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**Case Study**

**Case Study 1**

**What errors in the initial treatment of the student's injury occurred? What would you do to avoid this type of infection? How could it be avoided?**

The student does not wash his hand with an alcohol-based hand sanitizer. Although the teacher gave him a pass to the school nurse, due to his next class, he forgets to follow up. Due to this, he missed the immediate first aid treatment. Secondly, he did not tell his mother about vomiting and diarrhea.

It could be avoided if the student had cleaned his wound with alcohol-based hand sanitizer and had gone to the school nurse for first aid treatment.

**What symptoms are indicative of an infection caused by this organism?**

The symptoms which are indicative of staphylococcus infection include

* Small pimple and blister that developed after the injury
* Diarrhea and vomiting
* The wound area was sensitive to touch. Pus was present in the open sore. The area present around the injury was edematous.

**What are the treatments for this serious type of infection? What tests should be done in the clinical laboratory at the hospital to determine the antibiotic to be used? What treatment should begin immediately?**

Most of the small staphylococcus infection can be treated at home. Antibiotics are commonly prescribed to treat staphylococcus infection. The antibiotics include nafcillin, vancomycin, sulfa drugs, and cephalosporin. Vancomycin is commonly used to treat serious staphylococcus infection because most of the strains of staphylococcus bacteria are resistant to many traditional medicines; that's why vancomycin and other antibiotics are given intravenously to treat the infection. In case of a skin infection, an incision is made into the sore to drain fluid that has collected in it. *Staphylococcus aureus* bacteria are adaptable, and most of the varieties of it have become resistant to 1 or more antibiotics. It is reported that only 10% of staphylococcus bacteria can be cured with penicillin ("MRSA infection - Symptoms and causes," 2019).

The diagnosis of *Staphylococcus aureus* bacteria is usually based on performing the test with colonies. The test is performed for coagulase, clumping factor, thermostable deoxyribonucleic, and hemolysin. Other than this, commercial latex agglutination tests are also used to identify staphylococcus infection. Tissue culture is used to diagnose staphylococcus infection. A doctor can take a sample from tissue and wound from an infected area and then send it to the lab for testing. The blood test is also used to determine the staphylococcus infection.

Antibiotic treatment should begin immediately after being diagnosed with staphylococcus infection ("Staphylococcus aureus in Healthcare Settings | HAI | CDC," 2019).

**If untreated, what additional measures would need to be administered to prevent a widely disseminated infection?**

If untreated, *Staphylococcus aureus* infection can be deadly. The additional measures which are required to prevent widely disseminated staphylococcus infection are intravenous treatment with antibiotics until the patient has been afebrile for approximately 72 hours, and other infection signs have disappeared.

**Case Study 2**

**What is the immunization the patient should have received? What is the recommended period for booster shots? (2pts)**

The patient should have received the tetanus immunization. The first two shots of tetanus immunization are usually given in the first 4 weeks, and the third shot is given 6- 12 months after the second tetanus vaccine shot. Booster shots are recommended every 10 years after the initial series of tetanus shots ("Tetanus Disease | Home | Lockjaw | CDC," 2019).

**The causative agent for this disease is. (1pt)**

The causative agent for this disease is *Clostridium tetani*.

 **Describe three identifying characteristics of this organism? (3pts)**

*Clostridium tetani* are anaerobic, motile, and spore-forming bacteria ("Tetanus: Background, Pathophysiology, Etiology," 2019).

**How did the organisms enter the hand of the gardener? (2pts)**

The gardener left his gloves in the house, and while removing invasive weed, the tiny thorny base gouged his hand.

**What causes the paralysis? (2pts)**

*Clostridium tetani* is a bacteria that causes tetanus. The bacteria spores can spread to the central nervous system where it produce a toxin known as tetanospasmin. This blocks nerve signals from the spinal cord to the muscles and leads to severe spasm of muscles.

**What other organisms belong to this genus that is medically significant? Describe at least three. (5pts)**

The organism which belongs to this genus includes *Clostridium tetani, Clostridium perfringens and ‎Clostridium botulinum*. *Clostridium difficile*infectionis a most common causes of hospital-acquired diarrhea. In the United States, *Clostridium perfringens* is a common cause of food poisoning. *Clostridium botulinum* infection blocks nerve functions and can lead to respiratory and muscular paralysis.

**References**

Tetanus Disease | Home | Lockjaw | CDC. (2019). Retrieved 7 December 2019, from <https://www.cdc.gov/tetanus/index.html>

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