
No Magic Bullet for Combating *Clostridium difficile*

Combining environmental and hand hygiene can help reduce incidents

by Kirsten M. Thompson, BS



***Clostridium difficile* infection rates in the United States tripled from the years 2000 to 2005.**

With the rates of *Clostridium difficile* (*C. difficile*) now surpassing those of methicillin-resistant *Staphylococcus aureus* (MRSA),¹ it has emerged as one of the fastest growing healthcare-acquired infections in hospitals and long-term care facilities. Rates of *Clostridium difficile* infection (CDI) in the United States tripled from the years 2000 to 2005, particularly among elderly patients.¹

In addition to CDI becoming more frequent, severe and difficult to treat, it is also becoming costly in both human and economic terms. It's estimated that as much as \$3 billion annually is spent in the United States managing cases of CDI due to increased hospital stays, treatment costs, morbidity and mortality among adult patients.³ In fact, a 2008 study done by APIC demonstrated a prevalence rate of 13 *C. difficile* infections per 1,000 patients (6.5 to 20 times higher than previous estimates) which increased hospital costs from \$2,500 to \$7,000 per patient.⁴

C. difficile is a gram-positive, anaerobic bacillus spore forming organism that is active only when there is no oxygen present such as in a person's intestinal tract. The vegetative, or actively growing form of *C. difficile*, produces toxins that cause symptoms such as diarrhea, abdominal pain, fever and increased white blood cell count. Patients' gastrointestinal symptoms can range from mild to severe and may include diarrhea, pseudomembranous colitis, toxic megacolon, and intestinal perforation—in the most severe cases resulting in death.

About 2 percent of adults carry *C. difficile* in their lower gastrointestinal tract, or are colonized, with no symptoms or evidence of infection. However, the percentage of people colonized with *C. difficile* can increase as much as 25 percent during hospitalization due to the frequent use of antibiotics and exposure to *C. difficile* within the hospital environment.

When exposed to air, or any environment not suitable for its growth and reproduction, *C. difficile* becomes dormant and forms an endospore, or bacterial spore. In its endospore form, *C. difficile* has a resilient spore coat and can remain viable on surfaces for several weeks, even months, making it difficult to eradicate. Spores are re-activated when they are ingested and move into the intestinal tract where they germinate and begin to grow and reproduce.

C. difficile is transmitted via fecal matter. Spores are deposited on surfaces through contamination by an infected person's hands, or by objects or clothing exposed to fecal matter. The hands of direct caregivers and other healthcare workers are the most common method by which the spores are transmitted in health care environments.

Heavy contamination of *C. difficile* spores is generally found on high-touch objects such as the toilet and bed rails in the rooms of patients with CDI. Surfaces may look clean,

but unless they have been thoroughly cleaned and disinfected using a suitable cleaning method such as a disinfectant approved for controlling *C. difficile* spores by the U.S. Environmental Protection Agency (EPA), the surface may still be contaminated.

Because of the resistant nature of *C. difficile* spores and the manner by which they're transmitted between patients, care-givers and hospital workers, any infection prevention strategy must include hand hygiene and environmental hygiene. If one practice fails, the other will fail as well.

Though it is well documented that hand hygiene is the single best way to help prevent healthcare associated infections (HAIs),¹ alcohol-based hand rubs are not effective against spores. In fact, one recent study found no correlation between the incidence of CDI and the use of alcohol based hand rubs in the facility.⁶

Currently, both the Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO) recommend that, when caring for a patient with CDI, healthcare personnel perform hand hygiene with either an alcohol-based hand rub or a hand wash. But a hospital experiencing an

outbreak should consider requiring that hand hygiene be performed with soap and water until the outbreak is contained. The mechanical action of washing and scrubbing with soap and water, while not effective in killing *C. difficile* spores, can physically remove the spores from hands and reduce the probability of transmission. Hand hygiene initiatives should also encourage hand washing among visitors and patients to further reduce the risk of transmission.

