Blizzard Bag #1

Read through Worksheet **Vocabulary: “Fighting Invisible Killers”**

Read the article titled “Fighting Invisible Killers” (Paying Attention to graphics and captions)

Complete the Following, Attached Worksheets that go with the Article. Please use complete sentences where appropriate

  - Vocabulary Practice: “Fighting Invisible Killers”
  - “Fighting Invisible Killers” Quiz
**Vocabulary: "Fighting Invisible Killers"**

**Directions:** Read the following definitions and example sentences. Then add two more words from the article.

1. **trench (trench) noun:** a long, narrow ditch, either in the ground or in the ocean floor  
   **example:** We dug a six-inch-deep trench in the garden for the tomato plants.

2. **crucial (KROO-shuhl) adjective:** extremely important or necessary  
   **example:** The senator's support is crucial to getting this bill passed.

3. **deteriorate (dih-TEER-ee-uh-reyt) verb:** to become or make worse  
   **example:** This used to be one of my favorite restaurants, but the food has really deteriorated.

4. **administer (ad-MIN-uh-stur) verb:** 1. to manage or supervise; 2. to give something to someone  
   **example 1:** The mayor appointed an official to administer the new bike-safety program.  
   **example 2:** The nurse administered David's medicine at the same time each day.

5. **infectious (in-FEK-shuhss) adjective:** 1. able to be passed from person to person by germs; 2. capable of spreading easily  
   **example 1:** The doctor said that Julian had contracted an infectious disease, probably by coming in contact with sick people in the hospital.  
   **example 2:** The happy mood was infectious, and soon all of the guests were smiling.

6. **traumatic (truh-MAT-ik) adjective:** 1. relating to or describing serious injury or shock to the body; 2. emotionally shocking and deeply upsetting  
   **example 1:** Katy suffered a traumatic injury in the car accident and had to be rushed to the hospital.  
   **example 2:** The death of a loved one is an example of a traumatic experience.

7. **obliterate (uh-BLIT-uh-reyt) verb:** destroy completely  
   **example:** The massive tsunami obliterated the coastal towns. There was nothing left of them.

8. __________________ (________________) ___________________________________________________  
   **example:** ____________________ (________________) ________________________________________

9. __________________ (________________) ___________________________________________________  
   **example:** ____________________ (________________) ________________________________________
Deadly bacteria are lurking in hospitals, playgrounds, malls, and parks, infecting millions of people. Can we stop them before it's too late?

By Kristin Lewis

In May 2011, 11-year-old Addie Rerecich was attacked by a monster. No, this monster was not a ferocious animal. In fact, it was invisible to the naked eye. But it was one of the most dangerous killers in the world today.

Addie was attacked by a kind of bacteria that for years has given doctors nightmares. It's called methicillin-resistant Staphylococcus aureus, or MRSA.

And it was slowly poisoning her from the inside out.
The Nightmare
Addie's nightmare started when she developed an ache in her hip. At first, she and her mom, Tonya, chalked it up to a strain from softball practice. But then Addie's temperature spiked to 103 degrees. Doctors concluded that she had a virus. They said she should rest and follow up in a few days.

But Addie didn't get better. She got worse—a lot worse.

Two days later, Addie's pain had become so unbearable that she couldn't sleep. Tonya rushed her to a hospital in their hometown of Tucson, Arizona, that specializes in treating children. There, doctors tested Addie's blood and discovered that she was infected with MRSA. They suspected that it had entered her body through her hip, though no outside injury was visible. Now the brutal infection was coursing through her bloodstream.

Addie was rushed into the intensive care unit, where doctors and nurses scrambled to help her. MRSA can be one of the most dangerous and contagious infections. Some people can fight it off, but for others, particularly the elderly and sick, MRSA can be lethal.

MRSA is called a superbug because many medicines used to treat infections don't work on it. In the U.S., more than 2 million people get some kind of superbug every year, according to a new report by the Centers for Disease Control and Prevention. Superbugs threaten everyone—young and old, healthy and sick—and kill at least 23,000 people every year.

