Fecal microbiota transplantation: Breaking the chain of recurrent *C. difficile* infection

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More than 3 million new cases of *Clostridium difficile* infection (CDI) occur each year in acute-care and long-term care facilities in this country. A spore-forming bacterium most commonly found in the GI tract, *C. difficile* produces toxins noxious to the intestinal lining, where it alters epithelial cells. Disturbance of these cells can cause a wide range of signs and symptoms, from mild abdominal pain with watery diarrhea to painful abdominal cramping, fever, and bloody stool, possibly progressing to toxic megacolon. CDI accounts for roughly 14,000 deaths each year in the United States.

Traditional treatment varies with disease severity. For mild CDI, initial treatment includes metronidazole; for severe CDI, patients typically receive vancomycin. The newest drug used in CDI therapy is fidaxomicin. This drug may be superior to vancomycin in decreasing CDI recurrence, although it’s significantly more expensive.

**Emerging concerns**

CDI commonly follows exposure to antibiotics, which alter the intestinal flora and cause an imbalance of the natural gut flora. Initial treatment involves discontinuing the suspected causative antibiotic and starting oral vancomycin, metronidazole, or fidaxomicin.

Unfortunately, more than 1 million CDI patients who receive these drugs experience treatment failure. One possible explanation is the emergence of multiple-relapse CDI (MR-CDI). Relapse rates are nearing 30% in patients with first-time CDI and exceed 65% for patients with a history of recurrent CDI.

To make matters worse, a hypervirulent strain of *C. difficile*, known as BI/NAP1/027, recently emerged. Experts believe this strain accounts largely for the increased CDI incidence. First noted in the early 2000s in North America and Europe, this strain differs from other *C. difficile* strains in four dangerous ways:

- causes increased toxin production
- leads to more severe diarrhea
- involves increased spore production
- causes fluoroquinolone resistance.
Emergence of the new strain underscores the importance of prevention. (See the box below.)

**Crucial preventive measures**

Preventing the spread of *C. difficile* is crucial to reducing the incidence of CDI. Prevention requires a threefold approach: preventing person-to-person transmission, minimizing risk factors, and practicing antimicrobial stewardship through the following measures:

- hand hygiene with soap and water to rinse off *C. difficile* spores
- early contact precautions for patients with diarrhea (isolation in a private room, gloves and gowns worn by visitors and healthcare personnel)
- environmental cleaning and disinfection (single-patient-use equipment or bleach cleaning of shared equipment)
- CDI education for healthcare workers and environmental personnel
- CDI education for patient and families
- decreased overall use and duration of antibiotic therapy.

**Reviving an old treatment**

An old treatment may be the answer to the current MR-CDI epidemic. Fecal microbiota transplantation (FMT), also called fecal bacteriotherapy, was described as long ago as the 17th century. The similar veterinary practice of transfaunation (transfer of symbiotic fauna from one host to another) was used to cure colitis in farm animals. In 1958, before *C. difficile* was discovered as a causative pathogen, FMT was used successfully to treat patients with antibiotic-associated pseudomembranous colitis. (See the box below.)
*Clostridium difficile* commonly causes an inflammation of the colon called pseudomembranous colitis. This image shows yellow pseudomembranes on the wall of the colon.

More than 500 bacterial species inhabit the intestinal tract, creating a symbiotic environment within this microbial organ. Scientists are starting to recognize this symbiosis as an important element in immunity; the gut provides protection from pathogens and promotes epithelial-cell proliferation and nutrient production and metabolism.

*C. difficile* flourishes in the environment around us. Intestinal flora protect us from it, but antibiotics can disturb the balance, allowing *C. difficile* to proliferate, overgrow, and cause infection. FMT reconstitutes the normal intestinal flora, which explains its overwhelming success in treating CDI.

Candidates for FMT include patients who:

- have had three episodes of recurring CDI with 6 to 8 weeks of antibiotic failure, or two recurrent CDIs requiring hospitalization
- have moderate CDI but haven’t responded to antibiotic therapy
• have severe colitis from *C. difficile* and are decompensating and unresponsive to antibiotics.

Ineligible patients typically include those receiving immunosuppressant agents or chemotherapy, those who’ve had a recent bone marrow transplant, and those with advanced HIV/AIDS. Patients with toxic megacolon aren’t eligible for FMT because that condition is a surgical emergency.

FMT isn’t limited to patients with CDI. It also has been used successfully in patients with chronic severe constipation and in those with inflammatory bowel disease (such as Crohn’s disease or ulcerative colitis) who’ve failed other therapies.

