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## Adoption of policies to prevent catheter-associated urinary tract infections in United States intensive care units

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### Abstract

**Background**—Little is known about whether recommended strategies to prevent catheter-associated urinary tract infection (CAUTI) are being implemented in intensive care units (ICU) in the United States.

**Objectives**—Our objectives were to describe the presence of and adherence to CAUTI prevention policies in ICUs, to identify variations in policies based on organizational characteristics, and to determine whether a relationship exists between prevention policies and CAUTI incidence rates.

**Methods**—Four hundred forty-one hospitals that participate in the National Healthcare Safety Network were surveyed in spring 2008.

**Results**—Two hundred fifty hospitals provided information for 415 ICUs (response rate, 57%). A small proportion of ICUs surveyed had policies supporting bladder ultrasound (26%, n = 106), condom catheters (20%, n = 82), catheter removal reminders (12%, n = 51), or nurse-initiated catheter discontinuation (10%, n = 39). ICUs in hospitals with > 500 beds were half as likely as those in smaller hospitals to have adopted at least 1 CAUTI prevention policy (odds ratio, 0.52; 95% confidence interval: 0.33-0.86), and ICUs in hospitals where the infection control director reported always having access to key decision makers for planning were more than twice as likely as those with less access to have adopted a policy (odds ratio, 2.41; 95% confidence interval: 1.56-3.72).

**Conclusion**—Little attention is currently placed on CAUTI prevention in ICUs in the United States. Further research is needed to elucidate relationships between adherence to CAUTI prevention recommendations and CAUTI incidence rates.

### Keywords

Prevention; Infection control; Critical care; Policy

Catheter-associated urinary tract infections (CAUTI) are a common and costly occurrence in US hospitals.<sup>1,2</sup> In intensive care units (ICU) in the United States, the incidence rate ranges from 3.1 to 7.4 CAUTI per 1,000 urinary catheter-days.<sup>3</sup>

Multiple public policy incentives and private sector quality initiatives are aimed at reducing CAUTI and its resultant morbidity, mortality, and cost. Several evidence-based CAUTI prevention guidelines, compiled by panels of experts in infection control and hospital epidemiology have been published over the past 30 years.<sup>4-9</sup> These guidelines all point to 1 overriding principle: minimize unnecessary urinary catheter use. Many of the strategies advocated in the guidelines support this principle, including substituting condom catheters for indwelling catheters<sup>4,7-9</sup>; using bladder ultrasound scanners to identify or rule out urinary retention<sup>7-9</sup>; and using automated reminders, stop orders, or nurse-driven protocols to ensure catheters are discontinued as soon as they are no longer needed.<sup>7-9</sup> Successive guidelines have become more directive and specific in their call for monitoring adherence to CAUTI prevention practices as well as CAUTI incidence rates.<sup>5-9</sup> The consistency of these guidelines over time provides a solid basis for CAUTI prevention programs and policies. There is, however, a paucity of research regarding whether or not the practices endorsed in the guidelines are being implemented in ICUs. The aims of this study were 3-fold: (1) to describe the presence of and adherence to CAUTI prevention policies in ICUs in US hospitals; (2) to identify variation in policies based on setting characteristics, infection prevention and control (IPC) department characteristics, and organizational support; and (3) to determine whether a relationship exists between prevention policies and CAUTI rates.

## METHODS

The data were obtained from a large nation-wide, cross-sectional survey of IPC departments designed to examine the cost-effectiveness of infection prevention and control practices (Prevention of Nosocomial Infection and Cost Effectiveness Analysis, National Institutes of Health, R01NR010107). Study procedures were reviewed and approved by institutional review boards at Columbia University, the Centers for Disease Control and Prevention, and RAND Corporation. Sample and recruitment, as well as survey development, content, and pilot testing are described elsewhere<sup>10</sup> and summarized briefly here.

