

## Clostridium Difficile (C. Diff) Infection

### What Is C. Diff?

*Clostridium difficile* (pronounced klo-strid-ee-um dif-uh-seel)—commonly referred to as “C. diff”—is a type of bacteria (germ) that can infect the gastrointestinal tract. The gastrointestinal tract includes the stomach, small intestine, and the colon. When C. diff infects the colon and is allowed to grow out of control, it can lead to C. diff infection (CDI). CDI causes diarrhea and stomach pain due to inflammation (swelling) of the intestines.

C. diff is found throughout the environment in soil, air, water, human and animal feces, and in contaminated food products such as processed meat. C. diff bacteria can survive in harsh conditions for long periods of time by producing spores (rugged, seed-like structures). These spores can tolerate the acidic condition in the stomach and are resistant to the effects of antibiotic medications. Although antibiotics kill the actual C. diff bacteria, the spores can survive antibiotic treatment. Because of this, patients with CDI can be re-infected with C. diff, even after they have been treated with antibiotics for the infection. This is called *recurrent* (or repeated) CDI.

### How Do People Become Infected With C. Diff?

The colon is home to a wide range of different bacteria that are very important for a person’s health. These bacteria assist in digesting food and help prevent harmful bacteria like C. diff from invading and growing out of control. However, if something upsets the balance of these bacteria in the colon, potentially harmful bacteria can take advantage by growing in place of the good bacteria and make a person sick. A small number of healthy adults already have C. diff present in their colon and do not experience any problems. The C. diff bacteria are prevented from growing to large numbers by the “good” bacteria that are present in the colon of healthy individuals. When a person takes antibiotics to treat other infections such as bronchitis, sinus infections, or strep throat, some of the normal or “good” bacteria in the gut are killed. This allows C. diff to grow rapidly and take their place. Most

cases of CDI are seen in individuals taking antibiotics to treat other infections. People taking antibiotics are 7 to 10 times more likely to develop CDI while taking the medications and for 1 month afterwards.

A person can also get CDI by touching something contaminated with C. diff spores (such as bed linens, bathroom fixtures, door handles and knobs, or medical equipment) and then using their hands to eat or drink, which can pass these spores to their mouth. C. diff can also be spread through direct contact with infected individuals. Once the spores are swallowed, they reach the colon and produce the C. diff bacteria. As the C. diff grows, toxins (poisonous substances) are released that attack the lining of the colon, causing swelling and irritation (*colitis*).

### What Are the Symptoms of CDI?

The most common symptoms of CDI include watery diarrhea (at least 3 bowel movements per day for 2 or more days), fever, loss of appetite, nausea with or without vomiting, stomach pain, tenderness and cramping, and weight loss. Additionally, the stools of an individual with CDI may smell very bad.

Severe cases of CDI can lead to complications such as *pseudomembranous colitis* (areas of severe inflammation and pus in the colon), *toxic megacolon* (life-threatening, rapid widening and inflammation of the colon), *bowel perforation* (a hole in the colon), *sepsis* (life-threatening whole-body inflammation), and death.

### How Is CDI Diagnosed?

The doctor may suspect CDI if a patient has constant diarrhea over several days while taking or soon after finishing a course of antibiotics. To test for the presence of CDI, a stool sample may be taken. If the doctor suspects complications, other tests may be done such as blood cell counts, blood chemistry testing, X-rays of the abdominal area, or computed tomography (CT) scans.



# KNOW THE FACTS

## How Common Is CDI?

CDI is responsible for a significant proportion of all illnesses that people get while they are in the hospital in the United States and other countries. In 2011, *C. diff* was responsible for almost half a million infections and was associated with approximately 29,000 deaths within 30 days of infection.

In the United States in 2011, about 293,300 individuals (65% of cases) developed CDIs in hospitals, nursing homes, or after a recent visit to a health care facility. However, recent studies have reported that the rates of CDI in the community (outside of a health care facility) are increasing. About 35% of CDI cases occurred in people in the community in 2011. A few potential sources of *C. diff* in the community include contaminated soil, water, meats, and vegetables.

CDI tends to return in about 14–20% of patients within 4 weeks after treatment of the initial infection and may return several times in some patients. About 1–9% of patients with CDI in the United States die from complications caused by the disease 30 days after their diagnosis.

## What Are the Risk Factors for CDI?

The risk factors for developing CDI can include:

- Long-term treatment with antibiotics, particularly *broad-spectrum* antibiotics (kills many types of bacteria) or multiple antibiotics
- Long-term hospitalization or nursing home residency
- Gastrointestinal surgery
- A weakened immune system
- Use of chemotherapy drugs
- Older age (65 years or older)
- Use of medications to treat heartburn called proton pump inhibitors (such as Prilosec® [omeprazole], Prevacid® [lansoprazole], AcipHex® [rabeprazole], Protonix® [pantoprazole], and Nexium® [esomeprazole])

## How Can CDI Be Prevented?

Some ways to prevent and/or control CDI include the following:

- Only take antibiotics as prescribed by your doctor
- Inform the doctor if you have taken antibiotics and develop diarrhea within a few months
- If you have diarrhea, try to use a separate bathroom and ensure the bathroom is cleaned well after each use
- Ensure that health care providers, patients, and the people they are in contact with frequently wash their hands with soap and water (alcohol-based hand sanitizers are not effective)
- Be sure to wash your own hands regularly, especially before eating, after using the bathroom, and before and after visiting someone in a health care facility
- Clean surfaces and equipment with a chlorine bleach-based solution

## How Is CDI Treated?

The initial treatment for CDI is typically a 10- to 14-day course of oral antibiotics such as Flagyl® (metronidazole), Vancocin® (vancomycin), or Dificid® (fidaxomicin). Although metronidazole is not approved by the US Food and Drug Administration for treating CDI, it is commonly recommended and used for mild cases. For moderate to severe cases, treatment with vancomycin is recommended. If CDI returns after initial treatment, it is usually treated with the same antibiotic used for the first occurrence. Vancomycin is typically the treatment of choice in patients experiencing a second recurrence of CDI.

Patients with recurrent CDIs are sometimes treated with fecal transplants, or fecal microbiota transplantation (FMT), in which stool from a healthy person is transplanted into the colon of the patient with CDI. This procedure has been shown to successfully treat patients with recurrent CDIs.

For severe cases, surgery to remove the diseased portion of the colon may be an option for people with severe pain, organ failure, or inflammation of the lining of the stomach.

New treatments are also under investigation in clinical trials.

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