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Psychological safety and infection prevention practices: Results from a national survey

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Abstract

Background: Psychological safety is a critical factor in team learning that positively impacts patient safety. We sought to examine the influence of psychological safety on using recommended health care–associated infection (HAI) prevention practices within US hospitals.

Methods: We mailed surveys to infection preventionists in a random sample of nearly 900 US acute care hospitals in 2017. Our survey asked about hospital and infection control program characteristics, organizational factors, and the use of practices to prevent common HAIs. Hospitals that scored 4 or 5 (5-point Likert scale) on 7 psychological safety questions were classified as high psychological safety. Using sample weights, we conducted multivariable regression to determine associations between psychological safety and the use of select HAI prevention practices.

Results: Survey response rate was 59%. High psychological safety was reported in approximately 38% of responding hospitals, and was associated with increased odds of regularly using urinary catheter reminders or stop-orders and/or nurse-initiated urinary catheter discontinuation (odds ratio, 2.37; $P = .002$) for catheter-associated urinary tract infection prevention, and regularly using sedation vacation (odds ratio, 1.93; $P = .04$) for ventilator-associated pneumonia prevention.

Conclusions: We provide a snapshot of psychological safety in US hospitals and how this characteristic influences the use of select HAI prevention practices. A culture of psychological safety should be considered an integral part of HAI prevention efforts.

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Keywords

Infection control; Health care–associated infection

Health care–associated infection (HAI) remains a common and costly patient safety problem in US hospitals.[1–4] Despite the presence of evidence-based guidelines focused on HAI prevention[5–7] and the proliferation of several large-scale HAI implementation initiatives, including collaboratives concentrating on device-related infections,[8–14] variation in the use of recommended infection prevention practices across US hospitals remains.[15,16] Several studies have demonstrated the importance of leadership, clinical champions, and truly exemplary followers in adopting, implementing, and sustaining infection prevention efforts.[17–22] Additionally, the importance of 2 foundational domains—culture and the learning system—in fostering safe and reliable health care operations have been highlighted.[23]

A key component of the culture domain is psychological safety, defined as the degree to which people view the environment as conducive to interpersonally risky behaviors like speaking up if they witness an error or asking for help if they have concerns about an order.[24–26] More generally, psychological safety is a shared belief that team members will not be reprimanded, punished, or embarrassed for speaking up, sharing ideas, posing questions, raising concerns, or making mistakes. In health care, psychological safety is a particularly important topic due to concerns about patient safety, along with the growing complexity of care delivery processes, the high-stakes accountability systems, professional norms, and organization structures unique to clinical settings. Prior studies have examined the relationship between psychological safety, HAI prevention practices, and patient safety outcomes.[27–29]

We sought to examine relationships between psychological safety and the use specific infection prevention practices that positively impact patient safety.

METHODS

Study design and data collection

This cross-sectional survey study is part of an ongoing project in which every 4 years we ask infection preventionists across the United States what practices their hospitals are using to prevent common HAIs.[30,31] For the first wave in 2005, a national random sample was selected by identifying all nonfederal, general medical, and surgical hospitals with an intensive care unit and at least 50 hospital beds using the 2003 American Hospital Association (AHA) Database. As data from the 2003 AHA database may no longer reflect the current distribution of US hospitals, for the fourth (2017) wave we resampled based on AHA fiscal year 2013 data. Specifically, we randomly sampled 900 general medical and surgical hospitals with an intensive care unit, based on feasibility. However, unlike prior years, hospitals of all bed sizes were included. Three of the sampled facilities were later excluded because they had either closed or were no longer an acute care facility, resulting in an initial sample of 897 hospitals.

The study surveys were mailed to the hospital infection preventionist in May 2017. At hospitals that employ more than 1 infection preventionist we asked that the lead infection preventionist serve as the primary respondent. We encouraged consulting with others as needed to complete the questionnaire. The survey process followed a modified Dillman approach[32] that included an initial mailed invitational letter and survey, a reminder postcard after approximately 2 weeks, and additional survey mailings at 1, 2, and 5 months to those who had not yet responded. The final reminders to nonrespondents were sent in October 2017. This study received an exemption from the local institutional review board.