### Sample

The National Healthcare Safety Network (NHSN) was used as a sampling frame. NHSN is a network of hospitals that voluntarily or by state mandate confidentially submit data on device-associated health care-associated infections (HAI) at their facility for aggregation into a national database for the purposes of trending, benchmarking, and in some states public reporting.<sup>11</sup> Hospitals that collect and submit data do so using standardized methods and definitions that include both laboratory and clinical criteria. Hospitals in which NHSN device-associated infection surveillance was conducted according to protocol<sup>12</sup> in an adult medical, surgical, or medical/surgical ICU in 2007 and had at least 500 device-days per year in at least 1 ICU were invited to participate. There were 441 hospitals that met eligibility criteria. IPC department managers or directors of qualifying hospitals were recruited using a modified Dillman technique.<sup>13</sup> The survey was conducted online in spring 2008.

### Measures

The survey was developed by adapting a questionnaire used in the Study on the Efficacy of Nosocomial Infection Control.<sup>14</sup> Survey content was validated by a panel of individuals with expertise in infection control, hospital epidemiology, and psychometrics. A paper version of the survey was pilot tested in 13 different settings and took an average of 27 minutes (standard deviation [SD]  $\pm$  11) to complete. Test-retest reliability showed adequate

agreement (mean  $\kappa = 0.88$ ,  $SD \pm 0.24$ ). Criterion-referenced validity was assessed by comparing survey responses to institutional policies and data during site visits; no discrepancies were found.

Variables included facility characteristics, IPC department characteristics, organizational support, presence of CAUTI prevention policies, adherence to policies, and CAUTI incidence rates. Facility characteristics included region, number of beds, teaching status, ICU type, and state mandatory reporting of any HAI. IPC department characteristics were assessed with questions about the number and roles of professional staff, board certification in infection prevention and control, and hours dedicated to the IPC department. Organizational support was assessed through questions about access to key decision makers and the use of electronic surveillance systems to track HAIs.

CAUTI prevention policies were assessed with questions about the presence of policies for 4 specific CAUTI prevention strategies: use of condom catheters for men, use of portable bladder ultrasound scanners for determining postvoid residual, use of urinary catheter reminders or stop orders, and nurse-initiated urinary catheter discontinuation. Adherence to policy was assessed by asking respondents what proportion of time each policy was properly implemented: all of the time (95%-100%), usually (75%-94%), sometimes (25%-74%), rarely/never (<25%), or do not know. To assess CAUTI rates respondents were asked to provide incidence data for any medical, surgical, or medical/surgical ICU at their facility. NHSN surveillance definitions in use during the study period are detailed elsewhere.<sup>15</sup> The sensitivity and specificity of urinary tract infection reporting using the NHSN definitions has been reported to be 59% and 98.7%, respectively.<sup>16</sup>

### Statistical analysis

Data analysis was conducted using SPSS version 19 (SPSS Inc, Chicago, IL). Descriptive statistics including frequencies and percentages were used to summarize facility and IPC department characteristics and the adoption of CAUTI prevention policies. Mean and median CAUTI rates were calculated by type of ICU. Staffing ratios were calculated per 100 beds. Bivariate analyses using  $\chi^2$  tests were conducted to examine associations between facility and IPC department characteristics and the presence or absence of CAUTI policies (ie, having at least 1 of 4 CAUTI policies in place vs none). Variables that demonstrated significant association with having at least 1 of 4 CAUTI policies in place at the  $P < .10$  level were entered into a multivariable logistic regression model. Odds ratios (OR) with 95% confidence intervals (95% CI) were calculated to predict factors associated with adopting CAUTI policies. Last, associations between the presence of CAUTI policies, factors predictive of CAUTI policy adoption, and ICU CAUTI rates were examined using Mann-Whitney tests for bivariate analysis and generalized linear regression with log link function for multivariable analysis. Rate ratios with 95% CI were then calculated to predict factors associated with lower or higher CAUTI rates. All tests were 2-tailed, and the significance level was set at  $\alpha = .05$ .