Addie was in for a terrifying fight against MRSA—and it was just beginning.

Age-Old Problem
Bacteria are microscopic organisms that are too small to see or feel. There are 5 million trillion bacteria on Earth, and they are literally everywhere, from the top of Mount Everest to the deepest trench in the Pacific Ocean. You are surrounded by them right now, and your body is filled with them. The majority of bacteria are harmless. Many are actually crucial to our survival, like the bacteria that line our intestines and help us digest our food.

Some types of bacteria, though, make us sick. Until the 20th century, bacterial infections were a leading cause of death around the world. That's because there were few medicines to treat them. People routinely died of strep throat or even mild cuts that became infected. By the 1900s, for example, the Black Death, caused by the bacterium Yersinia pestis, had killed more than 200 million people.

**KILLERS THROUGH TIME**
And How We Stop Them

**BLACK DEATH**
(Yersinia pestis)
SYMPTOMS: fever, vomiting, coughing, swollen lymph nodes, tissue that blackens and dies
HOW IT SPREADS: bites from fleas living on infected rats and through the air
HOW WE FIGHT IT: antibiotics

At the height of the Black Death in the 14th century, at least a third of Europe's population was wiped out. Today, the disease is easily treated with antibiotics, and infections are extremely rare.
An Accidental Medicine

Human history changed on the morning of September 3, 1928—and it happened by accident.

A Scottish scientist named Alexander Fleming was cleaning his laboratory. For years, he had been searching—unsuccessfully—for a cure to infection. While organizing some glass plates he had coated with Staphylococcus, he noticed something odd. Some mold had grown on one of the plates (he was notoriously messy), and there were no bacteria on or near the mold.

Was there something in that mold that was killing bacteria? Fleming wondered.

It turned out that the mold was producing an incredible substance called penicillin. It would be the world’s first antibiotic.

Suddenly, the world had become a much safer place.

Antibiotics—medicines that destroy or slow down the growth of bacteria—were called wonder drugs. This was not an exaggeration. During World War II, penicillin saved hundreds of thousands of injured troops. Killer diseases were now survivable. Surgeries to fix everything from broken bones to failing kidneys became more common, because antibiotics prevented the fatal infections that would have likely followed.

For the next 50 years, antibiotics continued to open doors to incredible life-saving procedures. Organ transplants, chemotherapy for cancer patients, heart surgery—none of these would be as safe without antibiotics.

By the 1950s, doctors were handing out antibiotics like candy. The drugs were being prescribed to treat all kinds of sickness, whether caused by bacteria or not. Over time, even better antibiotics were developed, and their uses continued to expand. Farmers began giving them to cows, pigs, and other livestock to prevent, rather than treat, illness, and to make the animals grow larger.

What few people realized was that there was a consequence to the overuse of antibiotics. Some bacteria were fighting back, and they were getting stronger.

Preparing for the Worst

Within 24 hours of being admitted to the hospital, Addie’s condition had deteriorated. Tiny infected boils erupted on her skin. Fluid filled her lungs. She was put on a machine that breathed for her, giving her lungs time to heal.

But in a horrifying turn of events, hiding inside that machine was another kind of superbug. It is called Stenotrophomonas maltophilia, and it is even worse than MRSA.

Immediately, doctors administered another antibiotic, and Addie started to get better. Then the antibiotic stopped working and the infection came back. So doctors started Addie on a different drug. Then that one stopped working too.

This went on for several agonizing weeks until finally there were no antibiotics left to try. Doctors told Tonya to prepare for the worst.

The War on Superbugs

How could the bacteria inside Addie resist the medicines that once killed them?

Bacteria, it turns out, are smart—and resilient. Every time they encounter an antibiotic, they “learn” a little bit more about how to beat it. Over time, bacteria come up with ways to defend themselves. They build thick armor around their cells. They develop scissorlike arms that can stop medicines in their tracks. They can even pass on their
**E. COLI**

*(Escherichia coli)*

**SYMPTOMS:** diarrhea, cramps, nausea, vomiting, fever

**HOW IT SPREADS:** food and drink, especially meat, poultry, and dairy

**HOW WE FIGHT IT:** pasteurization

Good hygiene slowed e. coli down. So did pasteurization, a process invented by 19th-century scientist Louis Pasteur. (Thanks, Louis!) Milk is heated, then cooled, killing off harmful bacteria. Today in the U.S., all dairy products must be pasteurized. Sadly, a resistant form of e. coli is being reported.

