

Catch the Fever

INTEGRATED
CURRICULUM UNIT
ON COMMUNICABLE
DISEASES

UNIT
OVERVIEW



Catch the Fever

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UNIT OVERVIEW

Essential Question for This Unit

How has the development of society influenced the evolution of microorganisms?

Unit Summary

In this unit, students will explore the emergence and impact of communicable diseases on society. Students will investigate the role of microorganisms in causing disease. They will study the impact of a public health infrastructure, along with medical and pharmaceutical advances, on the evolution of microorganisms.

In Subunit 1, students learn about the emergence of disease in a population. In Health Science, students learn how microorganisms are transmitted, and how to avoid infection. They also examine their surroundings and possessions to discover that microorganisms can be found everywhere. In Biology, students learn about specific disease-causing pathogens, and how they can be treated. Students also explore how treatments can give rise to more dangerous forms of pathogens. Finally, students examine a mathematical model of disease in action and discuss how a more deadly pathogen does not equal the most successful pathogen.

Subunit 2 focuses on how society deals with the presence of communicable diseases. In Health Science, students participate in simulations in which they role-play the symptoms and diagnosis of common diseases while learning about and practicing common healthcare procedures. Students also examine the importance of vaccination and explore the concept of vaccinating populations. In Algebra I, they make calculations needed to manage the production of medications, and to administer medications to adult and pediatric patients. Finally, students research how various countries address the subject of communicable disease.

Detailed accounts of an epidemic can be a fascinating and informational resource. Students begin Subunit 3 by reading excerpts of *The Hot Zone*, an account of the 1989 Ebola outbreak in Virginia. Students also learn about the events contributing to past epidemics around the world, as well as the public reaction. Students conclude the unit by engaging in an in-depth research project on a specific infectious disease of their choice.

Culminating Event

Society has recently experienced several communicable disease scares: Avian Flu, SARS, resistant tuberculosis, and the list goes on. It seems a rare year when a new disease doesn't emerge on the world stage. Working in teams, students can research the background and impact of a specific communicable disease on human society and prepare a presentation. Students can also prepare a plan for their school or community to respond to an epidemic, including researching, evaluating, and revising existing plans, if any.

Key Questions/Issues

- What causes people to get ill? How can illness be prevented, how is it spread, and what can be done to treat it? (Biology and Health Science)
- What makes a successful virus? Why don't viruses evolve to be as deadly as possible? (Algebra I)
- How do healthcare practices influence the natural selection of microorganisms? How have public health efforts dealt with constantly changing humans and microorganisms? (Biology and Health Science)
- Do children receive different amounts of medication than adults? How can you figure out what is the right dosage? (Algebra I)
- Given constraints (e.g., production time and cost), how are optimization decisions made regarding the production of yearly vaccines? (Algebra I or Algebra II)
- What are some of the cures, remedies, or alternative nontraditional healing practices found within Hispanic cultures? (Spanish I)
- If everyone else is vaccinated, why is it important for me to be vaccinated as well? (Health Science)
- What major pandemics have occurred in the past? What events or circumstances contributed to these outbreaks? What could have been done differently in response to these pandemics? (English Language Arts and World History)

Learning Scenario to Kick Off the Unit

Every year without fail, it seems like there is a cold or flu virus that goes around the school. When the weather starts getting colder, someone gets sick, and soon all the teachers and students are sniffing and sneezing. As often as not, you (or one of your siblings) will carry the virus home and your parents will get sick as well. It wouldn't be so bad, except that your dad hates being sick. At the first sign of sniffles, he is off to the doctor. The doctor diagnoses your dad with a cold, and tells him to go home, drink lots of fluids, and he'll be feeling better in 5 or 6 days. Your dad wants a prescription for medication. The doctor tells him antibiotics won't do any good for a cold and sends him home. Two days later, still under the weather, your dad goes back to the doctor, insisting on medication. He argues that maybe the antibiotics will help, and even if they don't, at least they won't do any harm. Exasperated with your dad's persistence, the doctor writes him a prescription and your dad leaves happy. Four days later, he's feeling better, and he says it's all due to the prescription. Is your dad correct? Should the doctor have written him the prescription? Why or why not?

Biomedical/Healthcare and Education Partner Roles

- A school librarian/media specialist can assist the Biology, Health Science, and/or English Language

Arts instructors with teaching research skills, particularly in the use of print and other media resources.

- Invited speakers, such as public health specialists, epidemiologists, and/or microbiologists, can meet with students to discuss microorganism mutation and adaptation and the progression of disease-causing pathogens.
- Additional speakers to be invited to participate in the units and/or culminating event include:
 - Respiratory Therapist
 - Pulmonologist (physician who specializes in lung diseases)
 - Epidemiologist from a Health Department (local or state)
 - Pediatric Nurse Practitioner
 - Pediatrician
 - Medical Assistant
 - Pharmacist
 - Pharmacy Technician

SUBUNITS AND MAJOR TOPICS (ACROSS ACADEMIC AND TECHNICAL SUBJECT AREAS)

Subunit 1 Emergence of Disease

BIOLOGY · ALGEBRA I ·
HEALTH SCIENCE

- Infectious disease transmission
- Characteristics of viruses vs. bacteria and their role in infectious disease
- Mutation, genetic variation, and natural selection
- Co-evolution of organisms
- Artificial selection of microorganisms resulting from advances in medical treatment
- Direct and indirect relationships
- Rational expressions

Subunit 2 Dealing With Disease

HEALTH SCIENCE · ALGEBRA I OR II ·
SPANISH I · BIOLOGY

- Calculating percentages
- Setting up and solving single-variable equations from word problems
- Using linear programming to optimize a specific function within certain constraints
- Clinical epidemiology: identifying symptoms of infectious disease
- Vaccination and herd immunity
- Habits and behaviors contributing to the spread of disease
- Alternative medical practices in Spanish cultures

Subunit 3 Epidemic

ENGLISH LANGUAGE ARTS · WORLD
HISTORY

- Analysis of literature as a reflection of current societal issues
- Use of multimedia strategies for research on specific pathogen transmission and effects in the human body and general population
- Causes and impact of pandemics around the world
- Persuasive essay composition presenting a clear, evidence-supported perspective
- Composition and delivery of oral presentations for specific audiences