## RESULTS

There were 250 hospitals that responded to the survey (57%) and provided data on 415 ICUs. The majority of hospitals (56%,  $n = 140$ ) provided data for 1 ICU. Table 1 summarizes sample characteristics. The largest proportion of ICUs was from the Northeast region of the United States (41.2%,  $n = 171$ ). More than half of the ICUs were in hospitals with 201 to 500 beds (54.9%,  $n = 228$ ), and most were in teaching hospitals (71.3%,  $n = 296$ ). Compared with NHSN hospitals<sup>11</sup> and consistent with our eligibility criteria of > 500 device-days, our sample included a larger proportion of hospitals with > 500 beds (29.7% vs 15.8% NHSN,  $P < .05$ ) and teaching hospitals (71.3% vs 51.7% NHSN,  $P < .05$ ). There were

more medical-surgical ICUs (53.7%, n = 223) than either medical (24.9%, n = 103) or surgical (21.4%, n = 89) units. A majority was in states that required HAI reporting (63.4%, n = 251).

Median staffing for IPC departments was 0.61 full-time equivalent infection preventionists (IP) per 100 beds (range, 0-4.75). Forty-three percent of ICUs were in hospitals where more than half the IPs were board certified (n = 160), whereas one-quarter of the ICUs were in hospitals without a board certified IP (n = 95). A large proportion of ICUs were in facilities without a hospital epidemiologist (HE; 42.1%, n = 170); of the remainder, only 8.2% (n = 33) reported a full-time HE. A majority of respondents described always having access to key organizational decision makers for problems (60.2%, n = 250), whereas a minority described always having access for planning (39.5%, n = 163). Less than one-third (28.9%, n = 118) used an electronic surveillance system to track HAI.

### Presence of and adherence to policies

CAUTI prevention policies were uncommon in the ICUs surveyed (Table 2). Policies supporting clinician use of portable ultrasound were in place in 25.9% of ICUs (n = 106), and policies promoting the use of condom catheters for men were in place in 20% of ICUs (n = 82). Urinary catheter reminders or stop orders and nurse-initiated urinary catheter discontinuation were infrequently in place (12.4%, n = 51; and 9.5%, n = 39 respectively). Thirty-one percent of ICUs with urinary catheter reminders or stop orders in place tracked them (n = 16), whereas less than 20% of ICUs tracked any other policy. For any single policy, 5 ICUs or fewer reported 95% compliance. Less than half the ICUs surveyed reported having at least 1 of the 4 CAUTI policies in place (42.2%, n = 174).

### Variation in policies based on setting, department, and organizational characteristics

In bivariate analysis, factors significantly associated with having at least 1 CAUTI prevention policy in place included region, presence of an HE, and access to key decision makers (Table 3). A larger proportion of ICUs in the West or Midwest had at least 1 CAUTI policy in place than those in the Northeast or South (55.6% and 50% vs 39.2% and 36.8%, respectively,  $P = .04$ ). More ICUs supported by a full-time HE had a policy in place than those with a part-time HE or no HE (68.8% vs 36.2% or 44.3%, respectively;  $P = .002$ ). More ICUs in organizations where the IPC director always had access to key decision makers for planning or problems had a policy in place than those who had access most of the time, sometimes, rarely, or never (55.3% vs 34.8%, respectively,  $P < .001$  for planning; 47.5% vs 35.4%, respectively,  $P = .015$  for problems). Small hospital size and use of an electronic surveillance system were associated with having at least 1 CAUTI policy in place but did not reach statistical significance. No significant differences were found in policy adoption across the following characteristics: teaching status, ICU type, state mandatory reporting, IP staffing levels, or board certification in infection control.

The presence of a full-time HE and hospital region were not significant predictors of policy adoption once adjusted for other factors such as hospital size. In multivariable analysis, only 2 factors predicted policy adoption. ICUs in hospitals where the IPC director always had access to key decision makers for planning were more than twice as likely as those with limited access to have adopted a policy (OR, 2.41; 95% CI: 1.56-3.72) and ICUs in hospitals with > 500 beds were half as likely as those in smaller hospitals to have adopted at least 1 CAUTI prevention policy (OR, 0.52; 95% CI: 0.33-0.86) after controlling for region, presence of a HE, access to key decision makers for problems, and use of an electronic surveillance system.

