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Sanjay Saint
University of Michigan Medical School

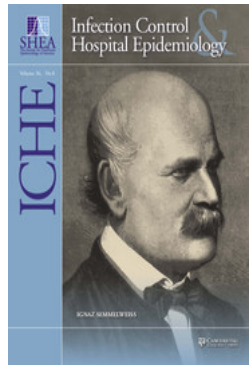
Karen E. Fowler
Veterans Affairs

Sarah L. Krein
University of Michigan Medical School

David Ratz
Veterans Affairs

Scott A. Flanders
University of Michigan Medical School

See next page for additional authors



Clostridium Difficile Infection in the United States: A National Study Assessing Preventive Practices Used and Perceptions of Practice Evidence

Sanjay Saint, Karen E. Fowler, Sarah L. Krein, David Ratz, Scott A. Flanders, Erik R. Dubberke and M. Todd Greene

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CONCISE COMMUNICATION

Clostridium Difficile Infection in the United States: A National Study Assessing Preventive Practices Used and Perceptions of Practice Evidence

Sanjay Saint, MD, MPH;[1,2,3] Karen E. Fowler, MPH;[1,3] Sarah L. Krein, PhD, RN;[1,2,3] David Ratz, MS;[1,3] Scott A. Flanders, MD;[2,3] Erik R. Dubberke, MD, MSPH;[4] M. Todd Greene, PhD, MPH[2,3]

We surveyed 571 US hospitals about practices used to prevent *Clostridium difficile* infection (CDI). Most hospitals reported regularly using key CDI prevention practices, and perceived their strength of evidence as high. The largest discrepancy between regular use and perceived evidence strength occurred with antimicrobial stewardship programs.

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The incidence of *Clostridium difficile* infection (CDI), a common, costly, and potentially life-threatening healthcare-associated infection, has increased dramatically.[1] Several practices are recommended to prevent CDI in acute care hospitals.[2,3] Little is known about the extent to which US hospitals are implementing these recommended practices to prevent CDI. It is also useful to understand how those who might champion infection prevention activities view current CDI prevention recommendations. We therefore conducted a national study to address these issues.

METHODS

Data Collection

The current study was part of an ongoing panel survey that began in 2005 in which we asked hospitals across the United States what practices they are using to prevent common healthcare-associated infections.[4] The most recent survey was sent in May 2013 to infection control coordinators at 571 hospitals across the nation. The survey sample included a stratified random sample of non-federal general medical and surgical hospitals with 50 or more beds and with intensive care beds. Description of the sample selection using the AHA Annual Survey Database and sample stratification is described elsewhere.[4] Surveys were mailed to all hospitals along with a cover letter, a pre-paid return envelope, and a $10 incentive. Survey reminders were sent after the initial mailing.

Institutional review board approval was obtained from the University of Michigan and the Veterans Affairs (VA) Ann Arbor Healthcare System.

Survey Measures

The survey instrument, which has been previously described,[4–6] included questions about facility characteristics, the infection control program, infection preventionists, and frequency of use and perception of evidence to determine hospital practices related to prevention and monitoring of device-associated infections. The present survey included questions related to CDI prevention. Respondents were asked how frequently certain CDI practices were used for adults in their acute care facility. Frequency was measured on a scale from 1 (never) to 5 (always), with "regular use" defined by a rating of 4 or 5. The CDI prevention practices of interest, derived primarily from the 2008 Society for Healthcare Epidemiology of America (SHEA) Compendium and other studies,[3] were the following: (1) contact precautions (gloves and gowns) while caring for infected patients; (2) private rooms or cohorting of infected patients; (3) soap and water hand hygiene before entering and exiting the room of infected patients; (4) terminal cleaning and disinfecting of an infected patient's room with a cleansing product containing chlorine bleach; (5) routine daily cleaning of high-touch surfaces of infected patients; (6) disposable (not reusable) thermometers for infected patients; and (7) participating in an antimicrobial stewardship program. Respondents were also asked about their perceptions of the strength of evidence for each of the above practices, using a Likert scale from 1 (no evidence) to 5 (extremely strong evidence). For our descriptive analysis of perceived strength of evidence, ratings of 4 or 5 represent "strong" evidence.

