

Germs – Viruses and Bacteria

Reading Bundle

20 Case Study Comprehension Articles

Grade 8 and Up

Bacterial Infections Case Studies – Part 2



Diphtheria Bacterial Infection Case Study:
Diphtheria is a serious bacterial infection caused by the *Corynebacterium diphtheriae* bacterium. It is spread through respiratory droplets or contact with infected individuals or objects. Diphtheria affects the throat and can also cause damage to the heart, nervous system, and kidneys. The disease was once a leading cause of death among children, but it is now rare in developed countries due to the availability of effective vaccines.

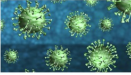
Symptoms:
Symptoms of diphtheria usually appear 2-5 days after exposure to the bacteria. The first symptoms are cold and sore throat, a sore throat, fever, and fatigue. As the disease progresses, a gray or white coating may form on the inside, throat, and/or neck passages, making it difficult to breathe and swallow. In severe cases, diphtheria can lead to heart failure, paralysis, and even death.

Prevention:
Diphtheria can be prevented through vaccination. The DTaP vaccine, which includes protection against diphtheria, tetanus, and pertussis, is given to children in a series of shots between the ages of 2 months and 6 years. Adults who have not been vaccinated or whose immunity has worn off should receive a booster shot.

Treatment:
In the case of an infection, diphtheria is treated with antibiotics and antitoxins. Patients may also require mechanical and respiratory support.

Case Study Summary:
James is a 12-year-old girl who has been experiencing a sore throat and fatigue for a few days. Her parents took her to the doctor, who indicated a gray coating on her throat and throat. The doctor diagnosed diphtheria and prescribed a series of shots. The family continued the prevention of diphtheria by ensuring James had the necessary vaccinations. James was admitted to the hospital for treatment with antibiotics and antitoxins.

Common Virus Case Studies



Influenza Virus Case Study:
The influenza virus, commonly known as the flu, is a highly contagious respiratory virus that can affect people of all ages. It is caused by the influenza virus, which belongs to the family Orthomyxoviridae. There are three types of influenza viruses: A, B, and C. Influenza A and B viruses are the most common types that cause seasonal outbreaks. Influenza C viruses are usually mild and cause only mild respiratory symptoms.

Transmission and Incubation:
The influenza virus spreads through the air when an infected person coughs or sneezes. The virus can also be transmitted through contact with infected surfaces such as door handles, countertops, and other frequently touched objects. The incubation period for the influenza virus ranges from 1 to 5 days, and the illness typically lasts for 1 to 2 weeks. The most common symptoms of the virus include fever, cough, sore throat, body aches, headache, chills, and fatigue.

Prevention:
Influenza viruses are constantly changing, which makes it difficult for the immune system to keep up. This is why people must get a flu shot every year. The vaccine is designed to protect against the strains of the virus that are most likely to cause illness during the upcoming season. Vaccination not only reduces the risk of getting the flu but also helps prevent the spread of the virus to others.

Complications:
Influenza can lead to serious complications, especially in people with weakened immune systems, the elderly, and young children. Complications of influenza include pneumonia, bronchitis, sinus infections, and ear infections. In severe cases, the flu can lead to hospitalization and even death. According to the World Health Organization (WHO), influenza kills between 250,000 and 650,000 people worldwide every year.

Diphtheria Bacterial Infection Case Study:

Diphtheria, also known as *Corynebacterium diphtheriae*, is a highly contagious bacterial infection. The bacteria are commonly found in the nose, throat, and skin. Diphtheria is not transmitted through food or water, and it affects the nervous system by causing muscle weakness and paralysis. The disease was once a leading cause of death among children, but it is now rare in developed countries due to the availability of effective vaccines.

Symptoms:
The symptoms of diphtheria usually appear within a week after infection, but they can take up to several months. The initial symptoms may include muscle weakness and paralysis in the jaw, neck, and chest. The severity of the disease depends on the age of the patient and the extent of the infection. In severe cases, the disease can lead to heart failure, paralysis, and even death. The disease is not transmitted through food or water, but it can be spread through respiratory droplets or contact with infected individuals or objects.

Case Study:
A 12-year-old boy named Jake was playing in his backyard when he stepped on a rusty nail. He didn't think much of it and went back to playing with his friends. However, over the next few days, he developed muscle weakness and paralysis in his jaw and neck. He also had difficulty breathing and swallowing. His parents took him to the hospital, where he was diagnosed with diphtheria. Jake was admitted to the hospital and given antitoxin and antibiotics. He was also given a series of shots to prevent the disease from returning. Jake was discharged from the hospital after 10 days and is now fully recovered.