## Relationship between policies and CAUTI rates

Forty-one percent of ICUs (172/415) monitored CAUTI incidence rates; the pooled mean was 3.7 infections per 1,000 urinary catheter-days (SD, 3.39). Median CAUTI incidence rates by ICU type were similar to those reported to NHSN from 2006 through 2008 (Table 4), falling between the 25th and 75th percentile for each unit type.<sup>3</sup> We found no significant difference in mean CAUTI rates for ICUs with at least 1 policy in place compared with those with no policy ( $P = .84$ ). Because hospital size and access to key decision makers for planning were associated with policy adoption, we examined their association with CAUTI rates. In bivariate analysis, hospitals with > 500 beds had significantly higher mean [median] CAUTI rates than hospitals with ≤ 500 beds (mean, 4.9 [4.1] vs 3.2 [2.3] per 1,000 catheter-days, respectively,  $P = .009$ ). Access to key decision makers for planning was not significantly associated with CAUTI rates ( $P = .804$ ). When the influence of policies and access were controlled for in multivariable analysis, hospital size remained predictive of CAUTI rates; CAUTI rates at hospitals with > 500 beds were 1.5 times higher than rates at smaller hospitals (relative risk, 1.55; 95% CI: 1.11-2.16). Given the low numbers of ICUs that tracked compliance with CAUTI policies, we were unable to compare CAUTI incidence rates in ICUs with low versus high reported adherence.

## DISCUSSION

To our knowledge, only 1 other large study of CAUTI prevention practices in US hospitals has been conducted to date. In 2005, Saint et al surveyed infection control coordinators at acute care Veterans Affairs (VA) hospitals and at acute care non-VA hospitals with ≤ 50 beds.<sup>17</sup> Similar to our current study, Saint et al found that there was no single, widely used CAUTI prevention strategy; only 30% of hospitals reported regularly using portable bladder ultrasound, 14% reported using condom catheters in men, and 9% reported using catheter reminders or stop orders. The verification code for this document is 114619.

In our study, ICUs were more likely to have at least 1 CAUTI prevention policy in place if their IPC director always had access to key decision makers for planning as opposed to having access most of the time, sometimes, rarely, or never. This may be an indication of a high level of organizational commitment to infection prevention. In a qualitative investigation of why certain hospitals adopt HAI prevention strategies and others do not, Krein et al<sup>18</sup> found that positive organizational context, including leaders' engagement in planning patient safety programs and provision of resources, promoted the adoption of HAI prevention practices at acute care hospitals. The authors noted that, "Hospitals with a positive emotional and cultural context, as evidenced by . . . active and engaged clinical leadership . . . appear especially conducive for fostering and encouraging internally motivated initiatives."<sup>18</sup> Our findings suggest a low level of organizational commitment to infection control overall, as evidenced by the fact that > 42% of ICUs had no HE, and only 29% had an electronic surveillance system for tracking HAI.

Our finding that the presence of an HE did not predict policy adoption was in keeping with results of Saint et al.<sup>17</sup> Our finding that teaching status did not predict policy adoption was in contrast to that earlier study, which concluded that hospitals with an approved residency training program were more than 4 times as likely to use urinary catheter reminders or stop orders than hospitals without residency training programs.<sup>17</sup> The finding that mandatory state reporting of HAI was not significantly associated with CAUTI policy adoption may be explained by the fact that, at the time of the study, all but 1 state mandated hospitals to report infections other than CAUTI.<sup>19</sup>

No relationship was identified between CAUTI rates and the existence of CAUTI policies. This is in keeping with the results of concurrent studies, which found that simply instituting

policies for the prevention of central line-associated bloodstream infection (CLABSI) and ventilator-associated pneumonia (VAP) was not associated with lower infection rates; rather, only when an ICU had 95% compliance with CLABSI or VAP prevention policies did corresponding infection rates decrease.<sup>20,21</sup> It is also possible that the negative finding is indicative of mixed causality—that, at some hospitals, policy adoption results in low CAUTI rates, whereas, at others, policies are adopted in response to high CAUTI rates. If an association between policies and CAUTI rates does exist, it might be difficult to find given the low sensitivity (59%) of CAUTI reporting using the NHSN definitions in place in 2008.<sup>16</sup> Last, the number of respondents in our study who provided CAUTI rates and had at least 1 prevention policy in place was low (n = 65); thus, the study may have been underpowered to find an association.