Sampling weights based on the inverse probability of selection and response in each bed size stratum were utilized to create nationally representative estimates for CDI practices and hospital characteristics. Descriptive statistics are reported as weighted proportions for categorical variables and weighted means for continuous variables.

RESULTS

The overall survey response rate was 71% (403 of 571); an additional 5 respondents did not answer the CDI questions, leaving a final sample of 398. Table 1 provides an overview of the responding hospitals along with their responses to several CDI-related questions. While 97% of hospitals reported having an established facilitywide surveillance system for monitoring CDI rates, only 24% have a written policy to routinely test for *C. difficile* when patients have diarrhea while on antibiotics or within several months of taking them. A total of 76% of hospitals reported that preventing CDI was very or extremely important to the leadership of their hospital.

Figure 1 shows the frequency of regular use and perceived strength of evidence for each of the key CDI preventive practices examined. Greater than 90% reported that their hospitals

TABLE 1. Hospital Characteristics and *C. difficile* Prevention Practices (N = 398)

Characteristic	% (95% CI)[a]
No. of hospital beds, mean (95% CI)	233 (222–245)
No. of intensive care unit beds, mean (95% CI)	22 (20–23)
Facility affiliated with a medical school	25.7 (21.6–29.8)
Facility has hospitalists	84.7 (80.9–88.5)
Facility has a hospital epidemiologist	42.6 (37.9–47.3)
No. of full-time equivalent infection preventionists at facility, mean (95% CI)	2.0 (1.5–2.5)
Facility has a written policy to routinely test for *C. difficile* when patients have diarrhea while on antibiotics or within several months of taking them	24.4 (20.0–28.8)
Established facility-wide surveillance system for monitoring *C. difficile* infection rates	97.0 (95.2–98.8)
Facility reports *C. difficile* infection rates to direct care providers	85.7 (82.1–89.3)
Perception of how important it is to hospital leadership at your facility to prevent *C. difficile* infection, very/extremely important	75.6 (71.2–80.0)

NOTE. CI = confidence interval.
[a]Data presented as percentage (95% CI) unless otherwise noted.

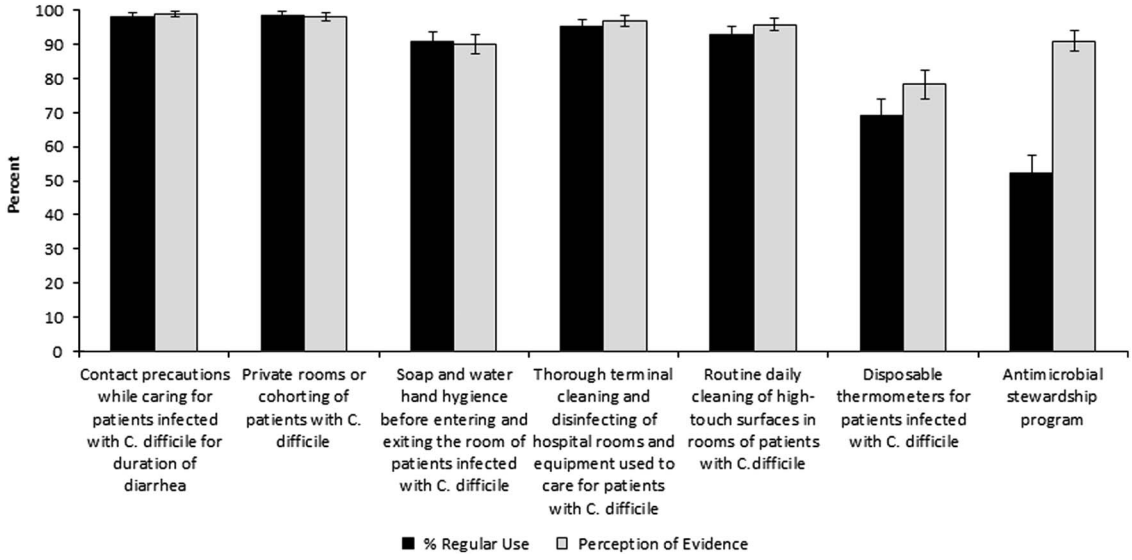

FIGURE 1. Use and perception of strength of evidence of key practices to prevent *C. difficile* infection.

