Clostridium difficile

General Information

Clostridium difficile [klo–strid–ee–um dif–uh–seel] (*C. difficile*) is the most common cause of healthcare-associated diarrhea. It is a spore-forming, Gram-positive anaerobic (does not grow in the presence of oxygen) bacillus that produces two exotoxins: toxin A and toxin B. It causes inflammation of the colon, known as colitis. People who have other illnesses or conditions requiring prolonged use of antibiotics and the elderly, are at greater risk of acquiring this disease. The bacteria are found in the feces.

People can become infected if they touch items or surfaces that are contaminated with feces and then touch their mouth or mucous membranes. *C. difficile* infections (CDI) can cause: pseudomembranous colitis (PMC), toxic megacolon, perforations of the colon, sepsis, and death.

Significance

There is significant morbidity and mortality related to C. difficile infection. Data collected NHSN between 2008 -2014 (published in 2016) demonstrated that there has been an 8% decrease in hospital acquired C. difficile infections.

- U.S. hospitals treat 165,000 cases of hospital-acquired, hospital-onset *C. difficile* per year, which add $1.3 billion in excess costs and cause 9,000 deaths. Many individuals will have a re-occurrence of infection and 29,000 individuals will die within the first 30 days of diagnosis.
- In terms of hospital-acquired, post-discharge *C. difficile* (up to four weeks), there are 50,000 cases annually leading to 3,000 deaths.
- In nursing homes, there are 263,000 cases of *C. difficile* per year, associated with $2.2 billion in excess costs and 16,500 deaths per year. Source: CDC

Symptoms

Symptoms include watery diarrhea (at least three bowel movements per day for two or more days), fever, loss of appetite, nausea, abdominal pain/tenderness.

Transmission

C. difficile is shed in feces. Most patients remain asymptomatic after infection. Normally, this pathogen has complicated nutritional requirements (fastidious) in its vegetative state. It can form spores when growth conditions are unfavorable, which enables the pathogen to persist in the environment for extended periods of time (e.g., in soil and on dry surfaces). Any surface, device, or material (e.g., toilets, bathing tubs, and electronic rectal thermometers – a disposable thermometer should be used for hospitalized patients) that becomes contaminated with feces may serve as a reservoir for the *C. difficile* spores. Environmental surfaces may serve as a source a reservoir for transmission of the spores. It was shown that direct exposure to contaminated patient-care items (e.g., rectal thermometers) and high-touch surfaces in patients' bathrooms (e.g., light switch) have been implicated as a source of infection. Spores are transferred to patients mainly via the hands of healthcare personnel who have touched a contaminated surface or item. Risk factors of acquiring infection include: exposure to antibiotics, gastrointestinal procedures and surgery, and advanced age.

Treatment

In about 20% of patients, CDI will resolve within 2-3 days of discontinuing the antibiotic to which the patient was previously exposed. The infection can usually be treated with an appropriate course (about 10 days) of antibiotics, including metronidazole, Vancomycin (administered orally), or recently approved Fidaxomicin. After treatment, repeat *C. difficile* testing is not recommended if the patients' symptoms have resolved, as patients may remain colonized. Newer treatment modalities are discussed in the literature.

General Prevention Guidelines

Measures for Healthcare Workers, Patients, and Visitors:

- Accommodate patients in a **private room with contact precautions**. If single rooms are not available, **cohort patients**, providing a dedicated commode for each patient
- Healthcare workers and visitors must use **gloves and gowns** on entry to a room.
- Emphasize compliance with the practice of **hand hygiene. An alcohol hand sanitizer can be used to perform Hand Hygiene upon entering the room, however, when leaving the patient/resident room, soap and water is to be used.**

Maintain contact precautions for the duration of diarrhea. If the patient/resident remains in the health-care setting, transfer to a new room and perform terminal disinfection of the room they had occupied or leave on Contact Precautions (Acute Care) until the time of discharge.

Guidelines and Recommendations	
SHEA-IDSA Guidelines (2010)	**CDC (2003)**
B. Environmental Cleaning and Disinfection Recommendations **19.** Identification and removal of environmental sources of *C. difficile*, including replacement of electronic rectal thermometers with disposables, can reduce the incidence of CDI (B-II). **20.** Use chlorine-containing cleaning agents or other sporicidial agent/s to address environmental contamination in areas associated with increased rates of CDI (B-II). **21.** Routine environmental screening for *C. difficile* is not recommended (C-III). *Source: Cohen et al. Clinical Practice Guidelines for Clostridium difficile. Infection control and hospital epidemiology may 2010, vol. 31, no. 5*	**VI. Special Pathogens** **G.** Because no EPA-registered products are specific for inactivating *C. difficile* spores, use hypochlorite-based products for disinfection of environmental surfaces in those patient-care areas where surveillance and epidemiology indicate ongoing transmission of *C. difficile*. **(Category II)** **H.** No recommendation is offered regarding the use of specific EPA-registered hospital Disinfectants with respect to environmental control of *C. difficile*. **(Unresolved issue)** *Source: CDC. Sehulster L, Chinn RYW. Guidelines for environmental infection control in healthcare facilities. MMWR 2003;52(RR10);1–42.*

Important Studies

1) Kundrapu et al. ***Daily Disinfection of High-Touch Surfaces in Isolation Rooms to Reduce***

Contamination of Healthcare Workers' Hands*. Infect Control Hospital Epidemiology 012;33(10):1039-1042.*

Study Conclusion:

In a randomized non-blinded trial, we demonstrated that daily disinfection of high-touch surfaces in rooms of patients with Clostridium difficile infection and methicillin-resistant Staphylococcus aureus colonization reduced acquisition of the pathogens on hands after contacting high-touch surfaces and reduced contamination of hands of healthcare workers caring for the patients.

2) Orenstein et al. ***A Targeted Strategy to Wipe Out Clostridium difficile.*** *Infect Control Hospital Epidemiology, 2012: 32(11): 1137-1139.*

Study Conclusion:

This study evaluated daily cleaning with germicidal bleach wipes on wards with a high incidence of hospital-acquired Clostridium difficile infection (CDI). The intervention reduced hospital-acquired CDI incidence by 85%, from 24.2 to 3.6 cases per 10,000 patient-days, and prolonged the median time between hospital-acquired CDI cases from 8 to 80 days.

Cleaning and Disinfection

Proper cleaning and disinfection is critical in reducing the risk of *C. difficile* transmission.

It is recommended to use a sporicidial agent to address environmental contamination in areas associated with **increased rates** of CDI or in **outbreak** situations.

Terminal cleaning of a patient/resident room requires a **two step** process. First, cleaning with a cleaning agent and second, to disinfect. If the product used is a cleaner/disinfectant, the environment should still be cleaned twice.

Clostridium difficile is susceptible to the following Diversey disinfectants and devices:

Product	Avert™ Sporicidal Disinfectant Cleaner/Wipes	MoonBeam®3 UV Disinfection
Contact Time (Min)	4	3
		

Product	Avert™ Disinfectant Cleaner	Rescue® (Liquid, Gel & Wipes)	MoonBeam®3 UV Disinfection
Contact Time (Min)	1	10	3
			

References:

1. www.cdc.gov/HAI/pdfs/cdiff/Cohen-IDSA-SHEA-CDI-guidelines-2010.pdf