

MEDICAL NUTRITION THERAPY

FOR RESIDENTS WITH *C. DIFFICILE*-ASSOCIATED DISEASE AND ANTIBIOTIC-ASSOCIATED DIARRHEA

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Introduction

Clostridium difficile (*C. diff*) is a spore-forming bacterium that releases toxins in the intestine, causing mucosal inflammation, intestinal damage and diarrhea. It is one of the most common nosocomial infections, with incidence and severity on the rise and reaching epidemic levels in the U.S. This is possibly due to the increased use of broad-spectrum antibiotics and the emergence of a *C. diff* strain that has increased virulence.

Long-term care (LTC) residents are at especially high risk because of their extended length of stay, advanced age, frequent hospitalizations and the widespread use of antibiotics.¹ Between 50 percent and 75 percent of residents in LTC are exposed to one or more courses of antibiotics over a 12-month period.^{2,3,4,5,6}

Up to 33 percent of LTC residents treated with an antibiotic acquire *C. diff*, with a 44 percent rate of recurrence within one to two months.^{7,8} Furthermore, up to 65 percent of residents who have suffered two or more episodes will have another recurrence.⁸ In the last decade, there has been a 500 percent increase in antibiotic-associated diarrhea (AAD). *C. diff* accounts for between 15 percent and 25 percent of all episodes of AAD.⁹ Even when an outbreak is not occurring, the prevalence of *C. diff* colonization in LTC can be up to 20 percent, compared with less than 3 percent in healthy adults.^{10,11,12}

Studies have conservatively estimated the national cost of *C. difficile*-associated disease (CDAD) to be between \$1 billion and \$3.2 billion.^{13,14}

Diarrhea treatment

C. diff is the most common infectious cause of acute diarrheal illness in LTC.^{15,16} For residents with CDAD who have decreased appetite, high calorie supplements such as 2cal/ml, given 60 minutes after or before meals, may help them obtain the calories required to meet metabolic needs. There are many liquid hydrolyzed protein supplements available that contain between 10-17 grams of complete protein per one ounce serving. Additionally, since breakfast is usually the meal where the most food is consumed, providing breakfast foods that have been enhanced

with calories, such as high-calorie cereals, might be a useful strategy. The use of fortified foods and beverages such as soups, mashed potatoes, desserts and juices should also be utilized to combat unintended weight loss. According to the nutrition care process, treatment for diarrhea should achieve the following:

Restore normal fluid, electrolyte and acid-base balance

If the resident has mild diarrhea, clear juices and soups with small, frequent feedings are recommended for rehydration. If the resident has moderate to severe diarrhea, the use of oral rehydration solutions such as Resol, Ricelyte, CeraLyte and Rehydralyte, which contain sodium, potassium and glucose, are recommended. Water losses should be replaced at a rate of 35 to 40 ml/kg. Beverage preferences should be obtained and provided to the resident possibly at the rate of 1-2 ounces every 1-2 hours. Liquids should be given at room temperature and advanced as tolerated.

RECOMMENDED	AVOID	LIMIT
Decaffeinated coffee, caffeine-free teas, soft drinks without caffeine and rehydration beverages. High-sodium soups along with fruit, vegetable or tomato juice can be used to help replace lost electrolytes.	Beverages sweetened with sorbitol and those containing caffeine, including regular coffee, regular tea and colas.	Beverages containing high-fructose corn syrup should be limited to 12 oz per day.

Thicken consistency of the stool

Banana flakes, apple powder and other pectin sources can be added to foods. Historically, the use of the BRAT (bananas, rice, applesauce and toast) eating pattern has been used to guide the initial food choices for acute diarrhea, but this pattern does not provide a variety of nutrients. Also, antimotility agents such as loperamide should be avoided when the resident has *C. diff*-associated diarrhea.

