

A Study of Epidemiology

OBJECTIVE / RATIONALE

An understanding of epidemiology is important to the prevention and control of infectious diseases. The student will identify and describe the patterns of disease transmission in order to understand the potential effect on world population.

TEKS 121.15 4D, 6A, 7D
Algebra I 1B, 1D, 2D

TAKS ELA 1, 4
Mathematics 4, 5, 9, 10
Social Studies 5
Science 1

National Science Education Standards A9-12; C9-12; F9-12; G9-12

National Health Care Skills Standards .01, .02, .03, .05, .06, .07

National Curriculum Standards for School Mathematics S1; S5; S10; S11

KEY POINTS

Epidemiology Power Point Presentation

1. Epidemiology – the study of the occurrence, distribution, and transmission of diseases in humans.
2. Epidemiologist – A professional who studies patterns of disease occurrence.
3. Classification of outbreak
 - a. endemic – disease is native to a local region
 - b. epidemic – disease spreads to many individuals at the same time over many areas
 - c. pandemic – epidemics that affect large geographic regions
4. Factors influencing the spread of disease
 - a. nutrition
 - b. age
 - c. gender
 - d. sanitation practices
 - e. socioeconomic conditions
 - f. lifestyle
 - g. agent
5. Possible modes of transmission:
 - a. Contact
 - b. Droplets
 - c. Airborne
 - d. Food or water
 - e. Vector born
6. Prevention/Containment
 - a. vaccination

- b. infection control
- c. isolation

ACTIVITIES

- I. Complete the **Transmission of Pathogens Laboratory Investigation.**

MATERIALS / RESOURCES

Disposable pipettes with a bulb

Test tubes with lids

Phenolphthalein

0.001 M HCl (stock solution for noncarriers)

$(M_{\text{Concentrated HCl}} \times V_{\text{Concentrated HCl}} = M_{\text{Dilute HCl}} \times V_{\text{Dilute HCl}})$

0.1 M NaOH (stock solution of the carrier) (See above calculation to make NaOH)

Safety goggles

Lab apron

Gloves

Biohazard containers

Surface disinfectant

Paper towels

http://Who.int/home/map_ht.html

<http://library.thinkquest.org/11170/main.html>

<http://www.discovery.com/stories/history/blackdeath/blackdeath.html>

<http://www.cdc.gov/excite/>

ASSESSMENT

Laboratory Investigation Rubric

ACCOMODATIONS

For reinforcement, the student will develop a time line about a communicable disease. Include contamination, incubation, signs and symptoms, diagnosis, prognosis and treatment.

For enrichment, the student will research and report on a disease that threatens world health. **World Health Issue Guidelines.**

REFLECTIONS

Transmission of Pathogens

Purpose:

In this lab you will show how a disease may be spread throughout a population. One student will be the original carrier of a “disease.” This disease is perfectly harmless, if handled properly. You will carry it in a test tube, rather than in your body. The original carrier will make contact with several students in the class who will then make contact with others. All the students will be tested to see who has become infected.

Background Information:

Materials:

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Procedure:

Strong acids and bases can cause bad burns especially eye membranes. They can also damage clothing, floor tiles, tables, etc. Therefore, strong acids and bases must be handled carefully and all safety precautions must be followed.

Phenolphthalein is a pH indicator that turns red or pink in the presence of a basic solution.

1. Wash hands and put on gloves and goggles.
2. Assemble equipment and materials.
3. Prepare work area.
4. Choose a partner at random.
5. Remove one pipette full of solution from your test tube and empty it into your partner's. Repeat for partner.
6. Place the lid on your test tube and gently invert the test tube several times.

7. In the data table (Round 1) record the name of the person with whom solutions were exchanged.
8. Repeat steps 4 – 7, two more times each time with a different partner.
9. When solutions have been exchanged solutions with three different partners, add a few drops of phenolphthalein to your test tube to see if you are “infected” with the “disease.” If the solution turns red you are “infected”. If the solution remains clear, you are “not infected”.
10. Complete the class data table using information from others in your class.
11. Wash all test tubes and caps thoroughly with soap and water. Rinse thoroughly.
12. Return all stock solutions to their proper location in the lab.
13. Clean work area with surface disinfectant. Remove goggles and gloves and wash hands.

Data:

Complete the Data Table.

1. Using an asterisk (*), mark those students’ names in the data table whose test tube solutions turned red (positive).
2. Trace the transmission of the infection to each student testing positive. Can you determine who the original carrier was? Add a drop of phenolphthalein to the stock solutions to see if you are right.)
3. Trace the transmission to see who infected you.

Conclusion:

1. What is the maximum number of people that could test positive after three rounds of contact?
2. How many rounds would it take for everyone in the class to become “infected”?
3. Was there any outward indication of those who were “infected”?
4. Explain why the lack of outward signs of disease could be so dangerous.
5. Predict how a transmission could be prevented.

World Health Issue Guidelines

The following information should be included in an oral presentation:

- 1. Origin and history of disease**
- 2. Description of disease**
 - a. Transmission**
 - b. Signs**
 - c. Symptoms**
 - d. Stages**
 - e. Treatment**
 - f. Prognosis**
- 3. How specific factors contribute to disease**
 - a. Age**
 - b. Gender**
 - c. Environment**
 - d. Lifestyles**
 - e. Heredity**
- 4. Current research and findings**
- 5. A prediction of the future outbreaks of disease and possible interventions**
- 6. At least one visual aid relating to disease**