Surface disinfection is also an essential component in a facility's CDI prevention and control program because of the strong evidence that the environment is a key source of potential transmission of spore forming organisms like *C. difficile*. Specifically, rooms of patients with CDI have a higher likelihood of contamination and there is a higher carriage of *C. difficile* on hands of personnel who enter and leave these rooms.^{2,7} A comprehensive program that ensures environmental services and other personnel follow best practices for cleaning and disinfection can minimize the presence of pathogens in the healthcare environment. Thorough cleaning is especially important for rooms of patients with a suspected or confirmed case of CDI.



Bathrooms in particular should be a focus area for thorough cleaning and disinfection as *C. difficile* is shed in fecal matter. Extra attention should be paid to toilets, bedpans, bedpan cleaners, as well as any high-touch objects such as light switches, grab bars, flush handles and sink fixtures.

It's important to remember that bathrooms may require thorough pre-cleaning to remove any soils that could harbor spores, preferably with an EPA-registered one-step cleaner/disinfectant. This should be followed by disinfection with an EPA-registered disinfectant with efficacy against *C. difficile* spores. Due to the risk of surface to hand and hand to surface transfer of *C. difficile* spores, all high-touch objects in the patient room should receive similar attention.

Since the Centers for Disease Control and Prevention (CDC) published its guidelines for control and remediation of *C. difficile* in acute care settings in early 2008, several new ready-to-use hard surface disinfectant products approved by the U.S. Environmental Protection Agency (EPA) for use against *C. difficile* spores have entered the market (EPA registration numbers 1677-226 and 81073-3 and others). Though healthcare facilities may be accustomed to bleach solutions, the new products available effectively kill *C. difficile* spores while

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also providing greater material compatibility, enhanced convenience and ease-of-use.

Though it is important to use a disinfectant that has efficacy against *C. difficile* spores, it is equally important to ensure that all surfaces are being effectively cleaned. A recent study evaluated surfaces at 23 hospitals and found that, on average, only 49 percent of all high-touch objects were effectively cleaned during terminal room cleaning.⁸

Environmental hygiene initiatives should be focused on a programmatic approach to cleaning the environment that includes the right products, tools, processes and improvement strategies.

A number of studies have been published which show decreased transmission of pathogens when there is an increased focus on environmental cleaning.⁹⁻¹²

An effective environmental hygiene program should include:

- ▶ Training and education on best practices.
 - Surfaces must be thoroughly cleaned of all visible soil. A product with *C. difficile* endospore efficacy does little to remediate it if the surface is not thoroughly cleaned prior to disinfection.
- ▶ The right products and tools for the specific application.
 - The vegetative form of *C. difficile* is as susceptible to disinfectants as other bacteria in hospitals, but *C. difficile* spores are much harder to inactivate because of their resilient coat. Due to the chemical resistance of spores, it is important that the correct amount of disinfectant active ingredient is delivered to the surface for the right amount of time, as indicated on the product's label.
 - Ready-to-use products take calculating and measuring dilution out of the equation. However, if you are using a product that needs to be diluted, it is critical to have the controls in place to ensure the correct dilution every time.
 - The correct tools can improve efficiency of the cleaning process to ensure that the room is thoroughly cleaned while still meeting turnover expectations.



- ▶ Standardized cleaning protocols and infection control practices.
 - Ensure that high-touch objects are consistently cleaned and disinfected.
 - Provide controls to prevent cross contamination.
 - Provide objective metrics to ensure effectiveness of the cleaning program.

In summary, though incidents of CDI are growing in some instances, there are solutions available to reduce their transmission in healthcare environments. A comprehensive program that combines thorough environmental cleaning practices and appropriate hand hygiene can help reduce CDI and other healthcare acquired infections when implemented correctly. With diligence, a strategic approach and the proper training and measurement, healthcare facilities can improve environmental hygiene and patient care. †

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