Stimulate the gastrointestinal tract

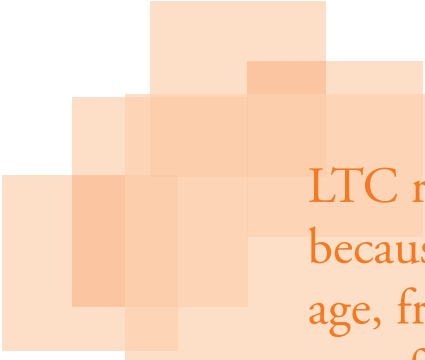
The goal here is to stimulate the gastrointestinal tract through the slow introduction of solid foods without exacerbating symptoms. Low-residue, low-fat, lactose-free nutrition therapy should guide initial food selections. If there is no evidence of lactose intolerance, these foods should be added back into the meal plan. Small, frequent feedings with fluids between meals will help control diarrhea.

RECOMMENDED	AVOID	LIMIT
Low-fat dairy products, yogurt with pre- and probiotics, poultry, eggs, white bread, crackers, pasta, cereals, well-cooked vegetables without seeds or skin, strained vegetable juice, melons, ripe bananas and tender, well-cooked meat.	Whole milk products, fried meats, luncheon meats, fatty meats, whole wheat or whole grain products, raw vegetables (except lettuce), all raw fruits (except bananas and melons), dried fruit, fruit with pulp, canned fruit in heavy syrup, honey, sugar alcohols (such as sorbitol), high-fiber and gas-producing foods such as nuts, beans, corn, broccoli, cauliflower and cabbage.	Fats should be limited to less than 8 teaspoons per day.

FOR SEVERE DIARRHEA, A CLEAR LIQUID DIET IS APPROPRIATE FOR 1 TO 3 DAYS AND INCLUDES:

Juice, gelatin, ice water, popsicles, ice chips, sweetened tea or coffee, meat or vegetable broths and hydrolyzed collagen-based liquid protein supplements.

(Cont.)



LTC residents are at especially high risk for *C. diff* because of their extended length of stay, advanced age, frequent hospitalizations and the widespread use of antibiotics.


Repopulate the gastrointestinal tract with normal flora

Probiotic and prebiotic supplementation can be used to repopulate gut flora, assisting with treatment and recovery from CDAD. Probiotics are live microorganisms that, when administered in adequate amounts, confer a health benefit to the host. Probiotics are available in foods and dietary supplements in the form of capsules, tablets, powders, gum and straws.

The addition of probiotics to the diet of residents undergoing antibiotic therapy replaces natural bacteria that would normally counteract *C. diff* by competing for resources in the colon. Probiotics have been associated with diminished rates of *C. diff* and reduced costs associated with treatment of these infections.¹⁷



Symptoms of CDAD include:

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- Loose, watery, foul-smelling stools
 - Cramping
 - Abdominal pain
 - Loss of appetite
 - Fever

Prebiotics

Prebiotics are non-digestible food ingredients that positively affect the host by selectively stimulating the growth and/or activity of one or a limited number of beneficial bacteria in the colon.¹⁸ In effect, prebiotics act as food for gut bacteria. A number of food ingredients have been shown to act as prebiotics. These include fructooligosaccharides (FOS), inulin, galacto-oligosaccharides (GOS), lactulose, polydextrose and digestive-resistant maltodextrin.¹⁸ They have been added to foods and beverages such as yogurt, kefir and other dairy drinks, functional waters, nutrition bars and supplements, soy milk, mineral supplements and medical foods.

Synbiotics (probiotics and prebiotics)

A prebiotic can be combined with a probiotic to make a synbiotic, which improves the survival rate and proliferation of the probiotic in the gastrointestinal tract and helps ensure that they reach the colon in numbers adequate enough to confer a health benefit. Providing foods and

supplements that contain synbiotics to residents with *C. diff* or AAD (or those at risk) will help ensure optimal delivery to the gut, strengthening their front-line defense and improving quality of life. 🍌



About the author

Jennifer Sallit, PhD, RD, serves as Scientific Director for Medical Nutrition USA, Inc., where she conducts research in gerontological nutrition for medical food product development. Dr. Sallit was an Adjunct Professor at Florida International University, where she taught courses in nutrition, and has been involved in nutritional research for the last 11 years. She holds a Bachelor of Science in Nutrition and Food Science from Drexel University and a Master's and Doctorate in Dietetics and Nutrition from Florida International University. Her current research focus is on improving nutritional status and quality of life in older adults.

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