Nutrition Therapy for *C. Difficile* Diarrhea

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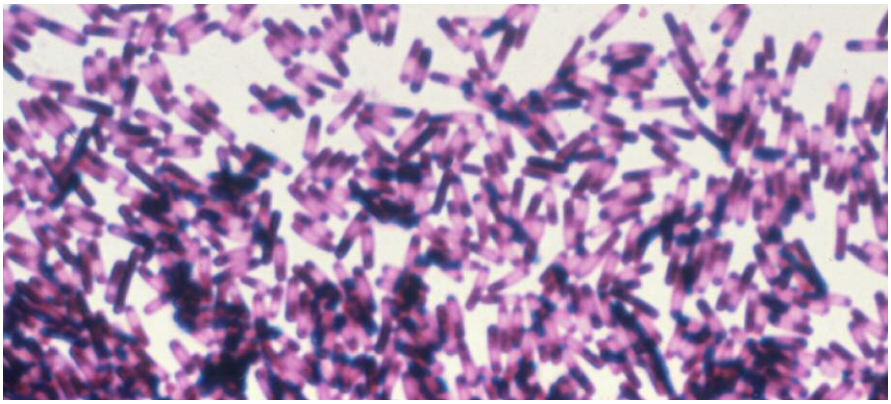
Clostridium difficile is an anaerobic spore-forming bacterium that causes diarrhea and more serious intestinal conditions.[1] *C. difficile* is one of the chief causes of hospital-acquired diarrhea in the US. It is responsible for approximately 3 million cases per year of diarrhea and colitis, and more than $1.1 billion in healthcare costs. Estimates indicate that approximately 13% of individuals with hospital stays up to 2 weeks and 50% of those with hospital stays of greater than 4 weeks acquire *C. difficile*.[2] Hospital stays for *C. difficile* patients are 3.6 days longer and accompanied by an extra cost of $3699.[3]



Causes and Symptoms

The normal human gastrointestinal (GI) tract contains approximately 400 types of bacteria that reduce the growth of harmful bacteria and promote a healthy digestive system. When the balance of bacteria in the gut is upset, the "good" bacteria may decrease in number, allowing harmful competitors to thrive. The balance of bacteria can be upset by many things, including use of antibiotics or other drugs, current or recent hospitalization, living in a nursing home, previous or current exposure to the bacteria, advanced age, surgery, nasogastric tube placement, stay in an intensive care unit, antacid use, or exposure to "unfriendly" microorganisms.

C. difficile can be acquired from a carrier and can be spread through either direct or indirect contact with contaminated surfaces or air-borne spores. The spores can survive for weeks on surfaces such as toilets, floors, bed rails, telephones, and stethoscopes.[2]

Individuals taking antibiotics are particularly at risk for infection. In fact, 80% of cases occur in patients who are currently on antibiotic therapy.[4] More than 3 days of antibiotic therapy doubles the risk of acquiring antibiotic-associated diarrhea, and the majority of cases occur on the 4th to 9th days of antibiotic therapy.[2]

Almost all antibiotics can increase harmful bacteria, but the broad-spectrum penicillins, clindamycin (Cleocin), and cephalosporin antibiotics (Ceftin, Omnicef, Rocephin, Maxipime) are the most problematic.[4] Additional contributing factors may include antiviral and antifungal agents, chemotherapy, dietary changes, anesthesia, intestinal surgery, uremia, and various other medications.[2,4]

Symptoms of *C. difficile* diarrhea (CDD) may include watery diarrhea (3 or more watery stools per day for 2 or more days), fever, loss of appetite, nausea and/or abdominal pain or tenderness.[1] Complications may include dehydration, sepsis syndrome, prerenal azotemia, toxic colitis, and death.[4]

Treatment

In most cases treatment requires discontinuing the offending antibiotic along with administering fluids and electrolytes. This therapy alone resolves diarrhea in 15% to 23% of otherwise healthy adults.[2]

For older individuals, those who must continue on antibiotic therapy, or patients with numerous comorbidities, typically treatment includes initiating an antibiotic such as metronidazole (Flagyl) for 10 to 14 days. Improvement is usually seen in 1 to 4 days, with resolution within 2 weeks.[2] Opiates and antidiarrheal medications may decrease motility, thereby increasing toxins in the intestine, so their use should be avoided.[2]

Relapses occur in approximately 20% of cases and are most often seen within 2 months after antibiot-

C. Difficile Infections Increasing

According to a recent study in the *Archives of Surgery*,[1] the rate of infections from *Clostridium difficile*, increased from 261 per 100,000 patients in 1993 to 546 per 100,000 patients in 2003, more than doubling.

- Colectomy resulting from *C. difficile* skyrocketed from 1.2 per 1000 patients in 1993 to 3.4 per 1000 in 2003.
- In 1993, there were 20.3 deaths per 1000 *C. difficile* patients; in 2003, this figure was 50.2 per 1000 patient.
- The case fatality rate increased from 7.8 per 100 to 9.3 per 100.

The authors of the study, led by Dr. Rocco Ricciardi, were able to calculate the number of patients affected, but were unable to provide a definitive reason, although much of the blame is pinned on antibiotic use and a new strain of *C. difficile* with 20 times the toxin of other strains.

The authors hypothesized that more virulent strains of the bacteria may be the cause as well as increased resistance to first-line antibiotic therapy, increased use of fluoroquinolone antibiotics, and increased patient acuity.