Study measures

The survey asked respondents to rate the use of specific evidence-based recommendations to prevent catheter-associated urinary tract infection (CAUTI), central line–associated bloodstream infection, ventilator-associated pneumonia (VAP), *Clostridioides difficile* infection, and other general infection prevention practices. Hospitals reported nearly universal use of most central line–associated bloodstream infection and *Clostridioides difficile* infection practices.[16] Because of this, we focused on CAUTI, VAP, and general infection prevention practices. Respondents were asked to rate the frequency of use for each practice and certain behaviors on a scale from 1 to 5 (1 being "never use" and 5 being "always use"). "Regular use" of a practice was defined as receiving a rating of 4 or 5, whereas values of 1–3 were considered reflective of lack of use of a practice on a regular basis.

The survey included questions intended to capture elements of organizational learning systems and culture, including 7 items that queried psychological safety.[33] These items were scored on a 1 to 5 in frequency of use or level of agreement scale (5-point Likert). Similar to our outcome variables, we constructed binary variables with ratings of 4 or 5 coded as 1 and 0 otherwise. Hospitals rating all 7 psychological safety questions as "regular use" or "agree/strongly agree" (ie, coded as 1) were deemed to have "high psychological safety." Two questions within this domain were reverse scored, so that responses would represent positive responses.

Statistical analysis

Sampling weights based on the inverse probability of selection and responses in each bed size stratum (<50, 50–250, >250) were used to create nationally representative estimates for HAI practices and hospital characteristics. Hospital bed size was derived by linking survey respondent hospitals to the AHA 2013 annual survey. Descriptive statistics are reported as weighted proportions (and 95% confidence intervals [CIs]) for categorical variables and weighted means (and 95% CI) for continuous variables.

We conducted multivariate logistic regression to determine associations between psychological safety and regular use of specific CAUTI, VAP, and general infection prevention practices. All models were adjusted for total number of hospital beds, medical school affiliation, involvement in HAI collaborative, overall support for infection control program from hospital leadership, presence of a hospital epidemiologist, whether or not the lead infection preventionist is certified in infection control, and patient/family engagement.

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Models specific to CAUTI and VAP practices were also adjusted for the presence of established surveillance systems for monitoring urinary tract infection rates and ventilator-associated event rates, respectively. A P value <.05 was considered significant. Stata MP version 13.1 (Stata-Corp, College Station, TX) was used for all analyses.

RESULTS

The overall survey response rate was 59% (530 of 897). Two surveys were returned with the study identification code removed. As we were unable to link these hospitals to the AHA survey to calculate sampling weights, they were dropped from this analysis leaving a total of 528 hospitals. Data from the 2013 AHA Annual Survey were used to compare responders to nonresponders on the following characteristics: urban vs rural, profit vs nonprofit, teaching vs nonteaching, and total number of hospital beds. A statistically significant higher percentage of nonresponding hospitals compared with responding hospitals were located in urban regions (84.8% vs 78.2%; $P = .014$), and nonresponders had a larger average number of hospital beds (237.8 vs 202.6; $P = .012$). There were no statistically significant differences in profit and teaching status.

The survey assessed selected hospital characteristics are shown in Table 1. The average reported bed size of responding hospitals was 193 beds. Over 26% of hospitals were affiliated with a medical school. Although nearly 80% of hospitals were involved in collaborative efforts to reduce HAI, only 53% of hospitals reported receiving strong to very strong support for infection control programs from hospital leadership. Over 41% of hospitals reported they had a hospital epidemiologist, and 62% had a lead infection preventionist certified in infection control. Less than half (47%) of hospitals had a program engaging patients and families in infection prevention.

The responses to the 7 questions addressing psychological safety are shown in Table 2. Only 5% of respondents indicated that mistakes were held against employees, and over 90% of hospitals encourage employees to discuss medical errors and mistakes to prevent future errors. Approximately 38% of hospitals responded positively for all 7 questions and were deemed to have “high psychological safety.”

Practices to prevent CAUTI

Regular use of portable bladder ultrasound scanners was reported in 73.2% (95% CI, 69.3%−77.0%) of hospitals. The percent of hospitals using urinary catheter reminders or stop-orders or nurse-initiated discontinuation was 75.3% (95% CI, 71.5%−79.0%). A total of 26.8% (95% CI, 22.9%−30.7%) were regularly using silver alloy Foley catheters; the same percent also reported routinely using condom catheters in men. Aseptic technique during catheter insertion and maintenance was regularly used in 90.0% (95% CI, 87.3%−92.6%) of hospitals. Intermittent catheterization was used in 47.5% (95% CI, 43.2%−51.9%) of hospitals. The percentage of hospitals that reported having an established surveillance system for monitoring urinary tract infection rates facility-wide was 93.2% (95% CI, 90.8%−95.1%).

