American Journal of Infection Control 41 (2013) 100-6

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major article

Perceived strength of evidence supporting practices to prevent health care-associated infection: Results from a national survey of infection prevention personnel

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Key Words:
Hospital-acquired infection
Nosocomial infection
Device-associated infection
Catheter-associated urinary tract infection
Line infection
Ventilator-associated pneumonia or event

Background: Limited data exist describing the perceived strength of evidence behind practices to prevent common health care-associated infections (HAIs). We conducted a national survey of infection prevention personnel to assess perception of the evidence for various preventive practices. We were also curious whether lead infection preventionist certification in infection prevention and control (CIC) correlated with perceptions of the evidence.

Methods: In 2009, we mailed surveys to 703 infection prevention personnel using a national random sample of US hospitals and all Veterans Affairs hospitals; the response rate was 68%. The survey asked the respondent to grade the strength of evidence behind prevention practices. We considered "strong" evidence as being 4 and 5 on a Likert scale. Multivariable logistic regression models assessed associations between CIC status and the perceived strength of the evidence.

Results: The following practices were perceived by 90% or more of respondents as having strong evidence: alcohol-based hand rub, aseptic urinary catheter insertion, chlorhexidine for antisepsis prior to central venous catheter insertion, maximum sterile barriers during central venous catheter insertion, avoiding the femoral site for central venous catheter insertion, and semirecumbent positioning of the ventilated patient. CIC status was significantly associated with the perception of the evidence for several practices.

Conclusion: Successful implementation of evidence-based practices should consider how key individuals in the translational process assess the strength of that evidence.

Preventing health care-associated infection (HAI) enhances patient safety. There has been a recent proliferation of guidelines, systematic reviews, meta-analyses, and other evidence-based recommendations that clinicians and policy makers can use to decide which HAI preventive practices to implement in their hospitals.[1-10] Whereas the availability of such information is helpful, it is important to understand how those who might champion HAI prevention activities in the hospital view the recommendations that are being provided. For instance, if a practice is perceived as being supported by weak evidence by those in a position to affect change among front-line health care personnel, uptake and implementation of this practice is unlikely—irrespective of the underlying strength of the evidence.[11]

Infection preventionists (IPs) play a key role in preventing HAI within US hospitals. Every US hospital is required to comply with a condition of participation issued by the Centers for Medicare and

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Supported by the National Institute of Nursing Research (5 R01 NR010700), the Blue Cross Blue Shield of Michigan Foundation, and the Ann Arbor VAMC/University of Michigan Patient Safety Enhancement Program.

The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs.

Conflicts of interest: None to report.

0196-6553/$00.00 - Published by Elsevier Inc. on behalf of the Association for Professionals in Infection Control and Epidemiology, Inc.
http://dx.doi.org/10.1016/j.ajic.2012.10.007

Medicaid Services (CMS) stating that each hospital must designate a person(s) who serves as the IP to develop and implement policies and practices aimed at prevention and control of infections and communicable diseases.[12] IPs are not only expected to keep up with the prevention literature and make recommendations as to what practices to use to prevent infection, they may lead hospital efforts to implement the practice for routine use by front-line health care personnel. In this manner, IPs are a key link in the diffusion of innovation process by taking recommendations from the scientific literature and implementing certain recommendations in their facility.[13] For example, Furuya et al recently found that a central venous catheter (CVC) bundle was associated with a lower infection rate only when compliance with bundle elements was high.[14] IPs can become certified in infection prevention and control (CIC), a designation that requires that an IP pass a comprehensive examination that demonstrates their mastery of the knowledge necessary to be a highly capable IP (Certification Board of Infection Control & Epidemiology [CBIC]; http://www.cbic.org/). Given the emphasis on credentialing health care personnel by all stakeholders—coupled with the recent intense focus on HAI prevention—understanding the impact of board certification on the effectiveness of an infection prevention program is imperative.[15]

Despite the importance of IPs in helping ensure the safety of hospitalized patients, little is known about how infection prevention personnel responsible for implementing infection prevention practices perceive the strength of evidence behind these practices. By identifying which preventive practices are believed to have strong, moderate, or weak evidence, we can better tailor implementation strategies in actual clinical settings to address such perceptions. As a secondary goal, we sought to determine whether CIC status influences the perceived strength of evidence for various infection prevention practices.