Other study findings included:

- A higher case rate in female patients but a higher mortality and colectomy rate in men
- A higher case rate and mortality in Medicare patients compared to all others, but a higher colectomy rate in patients with private insurance or self-pay
- Increasing case rate and mortality with the number of comorbidities
- Age-related increases in case rate, case fatality rate, and mortality

Reference

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ic treatment for CDD stops. Recurrence is usually the result of reinfection or germination of *C. difficile* spores in the colon.[2]

Recurrences may be more severe than the original infection. Those who have one recurrence are 65% more likely to have additional recurrences.[4] Relapses can be difficult and at times may require treatment with antibiotics such as vancomycin, metronidazole, or intervenous antibiotic treatments.[2,4]

For control of diarrhea, small, frequent feedings with fluids between meals is helpful. If diarrhea is severe, a clear liquid diet is appropriate for 1 to 3 days. Water losses should be replaced at a rate of 35 to 40 ml/kg.

Liquids should be given at room temperature and advanced as tolerated. Replace electrolytes by offering high-sodium soups and other foods, along with fruit or vegetable or tomato juice to replace lost potassium. Specialized electrolyte hydration products or intravenous replacement may be needed in some cases.

Prevention includes minimizing risk through the careful use of antibiotics (including restriction of cephalosporins, particularly clindamycin and broad-spectrum antibiotics). In addition, minimize exposure to *C. difficile* through stringent handwashing policies, careful isolation for those who already have CDD, and careful disinfection of any objects that may be contaminated.[2,4]

Tapering the dose of vancomycin or metronidazole over a 4- to 6- week period may be more effective than stopping it abruptly.[4] The theory is that tapering the dose allows restoration of normal gut flora while the antibiotic continues to kill the bacteria.

Probiotics and Prebiotics

Probiotics are "friendly bacteria" intended to assist the body's natural gut flora to reestablish themselves. They may help strengthen the immune system and offset side effects of antibiotics like gas, cramping, or diarrhea. Most probiotics are bacteria similar to those naturally found in the human gut such as *Lactobacillus* or *Bifidobacterium*. Within each group, there are different species and within each species, there are different strains or varieties.

Probiotics may be used to prevent diarrhea caused by antibiotics by helping to replace the lost beneficial bacteria and possibly by inhibiting regrowth of the offending bacteria.[5] Probiotics are available in foods and dietary supplements in the form of capsules, tablets, and powders. Foods may include yogurt, fermented and unfermented milk, miso, tempeh, some juices, and soy beverages.

There is limited evidence supporting some uses of probiotics. In studies of probiotics as cures, any beneficial effect was usually low; a strong placebo effect often occurs; and more research is needed to draw firmer conclusions.

There is some encouraging evidence on use of probiotics to treat diarrhea (this is the strongest area of evidence, especially for diarrhea from rotavirus), and to shorten the duration of intestinal infection caused by *C. difficile*.[6] There is evidence that probiotics form beneficial temporary colonies that may assist the body with the functions of the natural flora, allowing natural flora time to recover from depletion.

Prebiotics are nondigestible food ingredients that selectively stimulate the growth and/or activity of beneficial microorganisms already in the colon.[6] Prebiotics include fructooligosaccharides (FOS) that are not digested in the GI tract but are fermented in the colon. FOS are similar to soluble fiber but do not contribute to residue in stool. FOS stimulate growth of healthy bacteria, normalize bowel function, and

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organizations, and other related organizations to keep them apprised of your objectives and planed changes. Equally important is the development of a strategy for educating diverse stakeholders—families and friends of residents, your governing body, and the community at large, including churches, nursing schools, and colleges.

Welcome the Inevitable Challenges of this Transition

Any major change within a person or an organization brings uncertainties and errors along the way. Transitioning to a WPW approach to palliative care is no different. Managers may have different ideas about how to proceed, and you may lose some staff who cannot make the transition. There is considerable upfront cost in time and energy to rework personnel and administrative procedures. Discipline yourself to welcome each mis-step in the developmental process as an opportunity to improve your process. An abundance of "learning opportunities" is one of the differences between trail blazing and taking the well-trodden path.

Sustained focus on providing end-of-life care within a WPW environment is rich with rewards. With time this commitment will have an increasingly positive impact on your employees' job satisfaction and—thanks to the most effective of all marketing techniques, word of mouth—your occupancy rate. The highest reward, however, is intrinsic—knowing that you and your organization are achieving excellence in a partnership with people, one person at a time, at one of the most important and sacred times of their lives. ALC

If this were your own death, how would you want it?

Barbara Frank, MSW, is COO of Lakeview Village, Lenexa, KS, and Jan Montague, MGS, is Vice President of Community Life. ***(Note: Readers are welcome to write the authors at Lakeview Village, 9100 Park St., Lenexa, KS 66215 for a copy of the booklet, "Good Endings," which introduces the WPW approach to palliative care.)***

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may be used to manage diarrhea and constipation. "Research suggests that FOS may have a role in prevention and treatment of *C. difficile* infections by helping to restore normal indigenous microflora."[7] ALC

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Table 1. Resources

- *Clostridium difficile* Support Group: www.cdiffsupport.com
- Infectious Disease Fact Sheet (*Clostridium difficile*). Environmental Health and Safety Division of the Washington University in St. Louis: www.ehs.wustl.edu
- Medline Plus, National Library of Medicine, National Institutes of Health, Medical Encyclopedia: Stool *C. difficile toxin*: www.nlm.nih.gov/medlineplus/ency/article/003590.htm.
- Can M, Besirbellioglu BA, Avci IY, Beker CM, Pahsa A. Prophylactic *Saccharomyces boulardii* in the prevention of antibiotic-associated diarrhea: a prospective study. *Med Sci Monit.* 2003;12(4):119-22.