facilities and equipment, public areas such as restrooms and cafeterias, and large gatherings of humans or animals. These areas should be regularly cleaned and disinfected. By using the strategies mentioned earlier, you too can help keep yourself and animals healthy. This not only ensures the safety of our animals and food supply, but of your community too.

TALKING IT OVER:

Ask the group the following questions.

- What prevention strategies can you put into place to reduce the risk of your 4-H animal projects coming into contact with the influenza virus?
- What disease prevention strategies can you help put into place at local fairs or other community events you attend or participate in?
- Why is it important for humans to consider animal well-being and health as they plan activities around animals?

ADAPTATIONS & EXTENSIONS:

For Older or More Experienced Participants:

- Have participants brainstorm a list of ways that they can help reduce health risks at local fairs, community events or other animal-related events. Then have participants research and prepare a presentation on the topic that they could share with the fair board or 4-H livestock/species-specific council.
- Challenge teen leaders to travel to younger participants' barns to help them find ways that they can reduce health risks. Have volunteers help younger members select one way and carry that out throughout the year.
- Add an additional sentence to each of the five *Influenza – Mutation Nation* message cards to increase the challenge of the activity.
- Use the five *Influenza – Mutation Nation* message cards to discuss in more detail ways influenza travels through a community.
- Discuss in detail the various strains of influenza and the impacts they have had on the agricultural community.
- Increase the spread of the message by having the first person in line tell one other person, the second person then tell two people, and the third person in line tell three people. Continue this through a larger audience.

For Younger or Less Experienced Participants:

- Inform participants why the message in the activity changed from the beginning of the line to the end. Discuss with participants why viruses are able to change so rapidly.
- Shorten the *Influenza – Mutation Nation* messages to only one sentence each or even part of a sentence so participants focus more on the outcome of the activity.
- Instead of using the message cards, the instructor will provide a stuffed animal that is lightly coated in flour; the stuffed animal will be passed among the participants as they share what animals they have at home. Participants can only speak if they have the designated stuffed animal in their hands. At the end of sharing, participants will have a light layer of flour on their hands. Discuss how contact with objects can spread viruses such as influenza. (Note: Make sure that no participants have an allergy to flour.)

ALIGNMENT TO SCIENCE AND ENGINEERING PRACTICES:

How 4-H Increases Science Literacy

Nationally and in Michigan, 4-H has long enjoyed a reputation for engaging young people in positive, experiential (hands-on), and nonformal activities that are inquiry-based. The lessons in the *4-H Animal Science Anywhere* series can be used to enhance classroom science education in Michigan and elsewhere. The lesson activities are aligned with the eight Scientific and Engineering Practices (SEP) from *A Framework for K-12 Science Education* (National Research Council, 2012, p. 42).

The Michigan State Board of Education adopted a set of new state science standards in late 2015 that are based on the SEP. The activities in the *4-H Animal Science Anywhere: Influenza — Mutation Nation* lesson were evaluated for their alignment with the SEP by Michigan State University Extension Educator Tracy D’Augustino in 2016.

Table 2. How This Lesson Aligns With the Science and Engineering Practices (National Research Council, 2012, p. 42)

Science & Engineering Practice	Action	Activity Step
1. Asking questions and defining problems	▶ Participants brainstorm vectors. ▶ Participants brainstorm what makes humans and animals more susceptible to viruses like influenza.	10 13-14
2. Developing and using models	▶ Participants pass a verbal message modeling how a virus such as influenza can spread and mutate. ▶ Participants talk about the limits of the model, helping them understand no model is 100 percent correct.	2-9 9-10
3. Planning and carrying out investigations		
4. Analyzing and interpreting data	▶ Participants discuss how important prevention methods are to reduce the risk of exposure to viruses like influenza.	12
5. Using mathematics and computational thinking		
6. Constructing explanations and designing solutions	▶ Participants obtain evidence from their discussion to answer what preventative strategies can be taken to reduce the spread of a virus. ▶ Participants explain how a virus can spread within a species and how it is able to spread across species. ▶ Participants communicate which individuals are more susceptible to virus in a population.	10, 12, 14, Talking It Over
7. Engaging in argument from evidence	▶ Participants explain the benefits of using preventative measures to keep their animals and community safe from viruses like influenza.	12, 14, Talking It Over
8. Obtaining, evaluating, and communicating information	▶ Throughout the lesson, participants learn about how and why viruses spread. ▶ Participants learn prevention strategies and can communicate with each other and with fair attendees why these strategies are important.	Whole lesson Talking It Over

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***Influenza – Mutation Nation* Message Cards**

Remember to always wash your hands before eating and drinking, especially if you have been around animals.

There are three types of influenza viruses. The types of the virus are categorized by the letters A, B and C.

When an animal becomes ill, separate them from the rest. This reduces the risk of spreading the illness.

Influenza is primarily a seasonal virus. Most outbreaks happen during the fall and winter.

The influenza virus mutates as it spreads between species. The most common species infected are humans, swine and birds.