Clostridioides Difficile Infection

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Clostridioides difficile or C. difficile is a bacterium that can infect the large bowel (or colon) and is a major cause of infectious colitis and diarrhea in healthcare settings around the world. Infectious colitis is redness, swelling, and inflammation of the colon. (It was formerly known as Clostridium difficile; however, was renamed after it was reclassified in 2016.)

The Centers for Disease Control and Prevention (CDC) is a national public health institute in the United States. It is a United States federal agency, under the Department of Health and Human Services, and is headquartered in Atlanta, Georgia.
CDC's Role

- Detecting and responding to new and emerging health threats
- Tackling the biggest health problems causing death and disability for Americans
- Putting science and advanced technology into action to prevent disease
- Promoting healthy and safe behaviors, communities, and environment
- Developing leaders and training the public health workforce, including disease detectives
- Taking the health pulse of our nation

How common is C. difficile infection (CDI)?

According to the Centers for Disease Control and Prevention (CDC), almost half a million of cases of CDI occurred in 2011 in the United States. In the last 10 years its prevalence has decreased but it still affects over 350,000 patients a year. It is the most common hospital-acquired infection in the U.S. A decade ago, the vast majority of people who became infected with *C.Difficile* had some recent exposure to a hospital or other healthcare facility. With better infection control and other measures, the risk of acquiring CDI following a hospital admission or healthcare facility exposure has decreased. Community-acquired infections, in patients who have not been hospitalized, have remained stable, affecting over 150,000 people a year according to CDC estimates. The burden of this infection remains a major problem for our healthcare system.

CDI has significant effects on our healthcare related costs in the United States. Since CDI prolongs hospital stays by 2.8 to 10.4 days, it raises the cost of a hospitalization by over $42,000 per admission. Healthcare-related costs associated with CDI range from $1.9 to 7 billion USD each year.

How does C. difficile spread?

C.difficile is widely present in the environment and can be found on surfaces like doorknobs, bedside tables, and counters, especially in healthcare facilities. It can spread through contaminated objects and/or the hands of healthcare workers. Transmission occurs through what is called the "fecal-oral" route. This means that the *C.Difficile* bacteria that come from the bowel movement of an infected individual are ingested by another individual, who subsequently gets the infection.

Thorough hand washing with soap and water is important as hand sanitizers cannot kill CDI.

What is C. difficile infection (CDI)?

The *C. difficile* infection occurs when the *C. difficile* bacteria multiply and are able to grow within the gastrointestinal (GI) system. The bacteria and its spores resist heat, acid, and antibiotics. For most people infected by CDI, symptoms will begin in 2-3 days. In some cases, CDI may take more than one week and up to 28 days to become noticeable. CDI secretes several toxins, or poisonous substances in the colon (large

intestine). These toxins cause inflammation in the GI tract and diarrhea.

Under normal circumstances, the intestinal tract contains millions of bacteria, referred to as "normal gut flora" or "normal microbiota." These bacteria have many different functions, and one of them is to protect us against foreign infections. This immune function of the microbiota is sometimes called "colonization resistance". Our normal gut microbiota can be undermined and weakened when we take antibiotics. The changes that result from antibiotics can allow *C. difficile* to multiply and release toxins causing colitis by damaging the lining of the colon. This can result in diarrhea, abdominal pain, fever, and even sepsis.

But the mere exposure to *C. Difficile* doesn't necessarily mean that one will develop *C.difficile colitis.* In fact, a person can have the bacteria inside themselves and have no symptoms. This is referred to as being 'colonized' by the bacteria.

What are Risk Factors to getting C. difficile infection (CDI)?

The main risk factor for CDI is exposure to the bacteria and use of antibiotics. Exposure most often occurs in a hospital setting. Long-term antibiotic treatments or taking multiple antibiotics at the same time can further increase the risk for CDI. There are also certain patient characteristics that can increase the risk, including advanced age (over 65 years old), having inflammatory bowel disease (IBD), liver cirrhosis, chronic kidney disease, being a transplant recipient or any illness where the immune system is compromised.

Clinical Features of C. difficile infection (CDI)

The symptoms of CDI can vary in severity. According to this severity, a patient's case of CDI can fall into one of three categories: non-severe, severe and fulminant.

Non-Severe CDI - The most common form of CDI seen is either mild colitis, or simple diarrhea. This diarrhea is watery and contains mucus, but generally not blood. A sigmoidoscopy usually shows normal tissue in the colon. This test involves placing an endoscope through the anus and into the last part of the colon. An endoscope is a long flexible tube with a camera and light on the end. The camera allows your healthcare provider to see inside your GI tract during the test.

Severe CDI - Severe colitis is often present with a case of severe CDI or full-blown *C. difficile*-associated colitis. Severe CDI occurs when the patient has very bad diarrhea and possible dehydration, as well as abnormal lab tests and/or X-rays.

