Arterial Catheter Use in the ICU: A National Survey of Antiseptic Technique and Perceived Infectious Risk

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Objectives: Recent studies have shown that the occurrence rate of bloodstream infections associated with arterial catheters is 0.9–3.4/1,000 catheter-days, which is comparable to that of central venous catheters. In 2011, the Centers for Disease Control and Prevention published new guidelines recommending the use of limited barrier precautions during arterial catheter insertion, consisting of sterile gloves, a surgical cap, a surgical mask, and a small sterile drape. The goal of this study was to assess the attitudes and current infection prevention practices used by clinicians during insertion of arterial catheters in ICUs in the United States.

Design: An anonymous, 22-question web-based survey of infection prevention practices during arterial catheter insertion.

Setting: Clinician members of the Society of Critical Care Medicine.

Subjects: Eleven thousand three hundred sixty-one physicians, nurse practitioners, physician assistants, respiratory therapists, and registered nurses who elect to receive e-mails from the Society of Critical Care Medicine.

Interventions: None.

Measurements and Main Results: There were 1,265 responses (11% response rate), with 1,029 eligible participants after exclusions were applied. Only 44% of participants reported using the Centers for Disease Control and Prevention–recommended barrier precautions during arterial catheter insertion, and only 15% reported using full barrier precautions. The mean and median estimates of the incidence density of bloodstream infections associated with arterial catheters were 0.3/1,000 catheter-days and 0.1/1,000 catheter-days, respectively. Thirty-nine percent of participants reported that they would support mandatory use of full barrier precautions during arterial catheter insertion.

Conclusions: Barrier precautions are used inconsistently by critical care clinicians during arterial catheter insertion in the ICU setting. Less than half of clinicians surveyed were in compliance with current Centers for Disease Control and Prevention guidelines. Clinicians significantly underestimated the infectious risk posed by arterial catheters, and support for mandatory use of full barrier precautions was low. Further studies are warranted to determine the optimal preventive strategies for reducing bloodstream infections associated with arterial catheters. (*Crit Care Med* 2015; XX:00–00)

Key Words: arterial catheter; bloodstream infection; critical care; intensive care unit; sepsis; survey

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Peripheral arterial catheters (ACs) are commonly used in the intensive care setting for continuous hemodynamic monitoring, serial arterial blood gas measurement, and routine blood draws. Approximately 8 million ACs are placed in the United States each year (1). ACs represent a potential source of bloodstream infection (BSI), as they provide a direct, indwelling, frequently accessed pathway between the skin and the bloodstream (2).

Intravascular catheter infections increase morbidity, length of stay, and hospital cost (3–6). To date, infection control efforts have focused primarily on preventing nosocomial infections associated with central venous catheters (CVCs). The *5 Million Lives Campaign* demonstrated a 66–74% reduction in the rate of CVC-associated BSIs through the use of a five-part "bundle," which includes hand hygiene, chlorhexidine-based skin antisepsis, full barrier precautions (sterile gloves, sterile gown, surgical cap, surgical mask, and full body sterile drape), optimal site selection, and daily review of catheter necessity with prompt removal (7–12). Due to the success of the *5 Million Lives Campaign*, it is now considered standard of care to use these techniques during the insertion of all CVCs.

There is a growing body of evidence that ACs pose an infectious risk that is comparable to CVCs. Recent studies have shown that the occurrence rate of BSIs (new infections per 1,000 catheter-days) associated with ACs is 0.9–3.4/1,000 catheter-days, which corresponds to 40–90% of the occurrence rate of BSIs associated with CVCs (1, 13–17). Prior to 2011, there were no guidelines specifying which barrier precautions should be used during AC insertion (18). In 2011, the Centers for Disease Control and Prevention (CDC) released updated infection prevention guidelines for ACs, recommending that a cap, mask, sterile gloves, and a small sterile fenestrated drape be used during peripheral AC insertions (19). To date, there have been no large-scale studies evaluating which aseptic techniques are actually used by clinicians during AC insertion in clinical practice; it is unknown whether critical care clinicians in the United States are aware of or in compliance with the current CDC guidelines for AC insertion.

We hypothesized that significant practice variability exists with regard to infection prevention techniques used during AC insertion in the ICU setting. Furthermore, we hypothesized that clinicians underestimate the infectious risks posed by ACs. The objective of this study was to assess the attitudes and current practice patterns of clinicians who insert peripheral ACs in the intensive care setting of hospitals across the United States.