**Fecal donor selection**

FMT requires a healthy donor to provide stool for transplantation. Donors are recommended by the patient; they may be healthy relatives or close friends. Potential donors must undergo an extensive interview to assess lifestyle and health history, as certain laboratory tests may not detect early infection. Exclusionary criteria include tattoos or body piercings within the last 6 months, a history of incarceration, high-risk sexual behaviors, communicable illnesses or antibiotic treatment within the past 3 months, and such GI conditions as irritable bowel syndrome or chronic diarrhea. Donor stool is tested extensively for pathogens, including *C. difficile*, ova and parasites, *Helicobacter pylori*, *Giardia*, and *Cryptosporidium*. Donor blood is tested for human immunodeficiency virus, syphilis, and hepatitis A, B, and C.

For 5 days before stool collection, donors must refrain from eating foods to which the recipient may be allergic. They should notify the physician if they become ill with fever, diarrhea, or vomiting between screening time and donation. They are given a urine collection hat, a stool specimen cup prelabeled with their name, a tongue depressor, and a biohazard bag for transporting stool to the hospital.

**Patient preparation and education**

The notion of placing someone else’s feces into one’s body sounds unappealing—unless you’ve been suffering for month or years with recurrent CDI. Many patients are willing to try anything. For them, FMT is a welcome option. The goal of FMT is to reduce diarrhea frequency and decrease the infectious burden.

FMT usually is done in the inpatient setting. The physician explains the procedure to the patient and obtains informed consent. For 3 days before FMT, the patient is pretreated with oral vancomycin 125 mg three times daily; the drug is discontinued the day before the procedure. The patient receives a proton-pump inhibitor the evening before and morning of the procedure to reduce gastric acid in the stomach.
When providing patient education, be sure to include the FMT process, donor selection, and the method that will be used to instill the stool. Also teach the patient and family how to prevent spread of CDI at home, including proper hand hygiene with soap and water and use of bleach to clean environmental surfaces. Encourage the patient to notify all treating healthcare providers of their history and CDI treatment, and urge them to question any antibiotic prescription.

**Procedure**

Donor stool preparation is done using standard precautions. Usually, donor stool is instilled within 6 hours of the donor’s bowel movement. First it’s diluted using preservative-free sterile saline solution. Next, a fecal slurry is made by manually stirring it or using a blender until the stool is of a consistency that allows for aspiration. The fecal slurry is filtered using gauze or a mesh strainer to remove as much particulate as possible, and is instilled immediately.

Several methods can be used to deposit the slurry—colonoscopy, retention enema, or nasogastric (NG) tube. No established guidelines exist for the best instillation method or amount of slurry to instill; clinicians should consider the patient’s size and instillation method. For an average-size adult, 50 to 200 mL are instilled via NGT; for colonoscopic instillation, 250 mL to 500 mL are instilled.

If the patient is receiving the slurry through an NG tube, additional nursing considerations apply. Once the physician prepares and filters the stool, the nurse draws up the slurry into a clean 60-mL syringe and injects the prescribed amount slowly (50 mL over 2 to 3 minutes) into the NG tube, followed by a 50-mL flush of saline solution.

**Postprocedure care**

For at least 2 hours after the procedure, keep the head of the bed elevated at least 30 degrees to reduce reflux and aspiration. Patients may experience belching, abdominal cramping, and nausea, but these symptoms should last only a few hours. They may resume their normal diet or tube feedings 2 hours after the procedure.

Many patients report feeling better within 24 hours of FMT. Be sure to document continued diarrhea, as FMT may need to be repeated after 5 days if the diarrhea continues. FMT is deemed successful if symptoms resolve and don’t recur for 8 weeks; at that point, the patient is considered clinically cured. Patients don’t need to be retested for *C. difficile*, as they’re likely to remain colonized with the bacteria but not infected. Patients are tested only if they’re symptomatic.

In patients who’ve undergone FMT, the cure rate for MR-CDI is nearly 90%. Yet barriers to this procedure persist; for instance, most insurance companies don’t cover donor screening costs. Also, few hospitals have FMT protocols, making preparation and administration difficult.
As a nurse, you may come in contact with patients who have MR-CDI. You can play a crucial role in reducing MR-CDI by disseminating information about FMT. The next time you encounter a patient with MR-CDI, consider recommending FMT to the healthcare team.

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Selected references