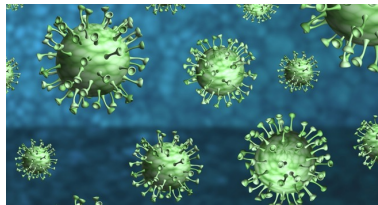
Prevention:
Diphtheria can be prevented through vaccination. The DTaP vaccine, which includes protection against diphtheria, tetanus, and pertussis, is given to children in a series of shots between the ages of 2 months and 6 years. Adults who have not been vaccinated or whose immunity has worn off should receive a booster shot.

Case Study Summary:
Measles is a highly contagious viral infection that spreads through the air. The disease is caused by the measles virus, which belongs to the family Paramyxoviridae. The disease is spread from person to person through respiratory droplets or close contact with an infected individual. The symptoms of measles include fever, cough, sore throat, and fatigue. The disease is not transmitted through food or water, but it can be spread through respiratory droplets or contact with infected individuals or objects.

Symptoms:
Symptoms of measles usually appear 10-12 days after exposure to the virus. The first symptoms are fever, headache, stiff neck, nose, and cough. The disease is not transmitted through food or water, but it can be spread through respiratory droplets or contact with infected individuals or objects.

Prevention:
Measles can be prevented through vaccination. The MMR vaccine, which includes protection against measles, mumps, and rubella, is given to children in a series of shots between the ages of 12 months and 6 years. Adults who have not been vaccinated or whose immunity has worn off should receive a booster shot.

Case Study:
In 1978, there was an outbreak of measles in a high school in California. Five students were hospitalized with the disease, and one of them died. The school had implemented a screening program to prevent the spread of the disease, but it was not effective.



Improve your students' Scientific Literacy and Analysis Skills, use an an Emergency Substitute Plan or create Applicability in your classroom.

Germ

Each germ reading contains 500-650 words that describes the

- Symptoms
- Prevention
- Treatments
- Example

Bacterial Infections Case Studies – Part 2



Diphtheria Bacterial Infection Case Study:

Diphtheria is a serious bacterial infection caused by the *Corynebacterium diphtheriae* bacterium. It is spread through respiratory droplets or contact with infected individuals or objects. Diphtheria affects the throat and can also cause damage to the heart, nervous system, and kidneys. The disease was once a leading cause of death among children, but it is now rare in developed countries due to the availability of effective vaccines.

Symptoms:

Symptoms of diphtheria usually appear 2-5 days after exposure to the bacteria. The first symptoms are mild and may include a sore throat, fever, and fatigue. As the disease progresses, a gray or white coating may form on the tonsils, throat, and/or nasal passages, making it difficult to breathe and swallow. In severe cases, diphtheria can lead to heart failure, paralysis, and even death.

Prevention:

Diphtheria can be prevented through vaccination. The DTaP vaccine, which includes protection against diphtheria, tetanus, and pertussis, is given to children in a series of shots between the ages of 2 months and 6 years. Adults who have not been vaccinated or whose immunity has worn off should receive a booster shot.

Treatment:

In the case of an infection, diphtheria is treated with antibiotics and antitoxins. Patients may also require hospitalization and respiratory support.

Case Study Scenario:

Jenny is a 12-year-old girl who has been experiencing a sore throat and fatigue for a few days. Her parents took her to the doctor, who noticed a gray coating on her tonsils and throat. The doctor suspected diphtheria and ordered a throat culture. The results confirmed the presence of the *Corynebacterium diphtheriae* bacterium. Jenny was admitted to the hospital for treatment with antibiotics and antitoxins.

Tetanus Bacterial Infections Case Study:

Tetanus, also known as lockjaw, is a serious bacterial infection caused by *Clostridium tetani* bacteria. These bacteria are commonly found in soil, dust, and animal feces. Tetanus can be contracted through a cut or wound, and it affects the nervous system by causing muscle stiffness and spasms. Tetanus can be prevented through vaccination and proper wound care, but it can be fatal if left untreated.

Symptoms:

The symptoms of tetanus usually appear within a week after infection, but they can take up to several months. The initial symptoms may include muscle stiffness and spasms in the jaw, neck, and chest. The muscles in the jaw can become so stiff that the patient is unable to open their mouth, leading to the characteristic "lockjaw" appearance. The patient may also experience muscle spasms in other parts of the body, such as the back and abdomen. The spasms can be triggered by touch, noise, or other stimuli, and they can be severe enough to cause bone fractures.

