Unit 5 Learning Objectives

Preface

The medical examiner who performed Anna Garcia's autopsy pulled copies of Anna's medical records before proceeding with the autopsy. Interestingly, the medical examiner discovered that Anna had been hospitalized just ten days prior to her death for a sickle cell crisis and subsequently was treated for an infection that was most likely acquired during her hospital stay. The medical examiner then noted that a page of the medical history is missing. Throughout this lesson, students will play the role of medical detectives in order to investigate Anna's mystery infection. Ultimately, they will need to identify the exact *pathogen*, or infectious agent, responsible for Anna's illness.

In this lesson students will demonstrate the transmission of an unknown infectious agent from person to person and use deductive reasoning to determine "patient zero," the initial patient in the population to develop the infection. They will investigate a variety of diseases caused by infectious agents and use this information to determine the tests needed to fill in the missing pieces from Anna's medical history. They will use aseptic technique to isolate bacterial colonies from four samples, including Anna's, and then complete a gross examination of the colonies from Anna's sample. They will create bacterial smears on microscope slides and perform a Gram stain on three types of bacteria, including the bacteria isolated from Anna's sample. They will look at the stained samples under the microscope and identify the morphology of the bacteria as well as whether the bacteria are Gram positive or Gram negative. They will use biochemical test results and bacteria identification flowcharts to identify the unknown bacterial species infecting Anna. And finally, they will design a board game or a children's book that showcases how the immune system works to fight infection.

Understandings

1. Infectious diseases are caused by infectious agents and are transmitted in a variety of manners.
2. Aseptic technique assures that contaminants are not introduced into a specimen and that infectious agents are not spread to people or laboratory surfaces.
3. Bacteria are characterized by their shape, colony morphology, metabolism, and reaction to the Gram stain.
4. The specific structures of the immune system function to protect the human body against foreign invaders.

Knowledge and Skills

It is expected that students will:

- Describe the mode of transmission and mode of reproduction of various infectious agents.
- Describe the prevention of and treatment for various infectious agents.
- Identify the basic structures of a bacterial cell.
- Describe how the immune system responds when an antigen enters the body.
- Demonstrate the transmission of a simulated infectious agent.
- Compare and contrast the biology and pathology of various infectious agents.
- Use proper aseptic technique to isolate bacterial colonies.
- Perform a gross examination of bacterial colonies to differentiate an unknown bacterial sample.
- Use proper Gram staining and microscope techniques to stain, observe, and classify bacteria.
- Chemically examine and identify unknown bacteria.

Essential Questions

1. How are infectious diseases spread through a population?
2. What is aseptic technique?
3. How can an unknown sample of bacteria be identified?
4. How does the immune system function to protect the human body from foreign invaders?