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### Clostridium difficile

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# Clostridium difficile

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## Introduction

Clostridium difficile (CD) is an infectious disease that has a direct impact on our healthcare resources. "Clostridium difficile, an anaerobic, spore forming, toxin-forming, gram-positive bacillus, has become the leading cause of health care—associated infectious diarrhea (Walters & Zuckerbraun, 2014, p. 329)." I chose this topic because CD is a hypervirulent organism that is not only affecting hospitalized patients but is now emerging as a community acquired infection. Healthcare treatments and costs are on the rise due to persistent and recurrent CD infections. Understanding the pathogenesis, risk factors, diagnostic testing, and management strategies are important in reducing the spread of CD infections (Keske & Letizia 2010).

## Signs & Symptoms

- Asymptomatic (carrier)
- Watery diarrhea (at least three bowel movements per day for two or more days)
- Fever
- Loss of appetite
- Nausea
- Abdominal pain/cramping
- Dehydration

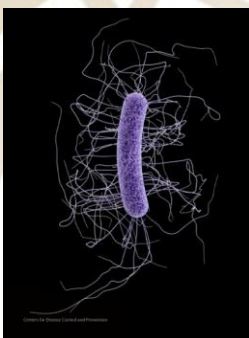


Figure 1. Medical Illustration of Clostridium

## Physiological Processes

### Underlying Pathophysiology

Clostridium difficile (CD) is a spore-forming microorganism that releases toxins when in an anaerobic environment. The spore form allows the bacteria to remain dormant until the opportune conditions cause the bacteria to emerge. The CD spore, after ingested, is resistant to gastric acid and can be passed into the intestines, where conditions are favorable. The spores then germinate and release two exotoxins, A and B, that contain properties of enterotoxins and cytotoxins. These toxins can open tight junctions between cells in the intestines that end with increased vascular permeability and hemorrhaging (Fraser & Swiencicki, 2015). The toxins also produce tumor necrosis factor-alpha and proinflammatory interleukins that cause an inflammatory response that leads to the development of pseudomembranes. Toxins A and B cause tissue damage in the gastrointestinal tract which results in diarrhea. CD is able to colonize in the gastrointestinal tract following a change in normal flora. The change in normal flora is typically caused by antibiotic use. Antibiotics kill off the body's normal flora in the intestines providing more nutrients and space for the remaining infectious microorganism like CD.

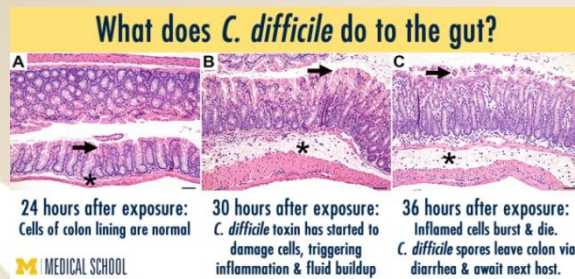


Figure 2. What does C. difficile do to the gut?

## Significance of Pathophysiology

The significance of the pathophysiology of CD is its highly virulent factors. The spore form is what makes this organism resistant and highly transmissible. Healthcare workers pose the greatest risk of transference from direct or indirect exposure to a patient or their patient's environment. Understanding CD, its transmission, and its infectious process will allow for adequate treatment. According to Juneau et al. (2015), "approximately 20% of patients with CDI develop a recurrent episode of C. difficile colitis, typically within 3-10 days after completing antibiotics" (p. 4). The etiology of CD recurrence is not currently well understood. It could be related to inadequate eradication following the antibiotic regimen or it may be related to inadequate production of antibodies against the bacterial toxins (Juneau et al., 2015). More research is needed to identify recurrence rates to better compare community acquired versus hospital acquired CD infections.

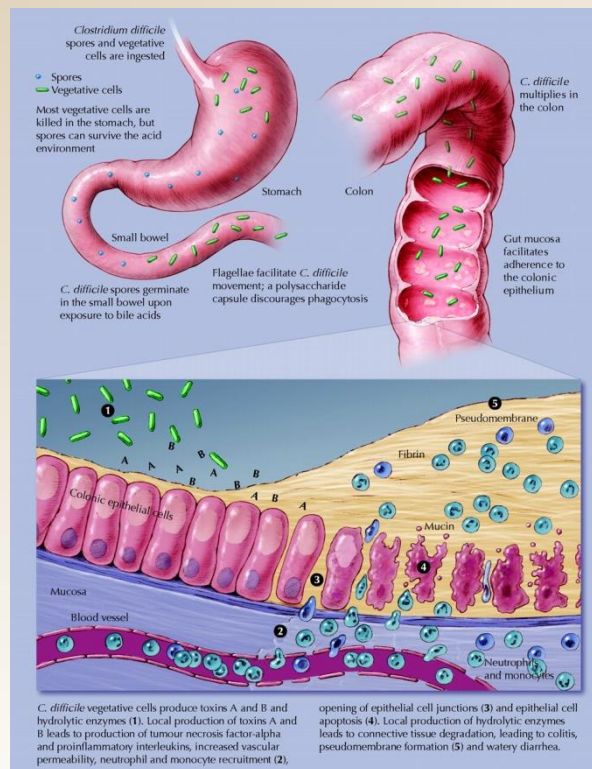


Figure 3. Untitled photograph of Clostridium difficile disease process

## Risk Factors

- Exposure to organism
- Prolonged hospitalization
- Older age
- Comorbidities (inflammatory bowel disease, gastrointestinal surgery, cancer, chemotherapy treatment, and organ transplant)
- Immunosuppressive patients
- Severity of illness
- Malnutrition
- Male sex
- Recent or frequent use of broad-spectrum antibiotics
- Use of proton pump inhibitors may also be a risk factor

## Implications for Nursing Care

- Early identification and diagnosis
- Implementation of contact isolation precautions (gown and gloves are important to prevent spore transmission)
- Private room (separate stethoscopes and blood pressure cuffs)
- Proper cleansing and care of environmental factors to stop transmission
- Cautious hand hygiene with soap and water is necessary to adequately remove spores and prevent transmission (Alcohol based hand gels are ineffective in removing spores)
- Focused antimicrobial stewardship programs
- Earlier surgical consultations and management may improve outcomes in patients with a complicated disease
- A multidisciplinary approach with the support of hospital leaders is needed to reduce the morbidity, mortality, and financial burden for patients and the health care system.
- Avoid unnecessary use of antibiotics



Figure 4 Untitled photograph of a compliance sign on contact precautions

## Conclusion

There are many unknown factors about CD infections that need further investigation. More research is needed to further evaluate its epidemiology, risk factors, diagnostic measures, control measures, and treatment options (Juneau et al., 2013). Prevention is key in controlling the spread of this hospital-acquired or community-acquired infection. Nurses play a critical role in the prevention of CD infections through early detection, patient education, implementing contact precautions, and assisting with environmental cleanliness and surveillance.

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