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Practices to prevent VAP

The most commonly used practice to prevent VAP was semirecumbent positioning of the patient (98.2%, 95% CI, 97.0%−99.4%), followed by a total of 85.5% (95% CI, 82.4% −88.6%) regularly using "sedation vacation" (eg, regular interruption of sedation). A total of 83.6% (95% CI, 80.3%−86.8%) of hospitals used antimicrobial mouth rinse, 57.6% (95% CI, 53.2%−62.1%) used subglottic secretion drainage, and 24.4% (95% CI, 20.5%−28.3%) used topical and/or systemic antibiotics for selective digestive tract decontamination. Only 7.5% (95% CI, 5.1%−9.9%) regularly used silver-coated endotracheal tubes. Finally, the percent of hospitals with an established surveillance system for monitoring VAP rates facility-wide or unit specific was 93.6% (95% CI, 91.4%−95.8%).

General infection prevention practices

A total of 42.2% (95% CI, 37.9%−46.5%) of hospitals regularly used decolonization of the nose and skin in patients colonized with methicillin-resistant *Staphylococcus aureus* prior to a surgical procedure. Chlorhexidine gluconate for daily bathing was used in 62.5% (95% CI, 58.3%−66.7%) and 16.8% (95% CI, 13.5%−20.1%) of hospitals for daily bathing of intensive care unit and nonintensive care unit patients, respectively. Contact precautions for patients colonized with methicillin-resistant *S aureus* were used in 78.6% (95% CI, 75.0% −82.1%) of hospitals.

Multivariable regression models

Statistically significant associations from logistic multivariable models within the CAUTI, VAP, and general infection prevention domains are shown in Table 3. High psychological safety was associated with increased odds of regularly using urinary catheter reminders or stop-orders and/or nurse-initiated urinary catheter discontinuation (odds ratio, 2.37; 95% CI, 1.39–4.04) for CAUTI prevention, and regularly using sedation vacation (odds ratio, 1.93; 95% CI, 1.02–3.68) for VAP prevention. Statistically significant associations with the other prevention practices examined were not detected.

DISCUSSION

We conducted a national survey to ascertain what US hospitals are currently doing to prevent common HAIs. We were especially interested in examining the degree to which psychological safety might influence the use of recommended practices to prevent HAI. We have 3 main findings. First, although the use of some practices to prevent device-related HAIs has increased in recent years, several prevention practices are still not used as frequently as they could be, particularly for some CAUTI prevention practices.[16] Second, approximately one-third of responding hospitals were classified as having an environment of high psychological safety. Third, high psychological safety was associated with increased odds of using specific CAUTI and VAP prevention practices, particularly practices that are more socioadaptive and relational than technical.

Numerous studies have investigated the relationship between psychological safety and performance in health care teams.[27–29,33–36] Across studies, psychological safety has consistently been shown to play a role in enabling performance and in 1 case lowering risk-adjusted mortality rates.[26,35] Our finding that the large majority of responding hospitals did not report high psychological safety is concerning, but not unexpected. Much of the literature on psychological safety provides little insight into how psychological safety unfolds and builds, or lessens, or even is destroyed. What is known is that an environment that supports psychological safety does not emerge naturally.[26]

Communication and teamwork interventions are a start. However, employee perceptions of feeling safe to speak up, ask for help, or provide feedback can vary from department to department and team to team.[37] Some of this is attributable to the behaviors of unit-level managers whose actions convey different messages about system-level programs, such as HAI prevention practices, suggesting leadership and followership plays an important role. Prior studies have highlighted the importance of leadership in HAI prevention.[18,19] It has also been demonstrated that hospitals with exemplary followers were more likely to regularly use urinary catheter reminders or stop-orders and/or nurse-initiated catheter discontinuation for CAUTI prevention, and subglottic drainage via endotracheal tubes for VAP prevention.[21]