METHODS

We conducted a national survey study to compare the use of specific infection prevention practices by US hospitals. In March 2009, using a national sample of non-federal and all Veterans Affairs (VA) hospitals, we surveyed infection prevention personnel to understand how they rated the evidence for general infection prevention practices and specific practices to prevent catheter-associated urinary tract infection (CAUTI), central line-associated bloodstream infection (CLABSI), and ventilator-associated pneumonia (VAP). The study sample had been originally derived for a similar survey study conducted in 2005.[11,16,17] Specifically, we identified all non-federal, general medical, and surgical hospitals with an intensive care unit (ICU) and at least 50 hospital beds using the 2005 American Hospital Association (AHA; Chicago, IL) Database (fiscal year 2003 data). We then stratified hospitals into 2 bed size groups (50-250 beds and ≥251 beds) and selected a random sample of 300 hospitals from each group. The 2009 survey was sent to the same hospitals sampled in 2005 with a few exceptions because of closure or merger between the longitudinal survey time points. We sent the survey out to a total of 586 non-federal hospitals. The VA sample consisted of all VA medical centers with primarily general medical and surgical acute care operating beds in 2005 (n = 119). Our 2009 survey was sent to 117 VA hospitals. Following a modified Dillman approach,[18] we sent an initial mailing, a reminder letter, and a second mailing of the survey after 4 weeks to those who had not yet responded. A third survey mailing was added in 2009 due to a lower response to the first two mailings, which had occurred contemporaneous with H1N1 preparations.

All mailings were addressed to the "Infection Control Coordinator" with the following instructions for survey completion: if there were more than 1 IP at that particular facility, then the IP who supervises and/or coordinates the other IPs should complete the survey. If an IP was unavailable, the survey should be completed by someone involved in infection prevention such as a hospital epidemiologist, the chair of the infection control committee, or the chief of nursing. The University of Michigan and VA Ann Arbor Healthcare System provided institutional review board approval.

Study measures

The survey asked about the perception of the evidence for use of general infection prevention practices and practices specific to the prevention of CAUTI, CLABSI, and VAP in adult acute care patients, with attention directed to practices identified in published guidelines or recommendations from the Centers for Disease Control and Prevention (CDC) or professional associations.[2,4,6,9,19,20] Using a Likert scale from 1 to 5 (1 being no evidence and 5 extremely strong evidence), respondents were asked to rate how strong they thought the evidence was for specific infection prevention practices. For our descriptive analysis, we categorized responses of 1 or 2 to correspond to "weak" evidence, responses of 3 to "moderate" evidence, and responses of 4 or 5 to "strong" evidence. For our regression analysis, strong evidence was defined as receiving a rating of 4 or 5. The perceptions of the evidence for all practices examined were dichotomized into binary dependent variables, with strong evidence (as defined above) coded as 1 and 0 otherwise. Information about general hospital characteristics and the infection control program were also collected, including whether the facility was participating in an infection prevention-related collaborative. Participation in a collaborative is measured as a "yes" response to the question "Is your facility involved in a collaborative effort to reduce health care-associated infections?" We also collected data on the number of full-time equivalent IPs, whether the lead IP is CIC, and the number of years the lead IP has been in current infection prevention position. The number of hospital beds was obtained from the AHA Database for fiscal year 2007 and was dichotomized as ≥250 beds or <250 beds for each hospital.

Statistical analysis

Means and standard deviations for continuous variables, and frequencies and percentages for categorical variables, were used to summarize selected hospital and IP characteristics. Descriptive statistics were used to generate frequency distributions of the perception of evidence for the infection prevention practices investigated. We used covariate adjusted logistic regression to examine multivariable associations between the CIC status of the lead IP and the perceived strength of the evidence for use of the various infection prevention practices. The following covariates were included in our final adjustment model: the number of years the respondent has been in their current position, the number of full-time equivalent IPs, hospital bed size, and hospital participation in a collaborative focused on reducing HAI. All analyses were conducted using Stata version 11.0 (Stata Corp, College Station, TX).

RESULTS

A total of 478 hospitals responded for an overall response rate of 68%. Demographic characteristics of the respondent hospitals are outlined in Table 1. Whereas our respondents had a number of different job titles, the most frequently identified titles were IP (60%), various infection prevention-related leadership titles such as director of infection prevention (23%), and infection control and/or employee health nurse (11%). The remainder listed a number of