The finding that larger hospitals have higher CAUTI rates is not surprising. In a HAI prevalence study in 18 acute care hospitals in Switzerland in 1999, Sax et al<sup>22</sup> found that the OR for HAI in large hospitals was nearly twice that in small hospitals. However, after controlling for patient case mix factors such as comorbidity, a history of intensive care unit stay, and intubation for more than 24 hours, hospital size was not an independent risk factor for HAI. In our study, hospital size may have been acting as a surrogate for case mix in predicting CAUTI rates.

Our finding that ICUs at larger hospitals were significantly less likely to have adopted at least 1 CAUTI prevention policy is puzzling. We speculate that, if larger hospitals have higher HAI rates overall because of less favorable case mixes, CAUTI prevention may be lost among competing priorities.

Some study limitations may have affected our results. First, inclusion criteria led to a sample of hospitals that were larger on average than NHSN and US hospitals.<sup>23</sup> Given our finding that smaller hospitals were more likely to adopt CAUTI prevention policies, this may have biased our results toward the finding of low policy adoption overall. Also, the fact that larger hospitals were over-represented may limit generalizability. Second, because the survey was voluntary, respondents may have differed from nonrespondents. However, the similarity of CAUTI rates reported by our sample to that of all NHSN hospitals engenders confidence that selection bias was not at play. Third, self-report bias may have influenced the data; however, that bias should lead to over-reporting of policies to prevent CAUTI. Therefore, the conclusion that there is a notable lack of policies and monitoring would be conservative. Fourth, our survey did not provide information regarding aseptic catheter insertion or maintenance practices; it is possible that hospitals are relying on these strategies to prevent CAUTI. Although this may be the case, the fact that nearly two-thirds of the hospitals do not know what their CAUTI rates are implies that reliance on insertion and maintenance practices is an assumption, not a reduction strategy. Fifth, it is possible that policy adoption is not an accurate surrogate for practice adoption. For example, some ICUs that use condom catheters may not have a policy in place specifically promoting their use. Thus, inferences about CAUTI prevention practices must be made with caution. Last, the information garnered in the survey is relatively superficial. Qualitative data are needed to elucidate the complex interplay of internal and external factors that influence infection control policy and clinical practice. Such a study is underway. Despite these limitations, our findings merit consideration.

The most notable finding is the low prevalence of CAUTI prevention policies. One possible explanation could be a weak evidence base for the recommended strategies. Although many recommendations are consistent across CAUTI prevention guidelines, the studies on which they are based are limited in number, size, and quality.<sup>7</sup> In addition, most CAUTI prevention studies use bacteriuria as the outcome of interest, rather than more clinically relevant

measures such as symptomatic CAUTI or urosepsis. In our survey, however, weight of research evidence did not seem to be a factor in the decision to convert CAUTI prevention strategies into policy. Ironically, strategies with weak research evidence (ie, portable bladder scanners) were codified in policy more often than practices with stronger support in the literature (ie, catheter reminders or stop orders).<sup>7,9</sup>

Another possible explanation for the low adoption of CAUTI prevention policies is a lack of awareness of current guideline recommendations. This is not likely the case because newer strategies such as bladder ultrasound to measure urinary retention were more widely adopted than the long-recommended practice of using condom catheters. Results from Saint et al<sup>17</sup> also suggest that lack of awareness was not a factor because only 3% of US hospitals reported an outdated practice: placing antimicrobial agents in the drainage bag.

A more plausible explanation for the low adoption of CAUTI policies is that preventing these infections is a relatively low priority for hospitals. A comprehensive program to reduce inappropriate catheter use can be effective but resource intensive.<sup>24</sup> A single CAUTI is not estimated to be as costly as a CLABSI, VAP, or surgical site infection.<sup>1</sup> CAUTI rarely cause sentinel events.<sup>25</sup> For these reasons, an annual infection control risk assessment would rarely identify CAUTI reduction as a priority. Hospitals may be directing their energies toward what they perceive are more harmful and costly infections.