It is not surprising that high levels of psychological safety are associated with frequent use of socioadaptive safety interventions such as nurse-initiated urinary catheter discontinuation or ventilator sedation vacation. These practices require communication between nurses, respiratory therapists and physicians, efforts by bedside staff to engage patient and family requests, and the willingness to speak up and challenge entrenched customs and practices.[38] Our findings are supported by previous research that suggested an imbalance in role-based status (eg, nurses or other staff speaking up to physicians) can negatively influence quality improvement activities and unit performance.[29,39] Further, research that investigated the challenge of enforcing safety protocols in health care identified relationships between team priority of safety, number of errors reported, and higher team psychological safety, suggesting that adherence to safety protocols, such as HAI prevention practices, requires high psychological safety.[40]

Multiple studies have shown that organizational efforts to prevent HAIs require both technical and socioadaptive interventions.[41] If leaders are unsure of the state of psychological safety and how this impacts socioadaptive interventions, it is important to ask. Psychological safety does not organically emerge; it must be fostered, supported, and routinely addressed so organizations can realize the positive impacts on performance and patient safety. HAI prevention practices are an ideal platform to attempt culture change, for it has been proposed that HAI prevention is a social problem that can be addressed through a professional movement with grassroots efforts.[42,43]

Even though we employed national sampling and achieved an acceptable response rate for surveys of health care workers, several important limitations must be acknowledged. First, we relied entirely on self-report from the lead infection preventionist at each hospital to determine the practices used to prevent HAIs. As such, our findings may not reflect the views or beliefs of all hospital employees and may not be generalizable to all areas of respondent hospitals. It is also possible that he or she may have understated or overstated the use of various practices. Second, although we surveyed approximately 10% of all US hospitals and our sampling strategy was intended to obtain a nationally representative sample, participating hospitals may have been different from nonparticipating hospitals, thereby making the results less generalizable. Third, although our multivariable models identified associations between psychological safety and the use of various HAI preventive practices, the nature of our cross-sectional study prevents us from determining the causal relationships between these factors. Considering that our goal was not to draw any causal conclusions from these analyses, but to identify important potential associations for future research, we did not adjust for multiple comparisons so the potential for a type 1 error is increased. Finally, it is possible that our included questions did not fully capture the psychological safety domain within hospitals. Still, our questions mapped reasonably well to prior work on psychological safety,[33] and we took a conservative dichotomization approach for classifying hospitals as having "high psychological safety."

CONCLUSIONS

Despite these important limitations, we provide a snapshot of psychological safety among US hospitals, and how this organizational characteristic is related to the use of HAI prevention practices. Although psychological safety is not a panacea for addressing all patient safety concerns, we provide evidence suggesting that the implementation of socioadaptive-based prevention practices—those requiring personnel to speak up, ask for help, or provide feedback— might be optimized in environments with high psychological safety. Ensuring infection prevention programs are well supported may enhance safety climates,[44] and provide a platform for organizations to build a culture of psychological safety to improve patient safety.

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Table 1

Select hospital characteristics (n = 528)

Characteristic	Mean or % (95% CI)
Total number of adult acute care beds (including intensive care unit beds)	192.91 (176.42–209.40)
Total number of adult intensive care unit beds	20.98 (18.70–23.26)
Hospital affiliated with a medical school	26.23 (22.35–30.10)
Involved in collaborative effort to reduce health care–associated infections	79.08 (75.54–82.62)
Strong/very strong overall support of infection pre vention program from hospital leadership	53.13 (48.84–57.41)
Presence of a hospital epidemiologist	41.31 (37.05–45.56)
Lead infection preventionist certified in infection prevention and control	61.98 (57.83–66.12)
Hospital has any program that engages patients and families in infection prevention	46.74 (42.42–51.06)

CI, confidence interval.

Table 2

Elements of psychological safety

Question	% (95% CI)
1. Do you assert your views on important issues, even though your supervisor may disagree?	87.81 (84.99–90.63)
2. I personally feel comfortable speaking up when I see a physician not clean his or her hands.	80.65 (77.25–84.05)
3. When a medical error occurs at this hospital, health care workers are encouraged to discuss mistakes in order to learn how to prevent similar future errors.	91.26 (88.85–93.67)
4. If you make a mistake at this hospital, it is often held against you.	5.40 (3.48–7.32)
5. Staff members at this hospital are able to bring up problems and tough issues.	77.00 (73.39–80.62)
6. It is safe to try something new at this hospital.	66.09 (62.01–70.17)
7. At this hospital, people are too busy to invest time in improvement.	15.33 (12.22–18.44)
"High psychological safety"*	37.89 (33.82–42.15)

CI, confidence interval.

