



NSF Engineering Research Center

This lesson plan was created by a teacher participating in the Research Experiences for Teachers (RET) program from the Precision Microbiome Engineering Research Center. Are you interested in spending part of your summer in a lab getting paid to do microbiome research and create lesson plans?

Learn more here: <https://premier-microbiome.org/for-teachers-ret/>

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## 3rd Grade Science Lesson Plan: “Who Made Them Sick?” – Exploring Hospital-Acquired Infections

**Lesson Format:** 5E Instructional Model

**Duration:** 1 hour 30 minutes or two day 45 minute lessons

**Topic:** Pathogens and Hospital-Acquired Infections (HAIs)

**Big Idea:** Sometimes patients get new infections while staying in hospitals. Scientists can use DNA clues to find out what caused the infection.

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### Learning Objective:

I can analyze patient symptoms and DNA clues to figure out what germ (pathogen) made someone sick while they were in the hospital.

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### 5E Breakdown

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#### 1. Engage (15 minutes)

**Objective:** Spark curiosity and connect to real-life.

**Activity:**

- Begin with a question: “**Have you ever been to a hospital or visited someone there?**”
- Review Precautions that hospitals take to keep patients from acquiring Hospital Acquired Infection.
  - Have students brainstorm ways that hospitals can protect patients from acquiring HAI.
  - Show video on ways hospitals take precautions to protect patients from HAI.
- Ask: “**How do doctors know what made someone sick?**”
- Show pictures of bacteria and viruses. Briefly explain that germs can live in hospitals and sometimes spread.

- Show video on [Amoeba Sisters bacteria](#) and [Amoeba Sisters Viruses](#)
- Model how to use BLAST online DNA tool [BLAST](#)

## 2. Explore (15 minutes)

**Objective:** Students investigate scenarios and gather data.

**Activity:**

- Divide class into 6 small groups. Each group will:
  - Through a gallery walk, each group will rotate around the room and examine patient scenarios/cases and highlight the new symptoms that showed up after the patient had been in the hospital.
  - Students will use BLAST to identify pathogens from DNA sequences. Then, research possible pathogens using clue cards and KidsHealth.org.
  - Document findings in graphic organizer.

## 3. Explain (15 minutes)

**Objective:** Students share findings and make claims using evidence.

**Activity:**

- Each group presents:
  - Who their patient is
  - The new symptoms
  - The germ they think made them sick (and if it's a virus or bacteria)
  - How they figured it out (DNA clue + symptoms + research)
- The teacher helps clarify concepts (e.g., difference between bacteria and viruses, why we wash hands, how DNA helps scientists).

## 4. Elaborate (30 minutes)

**Objective:** Apply understanding to new or broader contexts.

**Activity:**

- Ask: **“How can hospitals stop germs from spreading?”**
- Brainstorm ideas (e.g., handwashing, gloves, masks, cleaning tools).
- Engineering creative task: Create a “Germ-Fighting Superhero” and what powers they’d need to stop infections in hospitals.
- As a group students will share their “Germ-Fighting Superhero” and discuss what powers their “Germ-Fighting Superhero” has to stop pathogens in the hospital.
- Students can use a variety of supplies and tools to create a superhero (construction paper, card board, recycled items, etc.) They may also use technology to create a “Germ-Fighting Superhero” such as Apple Freeform, Keynote, 3D printing or Google slides or any other online digital platform.
- [Germ Buster Super Hero Engineering.pdf](#)

## 5. Evaluate (15 minutes)

**Objective:** Assess understanding of pathogens, evidence use, and classification.

**Activity:**

- Complete critical thinking questions
- Students complete an **exit ticket**:
  - One thing I learned about germs: \_\_\_\_\_
  - A symptom that shows someone is sick: \_\_\_\_\_
  - Was the germ in our case a bacteria or a virus?
  - The main organ that protects us the most is?
  - How did I use clues to figure it out?

## Materials

- [APK: Questions, Vocabulary, scenarios](#)
- [Patient Scenarios PPT](#)
- [HAI Scenarios and BLAST Graphic Organizer](#)
- [Teacher copy Patient scenarios](#)
- [HAI Scenarios, DNA Sequencing Cards](#)
- Printed or digital **research guides** from [Kids Health](#) (e.g., on UTI, pneumonia, MRSA, norovirus)
- BLAST online DNA tool [BLAST](#)
- Laptops/tablets (optional)
- [Graphic Organizer](#)
- [Critical Thinking Questions](#)
- [Canva](#)
- [Super Hero Engineering Activity](#)
- Markers, chart paper (for presentations or superhero activity)

## Differentiation

- **Support:** Provide symptom glossary or highlight key parts in scenarios. Pair readers with helpers.
- **Challenge:** Let advanced students explore what DNA stands for or learn a real pathogen name like *Klebsiella*.

## **Assessment (Formative)**

- Participation in group work and presentation
- Completed [Graphic Organizer](#) and exit ticket
- Verbal explanations during sharing
- [Critical Thinking Questions](#)
- [Rubric](#)

## **Extension Activity (optional)**

### **Careers in Science**

- Discuss genetic engineering and microbiology. Show students videos on genetic engineering and microbiology.
- Invite a Genetic Engineer to speak to students about the job of a genetic engineer.
- Invite a Microbiologist to speak to students about the job of a microbiologist.