Drug resistance, teaching other, weaker bacteria how to be strong too.

Does this mean the superbugs are going to win? Not if scientists like Dr. Helen Boucher can help it.

Dr. Boucher is an infectious disease specialist at Tufts Medical Center in Boston and one of a growing number of doctors and scientists who are working hard to stop the spread of superbugs.

Boucher warns that as antibiotics stop working, our world could start to look like it did before Alexander Fleming discovered penicillin, when a minor cut could kill within days. Common medical procedures could again be too risky to perform. Millions could die of infections that were once easily treated.

The good news is that we can stop this from happening—if we act now. According to Boucher, the best way to fight superbugs is to prevent infection in the first place. Because superbugs can travel around on your skin (they usually won’t make you sick unless they get inside your body), you can pass them to other people without ever knowing. Regularly washing your hands for at least 30 seconds with soap and water can help prevent that.

Just as important? Take antibiotics only when you really need them. And when you do take them, make sure you take the entire prescription. Don’t stop after you start feeling better. (Even if your symptoms are gone, you may still have bacteria inside you that can grow and multiply.) The CDC estimates that half of all antibiotics taken in the U.S. are unnecessary or used inappropriately. And the more antibiotics we take, the more resistant bacteria become. That’s why in places where antibiotics are used most—such as hospitals—bacteria seem to be the strongest.

The bacteria inside Addie were some of the strongest in the world.

**The Last Resort**

Addie’s condition continued to worsen. She developed more infections from drug-resistant superbugs that tend to

flourish in hospitals. Doctors said her lungs were damaged beyond repair. Yet her mom refused to give up. What Addie needed, Tonya realized, was a new set of lungs. “I went on the Internet at 3 a.m. and started researching transplants,” Tonya said. She found a doctor she thought could do the surgery, Dr. Michael J. Moulton, the surgical director of lung transplantation at the University of Arizona’s Medical Center in Boston and one of a growing number of doctors and scientists who are working hard to stop the spread of superbugs.

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Center-University Campus. "I knew I had to get to him somehow. I felt like if he could come and meet her, he'd see the life in this child. She'd come through a war covered in scars but intact."

Moulton agreed to see Addie, and Tonya tried not to get her hopes up. But to her relief, Moulton said he thought he could help Addie. First, though, doctors needed to deal with all the resistant bacteria inside Addie. Otherwise there was little chance she could survive a procedure as traumatic as a lung transplant.

Turns out, there was one more antibiotic they could try after all. It is rarely used because it can seriously harm organs. It's a last-resort antibiotic, basically poison. Tonya believed that if there was even a glimmer of hope that Addie's life could be saved, the risk was worth it.

After doctors administered the antibiotic, Tonya and Addie received the best news they'd had in months: The bacteria were being obliterated.

On September 8, 2011, Addie received a pair of lungs.

**Time to Act**

It's been two years since the lung transplant, and Addie, for now, is out of danger. Her new lungs are fragile, and she is still recovering her strength. But she is moving forward with her life, and eager for her mom to share her story.

Tonya has become a crusader against superbugs, working with the Infectious Diseases Society of America to get the word out. She is especially passionate about the importance of developing new antibiotics capable of killing superbugs. One challenge is that most big drug companies have stopped working on new antibiotics because they are so costly and time consuming to develop. It can take as much as a billion dollars to get a new drug to patients.

But the situation is not hopeless. Last October, the CDC sounded the alarm. They are working on ways to make it easier for companies to develop new antibiotics and get them to patients who need them most. They are ranking superbugs by threat level. They also want to better track where infections occur, so scientists can develop treatments more quickly.