*"High psychological safety" is defined as answering all 7 questions positively (ie, responses of 4 or 5 on 5-point Likert-scaled questions). Questions 4 and 7 were reversed scored, so that responses of 4 or 5 were positive.

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Table 3

Multivariable logistic regression associations[*] between high psychological safety[†] and infection prevention practices

Outcome variable	High psychological safety	
CAUTI prevention practice[‡]	**OR (95% CI)**	***P* value**
Portable bladder ultrasound	1.39 (0.87–2.22)	.16
Urinary catheter reminder/stop-order and/or nurse-initiated catheter discontinuation	2.37 (1.39–4.04)	.002
Silver alloy catheters	1.42 (0.89–2.26)	.14
Condom catheters in men	1.50 (0.91–2.50)	.11
Aseptic technique during catheter insertion and maintenance	1.92 (0.84–4.38)	.12
Intermittent catheterization	1.30 (0.86–1.95)	.22
VAP prevention practice[§]	**OR (95% CI)**	***P* value**
Semirecumbent positioning of the patient	0.48 (0.14–1.63)	.24
Antimicrobial mouth rinse	1.18 (0.66–2.09)	.58
Subglottic secretion drainage	0.96 (0.62–1.47)	.85
Topical and/or systemic antibiotics for selective digestive tract decontamination	1.40 (0.85–2.28)	.18
Silver-coated endotracheal tubes	1.70 (0.77–3.74)	.19
Sedation vacation	1.93 (1.02–3.68)	.04
General infection prevention practice[//]	**OR (95% CI)**	***P* value**
Decolonization of the nose and skin in patients colonized with MRSA prior to a surgical procedure	1.38 (0.91–2.08)	.13
Chlorhexidine gluconate for daily bathing of ICU patients	1.61 (0.98–2.65)	.06
Chlorhexidine gluconate for daily bathing of non-ICU patients	0.98 (0.57–1.70)	.95
Contact precautions for patients colonized with MRSA	1.21 (0.73–2.01)	.46

CAUTI, catheter-associated urinary tract infection; *CI*, confidence interval; *ICU*, intensive care unit; *MRSA*, methicillin-resistant *Staphylococcus aureus*; *OR*, odds ratio; *VAP*, ventilator-associated pneumonia.

[*] All multivariable logistic regression models were adjusted for total number of adult acute care beds, medical school affiliation, involvement in health care–associated infection prevention collaborative, overall support for infection control program from hospital leadership, presence of a hospital epidemiologist, whether or not the lead infection preventionist is certified in infection control, and presence of any programs engaging patients and families in infection prevention. CAUTI models were also adjusted for presence of established surveillance system for monitoring urinary tract infection rates. VAP models were also adjusted for presence of established surveillance system for monitoring ventilator-associated event rates. Presented ORs are adjusted OR estimates for “high psychological safety.”

[†] High psychological safety is defined as answering positively for all questions presented in Table 2. A total of 38% of hospitals were deemed as having high psychological safety.

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[‡]Sample sizes for CAUTI prevention practices were as follows: portable bladder ultrasound = 468, urinary catheter reminder/stop-order and/or nurse-initiated catheter discontinuation = 469, silver alloy catheters = 464, condom catheters in men = 465, aseptic technique during catheter insertion and maintenance = 468, intermittent catheterization = 468.

[§]Sample sizes for VAP prevention practices were as follows: semirecumbent positioning of patient = 448, antimicrobial mouth rinse = 445, subglottic secretion drainage = 432, topical and/or systemic antibiotics for selective digestive tract decontamination = 430, silver-coated endotracheal tubes = 428,"sedation vacation" = 445.

[//]Sample sizes for general infection prevention practices were as follows: decolonization of the nose and skin in patients colonized with MRSA prior to a surgical procedure = 477; chlorhexidine gluconate for daily bathing of ICU patients = 464; chlorhexidine gluconate for daily bathing of non-ICU patients = 468; contact precautions for patients colonized with MRSA = 478.