regularly use several practices to prevent CDI: contact precautions, private rooms or cohorting of infected patients, enhanced room cleaning of infected patients, and use of soap and water for hand hygiene for infected patients. However, only 69% reported regular use of disposable thermometers, and 52% reported employing an antimicrobial stewardship program. Greater than 80% of respondents also perceived the strength of evidence for several practices to prevent CDI to be high: use of contact precautions in patients with CDI, private rooms or cohorting of infected patients, appropriately enhanced room cleaning of infected patients, use of soap and water for hand hygiene for infected patients, and antimicrobial stewardship. The only practice for which there was a sizeable gap between practice use and perceived strength of evidence was antimicrobial stewardship. Strength of evidence for antimicrobial stewardship was rated as high by 91% of respondents but by only 52% in regard to regular use.

DISCUSSION

Several key findings emerged from our national survey. First, most US hospitals reported using a surveillance system to monitor for CDI among their patients. Herzig et al[7] reported that among the 37 US states and territories that have enacted laws requiring reporting of healthcare-associated infection data, over half have mandated reporting of CDI rates. Second, reported use of several recommended practices is very high, along with the corresponding perceived strength of evidence for many of these practices. Finally, the gap between our respondents' reported regular use of antimicrobial stewardship

and their perceived strength of evidence to support antimicrobial stewardship was the highest of any practice.

We are aware of 1 other national study that characterized to some extent what US hospitals are doing to prevent CDI. Specifically, a survey by Jarvis et al[8] in 2008 found that more than 91% of US hospitals used contact precautions for patients with CDI.

The practice for which we found the largest discrepancy between reported regular use and perceived strength of evidence was antimicrobial stewardship. The overuse of antimicrobials can lead to patient harm. Thus, antimicrobial stewardship has recently emerged as an important patient safety practice.[9] Greater than 60% of hospitalized patients receive antibiotics.[10] Unfortunately, as much as 50% of antibiotic use in the hospital setting may be inappropriate.[9] The 2014 SHEA Compendium states "appropriate antimicrobial use as a CDI prevention measure is essential to any CDI prevention program."[2]

Several important limitations of our survey must be considered. First, we relied upon self-reporting by the lead infection control coordinator at each site. Second, while our sampling strategy was designed to obtain a nationally representative sample, it is possible that participating hospitals were different from nonparticipating hospitals, thereby making the results less generalizable. Finally, we did not distinguish between practices routinely used in CDI outbreak settings from those used in nonoutbreak settings. We are aware that certain interventions (eg, hand washing with soap and water, use of bleach) are only recommended in outbreak settings rather than endemic settings.[2]

We have provided a snapshot of practices US hospitals currently use to prevent CDI. While nearly all US hospitals report using surveillance to detect CDI, the use of antimicrobial stewardship programs to prevent CDI is lacking in 48% of hospitals despite the perceived high strength of evidence to support such programs. Better understanding this discrepancy and, more importantly, resolving it will be important for clinicians, policy makers, and patients.

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Affiliations: 1. Center for Clinical Management Research, Veterans Affairs (VA) Ann Arbor Healthcare System, Ann Arbor, Michigan; 2. Department of Internal Medicine, University of Michigan Medical School, Ann Arbor, Michigan; 3. VA/UM Patient Safety Enhancement Program, Ann Arbor, Michigan; 4. Department of Internal Medicine—Infectious Disease, Washington University School of Medicine, St. Louis, Missouri.

Address correspondence to Sanjay Saint, MD, MPH, George Dock Professor of Internal Medicine, University of Michigan Department of Internal Medicine, 2800 Plymouth Road, Building 16, Room 430W, Ann Arbor, Michigan 48109-2800 (saint@med.umich.edu).

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