Negative payment incentives announced at the time of this survey should have effectively elevated CAUTI prevention to priority status. In August 2007, the Centers for Medicare and Medicaid announced that beginning in October 2008 it would no longer reimburse hospitals for costs attributable to CAUTI.<sup>26</sup> Although the specter of nonpayment for CAUTI may have induced physicians in at least 1 state to remove catheters earlier,<sup>27</sup> it does not appear to have had a broad effect at the time of this survey. Since the survey, there are indications that the regulation has had a minimal impact on hospitals' bottom line because of problems implementing it. The rule specifies that reimbursement will be withheld for only those CAUTI identified by specific ICD-9-CM codes. The ICD-9-CM codes "have very limited validity in identifying hospital-acquired CAUTIs, achieving 30% PPV [positive predictive value] at best."<sup>28</sup> Coders must correctly identify the presence of a qualifying UTI, indicate that it was not present on admission, and indicate that a urinary catheter was temporally associated with the UTI in order for payment to be denied. Miscoding at any of the 3 points will result in payment.<sup>29</sup> Meddings et al<sup>30</sup> demonstrated just such miscoding in a study of 80 randomly selected adult discharges with secondary diagnoses of UTI. Whereas a physician-abstractor categorized 35% of the UTIs as hospital-associated CAUTI, none had been coded as such.

State mandates for public reporting of infections also should have elevated CAUTI prevention to priority status but instead may have inadvertently reduced CAUTI prevention efforts by over-focusing on other HAI. By the end of 2009, 29 states required public reporting of HAI, and 2 allowed confidential reporting to the state.<sup>19,31</sup> Pennsylvania was the only state that specified CAUTI in its legislation.<sup>32</sup>

In the same way, national quality initiatives directed at HAI prevention but slow to target CAUTI specifically may have served to deprioritize CAUTI infections. The Institute for Healthcare Improvement targeted CLABSI, VAP, and surgical site infection prevention since 2006 but did not add CAUTI as a focus until 2009.<sup>33</sup> Consumers Unions' effort to reduce HAI is limited to a comparison of CLABSI rates.<sup>34</sup> The Leapfrog Group's hospital HAI comparisons include CLABSI but not CAUTI rates.<sup>35</sup>

Overall, public policy and quality initiatives in place in 2008 appear to have lacked the strength needed to promote real reduction in CAUTI. As a result, hospitals may not have

acted to reduce CAUTI despite the existence of clear practice guidelines. More recent federal quality initiatives may serve to elevate CAUTI prevention to priority status. In 2009, the Department of Health and Human Services added a 5-year goal to reduce CAUTI rates by at least 25% to its Action Plan to Prevent Healthcare-Associated Infections.<sup>2</sup> In 2011 The Joint Commission included the implementation of evidence-based practices to prevent CAUTI as one of its 2012 National Patient Safety Goals.<sup>36</sup> This year, the Centers for Medicare and Medicaid enacted public reporting of CAUTI rates through its Hospital Inpatient Quality Reporting Program beginning in 2014 based on data submitted beginning in 2012.<sup>37</sup>

Results of this study suggest that little attention is focused on CAUTI prevention in ICUs in the United States. To address this gap, IPs, HEs, administrators, and clinicians should implement policies aimed at limiting unnecessary catheter use and shortening the duration of catheterization at their institutions. Quality improvement organizations that currently direct their efforts toward HAI prevention in general must take up the cause of CAUTI prevention in particular. Further research is needed to elucidate relationships between adherence to CAUTI prevention recommendations and CAUTI incidence rates.

