Asymptomatic *Clostridium difficile* Colonization: Is This the Tip of Another Iceberg?

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(See the article by Riggs et al. on pages 999–8)

*Clostridium difficile* (CD)–associated disease (CDAD) remains the most common cause of acute care hospital–acquired diarrhea and is responsible for >300,000 cases of diarrhea per year in acute care facilities [1–3]. Historically, severe disease, such as toxic megacolon, as well as perforation, colectomy, and death, were infrequent events [4, 5]. However, hospitals across North America and Europe have identified CD infection outbreaks in their facilities, with rates as high as 39.9 cases per 1000 hospital admissions [6]. As importantly, the proportion of severe cases of CD infection (i.e., cases that resulted in colectomy and/or death) has significantly increased [7–9]. Molecular epidemiologic studies have identified these outbreaks as clonal [10, 11] and have identified the epidemic strain as BI by restriction enzyme analysis, North American PFGE type 1 (NAP1) by PFGE, and PCR ribotype 027 [11]. Additional data suggest that increased disease severity is a result of overproduction of CD toxins [12] and that the epidemic strain is associated with hypersporulation [13], which may facilitate environmental contamination and disease transmission.

Previously, investigators reported that approximately two-thirds of patients with fecal CD colonization become asymptomatic carriers [2, 14–16] and that asymptomatic carriers were associated with lower levels of environmental contamination [2, 17]. However, little is known about the frequency of asymptomatic carriage of the epidemic strain and its association with environmental and skin contamination.

Riggs et al. [18] prospectively examined the prevalence of asymptomatic carriage of NAP1 and nonepidemic toxigenic CD strains in long-term care patients and evaluated the frequency of environmental and skin contamination. Their findings are reported in this issue of *Clinical Infectious Diseases*. Over a 3-month period, they observed 73 long-term care residents. Five (7%) patients were found to have CDAD. Of the remaining 68 patients, 35 (51%) were asymptomatic carriers, and 13 (37%) of these 35 patients carried epidemic NAP1 strains. Nine of the 35 carriers had a history of CDAD. Asymptomatic carriers were associated with significantly higher rates of skin and environmental contamination than were noncarriers but with lower such rates than were patients with CDAD. Both asymptomatic patients and patients with CDAD had CD recovered from skin and environmental samples at a frequency of >50%, and spores on the skin of asymptomatic patients were easily transferred to the investigators’ hands. Incontinence did not increase contamination rates. Of note, CD was cultured from the skin samples of 19% of the noncarriers (i.e., patients with negative stool culture results). These findings differ from those previously reported and suggest that contamination of the patient and the environment occurs frequently and occurred in a significant proportion of patients with CDAD and in patients categorized as asymptomatic.

CD infection rates continue to escalate in many health care facilities. CD infection outbreaks have been documented, and rates as high as 39.9 cases per 1000 hospital admissions have been reported [6]. Although there are no benchmarks for CD infection rates, some experts believe that a rate ≤5 cases per 1000 hospital admissions (or discharges) is likely to be acceptable; a rate >5 cases per 1000 hospital admissions (or discharges) is a concern, >10 cases per 1000 hospital admissions (or discharges) a major concern, and >20 cases per 1000 hospital admissions (or discharges) is alarming (D. Gerding, personal communication).

As previously noted, CD hypersporu-
lation may facilitate environmental contamination [13] and contribute to ongoing CD infection outbreaks. Perhaps the undetected CD carriers, such as methicillin-resistant *Staphylococcus aureus* and vancomycin-resistant enterococci carriers, represent a reservoir for disease transmission, and the patients with CDAD will only represent the tip of the CD “iceberg.”

Riggs et al. [18] reported that only 58% of the isolates found in the environmental samples tested were identical to the isolates found in the stool of the patient currently residing in the room. This suggests that the environmental CD isolates may have been from prior occupants of the room. The authors’ data also demonstrated that significantly more patients were CD carriers, yet their contribution to environmental contamination was nearly equivalent to that of patients with CDAD. These asymptomatic CD carriers could have been the prior inhabitants of the contaminated room. Current guidelines do not routinely recommend enhanced environmental sodium hypochlorite bleach cleaning; however, several investigators have reported CD rate reduction when this measure was implemented for only patients known to have CD infection [19] or in combination with other measures [20]. Because asymptomatic CD carriers would not routinely be identified, these patients would not have been placed under barrier precautions, nor would enhanced bleach cleaning have been used. This can impact disease transmission in health care settings.

Although this information is not specifically documented, it can be assumed that these long-term care inpatients had rooms with an accessible sink, soap, water, and towels and that provisions were made for maintaining adequate resident personal hygiene according to guidelines [21]. However, it does not appear that there are mandates for frequency of bathing patients or requirements for specific bath products. Riggs et al. [18] also found that despite “adequate” resident personal hygiene, CD isolates were recovered from skin samples with a frequency of up to 67%, and nearly 20% of patients who were not found to have CD in their stool samples had positive skin culture results. These data suggest that CD infection may have been transmitted from the environment or from the hands, clothes, or equipment of the health care worker caring for another patient with CD infection. Before routine cleaning procedures are expanded to include a bleaching step, perhaps a more rigorous personal hygiene initiative could be developed.

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**References**


