



Why get vaccinated when the flu vaccine doesn't work well?

LESSON PLAN

Introduction

This lesson demonstrates the concept and importance of herd immunity. After introducing background information, it uses hands-on classroom activities (games) to illustrate how immunizations protect groups of people from vaccine-preventable diseases. The activities are followed by a reading assignment that consolidates the new information using real-world data.

Learning Objectives

After the lesson, the students should be able to:

- Explain what infectious diseases are and what causes them (viruses and bacteria) and list some examples (at a minimum influenza and measles).
- Understand that **humans are protected by our immune systems** (in particular, the antibodies produced by the white blood cells) and that **immunity can be created** by either recovering from a disease (natural immunity) or by vaccination (preventatively).
- Describe the concept of **herd immunity** using the following terms: disease, immune, vaccine, protect, and susceptible.
- List **reasons why people should get vaccinated**, why herd immunity is important, and why some people cannot or do not get immunized.

Key Terms

- Infectious disease
- Immune system
- Vaccine
- Virus, bacteria
- Antibodies
- Herd immunity

Time Requirement

- Minimum 2 class periods (could be on separate days).
- With extensions: up to 5 class periods.

Grade Level

Grades 2-8 (with adjustments)

Lesson Plan

1 GO OVER THE BASIC BACKGROUND INFORMATION

- What is an infectious disease? - A disease that can be transmitted from one person to another.
 - Discuss some examples (influenza/flu, tuberculosis, hepatitis, diphtheria, tetanus, pertussis, polio, measles, mumps, rubella, Rotavirus, rabies, Human Papilloma Virus/HPV)
 - Check the Wikipedia page for each disease and select photos that are not too gruesome (e.g. [Measles](#), [Rubella](#), [Polio](#))
- What causes infectious diseases? - Viruses or bacteria.
 - For higher-grade levels include the terms "pathogens" and "antigens."
- What is an immune system? - Focus on the white blood cells.
 - What is natural immunity? – The ability to resist/fight off infections.
 - Antibodies – produced by white blood cells.
 - The immune system “keeps a log” of past infections.
- We can create immunity by preventively administering vaccines made of weakened or dead pathogens.
- The catch: not everyone is/can be vaccinated - discuss some reasons why:
- Medical exemptions:
 - Acute illness - e.g. a person recently diagnosed with strep throat and taking medicine for it. This is temporary and the doctor will vaccinate after recovery.
 - Young age - for most vaccines, the baby has to be at least 2 months old. For some vaccines, the last shot (providing full immunity) is given as late as age 12.
 - Compromised immune system - e.g. a person undergoing cancer treatment.
 - Immunosuppressive therapy - e.g. taking medicines after an organ transplant.
 - Severe allergic reaction to a vaccine component during past vaccinations - incl. difficulty breathing, hives (very rare).
- Non-medical exemptions
 - Religious - some religions prohibit any medical interventions
 - Vaccine hesitancy - reluctance or refusal to be vaccinated or to have one's children vaccinated due to misconceptions and misinformation.
- Alongside the discussion, watch the video “[What are Vaccines and How do they Work?](#)” by Oregon State University Ecampus. You can ask a question, play part of the video, then pause it.
 - For lower-grade levels, you could do a puppet show instead of showing the video.

Duration 10-25 min, depending on grade level

2 HANDS-ON ACTIVITY/GAME

Activity 1

Key questions: How do diseases spread? How do vaccines protect?

- Have each student in the class randomly draw one of the red, blue, or green cards. Explain that students with red cards have an infectious disease (let them pick which one) that they can spread to other people; students with green have been vaccinated and are protected against infection with the disease; and those with blue cards have not been vaccinated and are not protected.
- Tell all students with red cards to remain in their seats. Students with green or blue cards should stand.
- Give a squishy ball to the students with a red card. Explain that when you tell them to start, they are allowed to throw the ball at anyone who is standing. Their goal is to hit the standing students in the torso (front or back). Explain that vaccinated students with green cards are protected and allowed to use their hands to deflect the ball to keep from getting hit on their torso. Unvaccinated students with blue cards are not protected and must keep their hands by their side. Any unvaccinated student who gets hit in the torso must sit down. They are now sick and should be given a squishy ball to throw. Vaccinated students who get hit should remain standing.
- Eventually, all students who were not vaccinated will get hit and have to sit, at which point they can receive a ball and throw it at anyone who is still standing (because now they are sick and can spread the disease).
- The number of sick people will be increasing. After each student has had a certain number of throws, the round stops. The number of throws can be varied according to the teacher to reflect disease specifics. A moderately contagious disease such as influenza could be represented by each sick student getting four throws. A highly contagious disease such as measles could be represented by each sick student getting 18 throws.

Duration 15-20 min, depending on the number of rounds

Activity 2

Key concept: herd immunity.

- In round 2, ask the students to think of ways the green-card holders (immunized students) can help protect the blue-card holders (unvaccinated students).
- Someone will likely figure out that they can protect them from the flying ball by physically stepping in front of the unvaccinated students and shielding them with their own immune system (by deflecting the ball with their hands).
 - After testing it a few times, they will realize that it works.
 - Point out that this is how herd immunity works in real life too.
- Ask what would happen if the proportion of vaccinated students decreased relative to the unvaccinated ones. Redistribute the color cards to reflect this scenario.
 - At some point, there won't be enough vaccinated students to protect the unvaccinated ones. At that moment it will be very likely for a blue-card holder to get hit. This point represents the threshold for herd immunity. (They don't have to know the term.)
- Back on the board, you can show some visualizations of these different scenarios (models):
 - The Guardian: [Watch how the measles outbreak spreads when kids get vaccinated – and when they don't](#)
 - The History of Vaccines: [Herd Immunity](#)

Duration 10-15 min, depending on the number of rounds

3 CONSOLIDATION: READING ASSIGNMENT

- Explain that scientists constantly research how to reduce the risk of infectious disease outbreaks in society.
- Give the influenza (flu) vaccine as an example - a new version of it is developed and produced each year to make sure it provides the maximum protection against the virus strands likely to be active that season.
- Explain that scientists write about their research findings in academic magazines and that they are about to read one of these articles (adapted from a real peer-reviewed journal).
- Individually or in groups, have the students read the article [Why get vaccinated when the flu vaccine doesn't work well?](#)
- Discuss as a class and make sure they understand the graphs.
- Answer the assessment questions at the end of the article (teacher's key available on the same page)

Duration 30-45 min, depending on reading level

Materials

- Soft squishy balls or small stuffed toys (for about half of the class size)
- Red, blue and green cards from the Appendix - print, cut and (optionally) laminated.
- Internet access and a projector to show photos, videos, and visualizations.
- Printed reading assignment from sciencejournalforkids.org/articles/why-get-vaccinated-when-the-flu-vaccine-doesnt-work-well

Writing Extension

Explain to the students that their parents have received a letter from your family doctor stating that they need to make an appointment to receive a meningococcal vaccination to protect against bacterial meningitis.

Tell the class that:

- This type of bacterial meningitis is spread among close contacts.
- Approximately one out of every 10 people who develop the disease will die.
- One out of every five who survive have serious and often permanent complications.

Then tell them that their parent replied:

- I don't have time to get the shot.
- I hate needles.
- I think I will just skip this vaccination.

Next, direct students to write a letter to their parents that explains why vaccinations are important for individuals and public health. The letters are expected to explain the concepts of immunizations and herd immunity in a way that indicates the students' knowledge of these concepts. Evaluate the letters for evidence of the students' understanding of the concepts.

Credit

Adapted from CDC's [Have You Heard About Herd Immunity?](#) Lesson Plan