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Table 1

## Sample characteristics

	Sample N = 415 ICUs % (n)	National Healthcare Safety Network* N = 621 % (n)	$\chi^2$
Region			
Northeast	41.2 (171)		
South	28.7 (119)		
Midwest	14.9 (62)		
West	15.2 (63)		
Size			
200 Beds	15.4 (64)	44.0 (273)	$P < .05$
201-500 Beds	54.9 (228)	40.2 (250)	
501-1,000 Beds	27.0 (112)	15.5 (96)	
> 1,000 Beds	2.7 (11)	0.3 (2)	
Teaching status <sup>†</sup>			
Teaching	71.3 (296)	51.7 (321)	$P < .05$
Nonteaching	28.7 (119)	48.3 (300)	
ICU type			
Medical teaching	21.0 (87)		
Medical all others	3.9 (16)		
Medical/surgical teaching	33.5 (139)		
Medical/surgical all others	20.2 (84)		
Surgical	21.4 (89)		
State mandatory reporting			
Yes	63.4 (251)		
No	36.6 (145)		

\* Based on data from Edwards et al.<sup>11</sup>

<sup>†</sup> Definition of teaching status is different than that used by NHSN.

**Table 2**

CAUTI prevention policies and compliance in ICUs

Does your ICU have a written policy in place to use . . . ?	Policy in place % (n)	Compliance is tracked % (n)	Compliance with policy % (n)		
			Always ( 95%)	Usually, sometimes or rarely/never	Do not know
1. Clinician use of portable bladder ultrasound scanner for determining postvoid residual	25.9 (106/409)	18.9 (20)	10.0 (2)	15.0 (3)	75.0(15)
2. Condom catheters for men	20.0 (82/410)	8.6 (7)	14.3(1)	85.7 (6)	0 (0)
3. Urinary catheter reminder or stop order	12.4 (51/410)	31.4 (16)	31.3 (5)	56.3 (9)	12.5 (2)
4. Nurse-initiated urinary catheter discontinuation	9.5 (39/409)	12.8 (5)	40.0 (2)	20.0 (1)	40.0 (2)
At least 1 policy	42.2 (174/410)	22.4 (39)	15.4 (6)		

**Table 3**

Factors associated with having at least 1 of 4 CAUTI prevention policies in place

	ICU with at least 1 of 4 CAUTI prevention policies in place, n = 174, % (n)	ICU with none of 4 CAUTI prevention policies in place, n = 234, % (n)	$\chi^2$
Region			
Northeast	39.2 (65)	60.8 (101)	$P = .04$
South	36.8 (43)	63.2 (74)	
Midwest	50.0 (31)	50.0 (31)	
West	55.6 (35)	44.4 (28)	
Size			
200 Beds	51.6 (32)	48.4 (30)	$P = .09$
201-500 Beds	44.2 (99)	55.8 (125)	
501-1,000 Beds	36.9 (41)	63.1 (70)	
> 1,000 Beds	18.2 (2)	81.8 (9)	
Hospital epidemiologist			
No hospital epidemiologist	44.3 (74)	55.7 (93)	$P = .002$
Part-time or hours not specified	36.2 (72)	63.8 (127)	
Full-time	68.8 (22)	31.3 (10)	
Access to key organizational decision makers for planning			
Never, rarely, sometimes, or most of the time	34.8 (86)	65.2 (161)	$P < .001$
Always	55.3 (88)	44.7 (71)	
Access to key organizational decision makers for problems			
Never, rarely, sometimes or most of the time	35.4 (58)	64.6 (106)	$P = .015$
Always	47.5 (116)	52.5 (128)	
Electronic surveillance system			
Yes	50.0 (59)	50.0 (59)	$P = .06$
No	39.8 (113)	60.2 (171)	

**Table 4**

CAUTI rates per 1,000 urinary catheter days by unit type compared with National Healthcare Safety Network

Unit type	Sample n = 172		NHSN 2006-2008*	
	N	Pooled mean (median)	n	Pooled mean (median)
Medical teaching	32	4.1 (3.3)	53	4.7 (3.8)
Medical all others	5	2.5 (2.8)	59	3.9 (3.0)
Medical/surgical teaching	65	3.3 (3.0)	89	3.4 (3.1)
Medical/surgical all others	34	3.5 (2.4)	15 Beds, 235	3.4 (2.1)
			>15 Beds, 111	3.1 (2.6)
Surgical	36	4.5 (3.3)	95	4.3 (3.4)

*NHSN*, National Healthcare Safety Network.

\* Based on data from Edwards et al.<sup>3</sup>