Fulminant CDI - This is the worst type of CDI and is often seen with very serious complications. This can be life-threatening and occurs in 3% of patients. Most of those affected by this type are elderly and/or debilitated from other diseases. Patients with this level feel severe lower abdominal pain, diarrhea, high fever with chills, and rapid heartbeat. They usually have markedly abnormal blood tests and can have low blood pressure.

C. difficile infection (CDI) Recurrence

CDI recurrence is the reappearance of diarrhea and other CDI symptoms after treatment ends following an initial improvement or response to the antibiotic used to treat the infection. In other words, the patient responds to the antibiotics and feels better, but after antibiotics are stopped, the symptoms and the infection come back. This most commonly happens within 4-8 weeks of completion of therapy. It is estimated that approximately 25% of patients with CDI who receive a standard of care antibiotic therapy will have at least one recurrence. After each subsequent recurrence, a future recurrence becomes more likely. For example, after a first recurrence, the risk of a second recurrence is about 40%. Recurrences occur because the antibiotics that we use to treat CDI aren't effective against the *C. Difficile* spore (the more resilient form of this bacterium that results in recurrence and transmission from person to person).

Diagnosis in Adults

Generally, testing for CDI should be done in any patient who has new unexplained diarrhea. This is defined as three or more unformed bowel movements a day without the use of laxatives. Currently there are many laboratory testing options for detecting *C. difficile*. These tests usually check for toxin or genes from the bacteria, rather than culturing the bacteria itself. The name 'difficile' was used because the bacteria is quite

difficult to culture. Despite multiple tests for this bacterium, each has limitations, so consult your medical professional if you think that you need to be tested for this infection.

Diagnosis in Children

For children, diagnostic testing recommendations are based on age.

- Children younger than 12 months of age should not be tested. C. diff can be a normal finding in newborns and not cause illness.
- Children older than 12 months may be tested if they have prolonged diarrhea, have risk factors (such as IBD, cystic fibrosis, malignancy) and other causes of diarrhea have been ruled out.
- Children older than 3 years have the same diagnostic recommendations as adults. Other possible causes of diarrhea should be investigated at the same time. This includes viral infections or other conditions.

Treatment of C. difficile infection (CDI)

As with any type of acute diarrhea, maintaining hydration and adequate nutrition is important. If the patient is taking antibiotics that may have contributed to the development of CDI, those should be stopped if possible.

The primary treatment for *C. difficile* is an antibiotic such as Fidaxomicin™, Vancomycin™ or Metronidazole™ that kills the bacteria itself. If symptoms are severe, antibiotics may used even before the diagnosis is confirmed. Close monitoring in a hospital setting are necessary for severe or fulminant cases.

In cases of CDI recurrence, patients are treated with another course of antibiotics. Depending on the risk for further recurrence, there are other measures one can take to decrease that risk. This may include an intravenous infusion of monoclonal antibody called bezlotoxumab™ or Fecal Microbiota Transplant (FMT). With FMT, stool from a healthy donor is placed in the patient in an effort to add more 'good' bacteria to re-strengthen the "colonization resistance." There are two FDA approved FMT therapies available by prescription specifically for CDI Recurrence, they are Rebyota® and Vowst®.

Rarely, surgery may be needed when the most severe complication of fulminant disease is present. This complication is termed "toxic megacolon" and can result in colonic perforation (a hole or tear in the lining of the colon) or necrotizing colitis (an inflammation in the intestines (usually the colon) that can be life-threatening if not treated right away). Thankfully, advances in research have made this complication exceedingly rare.

Prevention of C. difficile infection (CDI)

The bacteria spreads for as long as the patient's diarrhea persists. Prevention strategies should be used in every suspected case, not only in confirmed patients. In the hospital and other health care facilities, measures include proper use of personal protective equipment (PPE): Gloves and disposable gowns should be used by anyone in contact with the patient during the duration of symptoms. Proper hand washing by the patient and anyone in contact with them. (Note: alcohol-based hand sanitizer does not kill *C. difficile* well, but soap and warm water work very well on our hands).

The Food and Drug Administration (FDA) is one of the U.S. government's regulatory agencies. This agency oversees a broad range of topics that pertain to food, drugs and other products used on a daily basis.

The FDA works to protect public health by assuring that foods and drugs for humans and animals are safe and properly labeled. The FDA also ensures that vaccines, other biological products, and medical devices intended for human use are safe and effective.

Products approved by the FDA have been deemed safe, with benefits that are worth the possible risks. This is done after reviewing studies and tests that have been done on a product.

About IFFGD

The International Foundation for Gastrointestinal Disorders (IFFGD) is a 501(c)(3) nonprofit education and research organization. We work to promote awareness, scientific advancement, and improved care for people affected by chronic digestive conditions. Our mission is to inform, assist, and support people affected by gastrointestinal disorders. Founded in 1991, we rely on donors to carry out our mission. Visit our websites at: www.iffgd.org, and aboutIBS.org.

the knowledge or diagnosis of your healthcare provider. We advise seeing a healthcare provider whenever a health problem arises requiring an expert's care.

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