And that is good news. "We need to take steps now to ensure we are able to more effectively battle these infections in the future," Tonya urges. "My family and I pray every day that no one else will have to experience what Addie has gone through."

Addie's mom, Tonya, brings Addie home from the hospital.

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**WRITING CONTEST**

Doctors and scientists are working hard to stop superbugs. But they aren't the only ones who can help. Write an essay explaining three ways you can help in the fight against superbugs. Use text evidence in your response. Send your essay to SUPERBUGS CONTEST.

Five winners will each receive a copy of *Invincible Microbe* by Jim Murphy.
Vocabulary Practice: "Fighting Invisible Killers"

Directions: In each row, cross out the word that does not belong.

1. conduct  neglect  administer  manage
2. contagious  infectious  harmless  transmittable
3. thrive  grow  flourish  deteriorate
4. unimportant  necessary  vital  crucial
5. groove  trench  pit  hill
6. shocking  traumatic  calming  alarming
7. crush  create  obliterate  wreck

Directions: Complete the sentences using a form of the vocabulary words listed in the Word Bank. You will use each word once.

WORD BANK

<table>
<thead>
<tr>
<th>administer</th>
<th>deteriorate</th>
<th>obliterate</th>
<th>trench</th>
</tr>
</thead>
<tbody>
<tr>
<td>crucial</td>
<td>infectious</td>
<td>traumatic</td>
<td></td>
</tr>
</tbody>
</table>

8. Chickenpox is a/an __________ disease. When one kid gets it, it’s pretty much guaranteed that a whole bunch of his or her classmates are going to get it too.

9. The goats got loose and __________ my vegetable garden. They ate everything!

10. The tornado left massive destruction in its wake. It was a __________ event for the community.

11. The patient’s condition __________, so her doctors called in an expert.

12. There was a __________ alongside the road to collect rainwater.

13. “It’s important to __________ the medicine to Mr. Bones every morning and night,” said the vet.

14. Adequate water and sunshine are __________ to the survival of plants.
"Fighting Invisible Killers" Quiz

Directions: Read "Fighting Invisible Killers." Then answer the multiple-choice questions below.

1. What is a central idea of the article?
   A) Superbugs are causing a crisis that must be addressed.
   B) Penicillin changed the world.
   C) Bacteria are mostly good for you.
   D) Tonya Rerecich refused to give up on her daughter.

2. Which line best supports this central idea?
   A) "Addie was in for a terrifying fight against MRSA—and it was just beginning."
   B) "Almost overnight, the world became a safer place."
   C) "In the U.S., more than 2 million people get some kind of superbug every year."
   D) "It turns out bacteria are smart—and resilient."

3. Select the best definition of superbug.
   A) a microscopic organism that lines the intestines
   B) a type of bacteria that is highly contagious and resistant to most medicines
   C) a disease that requires an organ transplant
   D) an infection that starts in your hip

4. Which of the following was NOT an effect of the discovery of antibiotics?
   A) People began to survive infections that were once deadly.
   B) Doctors were able to perform more surgeries.
   C) Scientists discovered a cure for MRSA.
   D) Some bacteria began to grow stronger.

5. The poster on page 7 supports which idea from the article?
   A) Today's antibiotics are losing their power.
   B) Alexander Fleming was a great man.
   C) World War II was a terrifying period in history.
   D) The discovery of antibiotics changed the world.

6. Context clues reveal that a "last resort" is
   A) something that is usually poisonous.
   B) a depressing situation.
   C) a powerful and risky medication.
   D) a course of action taken only if all other options have failed.

7. Which best supports the idea that you should take antibiotics only when you need them?
   A) "The bacteria inside Addie were some of the strongest in the world."
   B) "It's a last-resort antibiotic, basically poison."
   C) "By the 1950s, doctors were handing out antibiotics like candy."
   D) "The more antibiotics we take, the more resistant bacteria become."

8. With which statement would the author most likely disagree?
   A) It's important to post signs in public places reminding people to wash their hands.
   B) If you start sneezing, ask your doctor for antibiotics immediately.
   C) Pasteurization has saved lives.
   D) We need to fund research into new antibiotics.