Case Study:

A 12-year-old boy named Jake was playing in his backyard when he stepped on a rusty nail. He didn't think much of it and went back to playing with his friends. However, over the next few days, he developed muscle stiffness and spasms in his jaw and neck. He also had difficulty swallowing and breathing. His parents took him to the hospital, where he was diagnosed with tetanus. Jake was admitted to the hospital and given tetanus immune globulin (TIG) to neutralize the toxin produced by the bacteria. He was also given antibiotics to kill the bacteria and prevent further infection. He had to be placed in a dark and quiet room to avoid triggering muscle spasms, and he was given medications to control the spasms when they did occur. Jake remained in the hospital for several weeks until his symptoms improved, and he was able to resume normal activities.

Meningococcal Disease Case Study:

Meningococcal disease is a severe bacterial infection that affects the membranes surrounding the brain and spinal cord. It is caused by the bacterium *Neisseria meningitidis*, which can cause life-threatening illnesses such as meningitis and sepsis. The disease can spread from person to person through respiratory droplets or close contact with an infected individual.

Symptoms:

Symptoms of meningococcal disease can include sudden onset of fever, headache, stiff neck, nausea, vomiting, and a rash that may develop into purple or red spots. These symptoms can progress rapidly, leading to severe complications such as brain damage, hearing loss, and limb amputation.

Prevention:

One of the best ways to prevent meningococcal disease is through vaccination. The meningococcal vaccine is recommended for all children starting at age 11 or 12, and for individuals at higher risk of infection, such as college students, military personnel, and travelers to certain parts of the world.

Case Study:

In 2019, there was an outbreak of meningococcal disease in a high school in California. Five students were diagnosed with the disease, and one of them died. The school took immediate action by informing parents, providing free vaccinations, and increasing cleaning and disinfection of the school premises. One of the students who contracted meningococcal disease was a 15-year-old girl named Lily. Lily was a healthy and active student who loved playing soccer and spending time with her friends. However, she started to feel sick one day and developed a fever and headache. Her parents took her to the doctor, where she was diagnosed with meningococcal disease.

Germ

Each germ reading contains 4 questions and answers.

Bacterial Infections Case Study Questions:

Diphtheria Questions:

1. What causes diphtheria?
2. How is diphtheria spread?
3. What are the symptoms of diphtheria?
4. How can diphtheria be prevented?

Tetanus Questions:

1. What is tetanus?
2. What are the symptoms of tetanus?
3. How can tetanus be prevented?
4. How is tetanus treated?

Meningococcal Questions:

1. What is meningococcal disease?
2. How can meningococcal disease spread from person to person?
3. What is the best way to prevent meningococcal disease?
4. What happened during the meningococcal outbreak in a California high school in 2019?

Anthrax Questions:

1. What causes anthrax?
2. What are the symptoms of cutaneous anthrax?
3. Who is at higher risk of contracting anthrax?
4. What is the treatment for anthrax?

Botulism Questions:

1. What is botulism?
2. How is botulism usually contracted?
3. What are the symptoms of botulism?
4. How is botulism treated?

Bacterial Infections Case Study Questions: KEY

Diphtheria Questions:

1. What causes diphtheria?
Diphtheria is caused by the *Corynebacterium diphtheriae* bacterium.
2. How is diphtheria spread?
Diphtheria is spread through respiratory droplets or contact with infected individuals or objects.
3. What are the symptoms of diphtheria?
Symptoms of diphtheria may include a sore throat, fever, fatigue, and a gray or white coating on the tonsils, throat, and/or nasal passages.
4. How can diphtheria be prevented?
Diphtheria can be prevented through vaccination with the DTaP vaccine.

Tetanus Questions:

1. What is tetanus?
Tetanus is a bacterial infection caused by *Clostridium tetani* bacteria.
2. What are the symptoms of tetanus?
The symptoms of tetanus include muscle stiffness and spasms, especially in the jaw and neck, and difficulty swallowing and breathing.
3. How can tetanus be prevented?
Tetanus can be prevented through vaccination and proper wound care.
4. How is tetanus treated?
Tetanus is treated with tetanus immune globulin (TIG) to neutralize the toxin produced by the bacteria, antibiotics to kill the bacteria, and medications to control muscle spasms.

Meningococcal Questions:

1. What is meningococcal disease?
Meningococcal disease is a severe bacterial infection that affects the membranes surrounding the brain and spinal cord. It is caused by the bacterium *Neisseria meningitidis* and can cause life-threatening illnesses such as meningitis and sepsis.
2. How can meningococcal disease spread from person to person?
Meningococcal disease can spread from person to person through respiratory droplets or close contact with an infected individual.
3. What is the best way to prevent meningococcal disease?
One of the best ways to prevent meningococcal disease is through vaccination. The meningococcal vaccine is recommended for all children starting at age 11 or 12.