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Clostridium Difficile

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Clostridium Difficile **is an intestinal anaerobic bacterium that is the leading cause of antibiotic-associated inflammation of the colon as well as the leading cause of nosocomial diarrhea. Its severity ranges from mild to severe infection and the symptoms correspond with the severity of infection. A survey was recently done by the Association for Professionals in Infection Control and Epidemiology that estimated 13 in 1,000 in-patients are diagnosed with *C. Diff* and approximately 109,000 patients die per year. Over the last ten years, more virulent strains of the bacteria have emerged. The incidence of infection with these virulent strains has also increased tremendously, almost always happening during a hospital stay. These virulent strains lead to severe diarrhea, dehydration, and sometimes death, especially in the elderly. *C. Diff* infection is a serious health concern worldwide, but for the purpose of this discussion we will focus primarily on the American hospital setting and how polymerase chain reaction testing reduces isolation time and improved patient management.**

Introduction

The problem with *C. Diff* is that it exists as part of humans' natural intestinal flora. *C. Diff* does not cause symptoms while apart of the intestinal flora because it does not exist in high enough numbers to produce enough toxins to become symptomatic due to the competition of the rest of the intestinal flora. *C. Diff* infection arises following the administration of a broad-spectrum antibiotic that eliminates the other bacteria in the intestine. *C. Diff* is able to survive and propagate faster because it is a spore forming bacteria that can quickly become active again after antibiotic assault. Currently there is no good way to prevent *C. Diff* infection when it is necessary to administer broad-spectrum antibiotics, and the most common way in a hospital setting to detect toxigenic *C. Diff* is by A/B enzyme immunoassay. An immunoassay is a procedure for detecting or measuring proteins and other substances through their properties as antigens or antibodies.

Recent Progress

Coupling probiotics with any broad-spectrum antibiotic will decrease the amount of *C. Diff* infection resulting from the loss of competition by eliminating natural flora. The basis of this belief is derived from the thought that resupplying "healthy" bacteria when they are eliminated by antibiotics will again supply the competition that will keep natural *C. Diff* levels at in a healthy range. This would still allow for problem bacteria to be eliminated because bacteria can now be added selectively to the gut to replace the collateral damage suffered at the hands of antibiotics. Also, the polymerase chain reaction testing is a more accurate and reliable source than the A/B enzyme immunoassay when determining the diagnosis of a patient and how long a patient is to remain in isolation. Accurately determining the identification of *Clostridium Difficile* early, as well as providing the appropriate treatment and infection control, helps reduce the severity of the bacterium and transmission.

Discussion

Currently there are two antibiotics that are commonly used when it is necessary to attack a broad spectrum of bacteria. These are Vancomyacin and Metronidazole. When a *C. Diff* infection follows the use of one of these antibiotics it is customary to treat this by readministering the antibiotic while tapering the amounts

given in an attempt to slowly eliminate bacteria in the gut which allows the natural flora to grow back slowly. This usually takes about three to four weeks. This treatment is also typically accompanied by the use of a probiotic which directly adds good bacteria back to the gut. These bacteria are typically of the phyla Bacteroides, mostly commensal anaerobic bacteria, and Firmicutes. The idea of administering probiotics as a way to prevent pathogenic infection by *C. Diff* has been presented already. Research has gone into the addition of Lactobacillus spp. and Saccharomyces boulardii . The results showed that there was a substantial decrease in the amount of patients being infected with *C. Diff* following a hospital stay. However, administration of probiotics does pose a risk of causing fungemia and bacteremia in immunocompromised patients. Fungemia is the product of an over infection of Saccharomyces boulardii and bacteremia is the over infection of Lactobacillus spp.

There are other contraindications to the use of probiotics as a preventative measure, however, there is very limited data that supports this as a viable option. Unfortunately, there is also the risk of bloodstream infections. It was not until recently that an individual study was conducted to study the benefits of using probiotics to prevent *C. Diff* infection. While the study showed promising results, it is hard validate this study as a means for all patients to be prescribed probiotics with any antibiotic because there are so many different types of probiotic on the market. There is currently not enough data to confidently advise any physician to prescribe a probiotic due to the risks above related to having a decreased amount of intestinal flora.

In conclusion, it is not advisable to use probiotics as a preventative measure for *C. Diff* infection. This is solely based on the lack of research into the subject. After the development of a baseline probiotic with research to back its efficacy in prevention of *C. Diff* infection, it could definitely be probable to support this as viable treatment. There should be a major push in this area of research as *C. Diff* infection is on the steady rise in American hospitals. The good news is that there are ways that are proven to help prevent *C. Diff* infection until research can be conducted.

When testing for the detection of Clostridium Difficile, a toxigenic culture is the most sensitive but is difficult to produce and has a long turnaround time. In comparison, rapid toxin A/B EIA tests quality is suboptimal because the enzyme glutamate dehydrogenase is less specific. Polymerase Chain Reaction testing appears to be a possibility due to the rapid turnaround time and its sensitivity.

Some ways that are currently being implemented in hospitals to prevent the spread of *C. Diff* are utilizing hand washing over alcohol scrubs, using contact precautions, isolating patients suspected of having *C. Diff* infections, and routine testing to identify asymptomatic patients before they become symptomatic. Hand washing is essential to preventing the spread of *C. Diff* because the friction from hand scrubbing is essential to removing spores from the *C. Diff*. Contact precautions and isolating patients limits exposure of *C. Diff* to healthy patients and testing patients as a preventative measure identifies build up of *C. Diff* bacteria prior to toxicity and allows for treatment. *Clostridium Difficile* is a serious healthcare risk and should be treated as such. It is imperative to promote the use of these safety measures as well as encourage the research into preventative measures such as probiotics in preventing the spread of this disease.

References

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