MATERIALS AND METHODS

Study Design and Instrument Development

An anonymous, web-based survey was used to assess the infection prevention techniques used by clinicians who insert ACs in the intensive care setting. The survey was developed by a focus group at The Warren Alpert Medical School of Brown University consisting of an infectious diseases specialist, three medical intensive care specialists, one surgical intensive care specialist, an internal medicine resident, and a biostatistician. A pilot version of the survey was sent to intensive care physicians practicing in the state of Rhode Island (20). Based on the results and feedback from participants in the pilot study, the survey was revised to target a national audience. The survey was submitted to the Society of Critical Care Medicine (SCCM) and subsequently underwent two additional rounds of revision after review by the SCCM Research Committee and SCCM Executive Committee. Prior to dissemination, the survey was reviewed and approved by the Institutional Review Board (IRB) at Rhode Island Hospital. The need for written consent was waived by the IRB.

Participants

Survey participants consisted of clinician members of the SCCM. Specifically, the survey was e-mailed to all physicians (including attending physicians, fellows, and residents), nurse practitioners (NPs), physician assistants (PAs), registered nurses (RNs), and respiratory therapists who elect to receive e-mails from the SCCM.

Survey Instrument and Administration

The survey consisted of 22 questions (**supplemental survey**, Supplemental Digital Content 2, http://links.lww.com/CCM/B408). Twenty-one multiple-choice questions assessed demographic information, frequency of AC use, specific infection prevention techniques used during AC insertion, use of ultrasound during AC insertion, and attitudes regarding mandatory use of full barrier precautions for AC insertion. In one question, participants were asked to provide a numerical estimate (percentage) for the relative risk of BSIs associated with ACs when compared with CVCs, in terms of occurrence rate. For reference, the participants were provided with the estimated occurrence rate of BSIs associated with CVCs (2.2/1,000 catheter-days) (13). All data were nonidentifiable. The survey was conducted via REDCap (Vanderbilt University, 2014, Nashville, TN), an online survey and data capture tool (21). Each participant received the research invitation and survey link via e-mail. Implied consent was obtained by the informational letter and taking part in the survey. Participants were sent a total of two invitation e-mails over a period of 2 weeks in April and May 2014.

Analysis

Prior to analysis, the following groups were excluded from the study: clinicians who provided incomplete responses to the survey, clinicians who reported that they had not inserted an AC within the past year, clinicians who reported that they insert ACs exclusively in the operating room setting, and clinicians who practice outside the United States. Of note, clinicians who reported that they had not inserted an AC within the past year were included in a focused analysis examining their perceived risk of infection associated with ACs in comparison with the eligible study participants denoted above. Categorical responses were reported as percentages. Data were analyzed using Excel (Microsoft, 2003, Redmond, WA) and SAS software, Version 9.3 (SAS Institute, 2013, Cary, NC).

Logistic regression analyses were conducted using SAS. The specific outcomes examined in our subgroup analyses were 1) self-reported compliance with CDC guidelines during AC insertion, 2) self-reported use of full barrier precautions during AC insertion, and 3) support for mandatory use of full barrier precautions during AC insertion. The eight subgroups examined for all outcomes were 1) level of training, 2) specialty, 3) critical care training, 4) hospital size, 5) ICU size, 6) frequency of AC insertion, 7) status as a teaching hospital,

TABLE 1. Demographics of Eligible Respondents

Variable	n (%)
Level of training	
Attending physician	715 (69)
Fellow	161 (16)
Resident	13 (1)
Nurse practitioner	81 (8)
Physician assistant	32 (3)
Registered nurse	23 (2)
Other	4 (0)
Specialty	
Internal medicine (including subspecialties)	318 (31)
Surgery (including subspecialties)	192 (19)
Anesthesiology	147 (14)
Pediatrics	263 (26)
Neurology	21 (2)
Emergency medicine	35 (3)
Other	53 (5)
Critical care training	
Yes	827 (80)
No	134 (13)
Not applicable	68 (7)
Region of United States	
Northeast	321 (31)
Southeast	203 (20)
Midwest	287 (28)
California and Northwest	123 (12)
Southwest	95 (9)
Hospital type	
Teaching	839 (82)
University-based	807 (78)
Hospital size	
> 500 beds	490 (48)
150–500 beds	490 (48)
< 150 beds	49 (5)
ICU size	
> 20 beds	635 (62)
10–20 beds	348 (34)
< 10 beds	43 (4)
Not applicable	3 (0)
Frequency of arterial catheter insertion	
Once per day	242 (24)
Once per week	494 (48)
Once per month	205 (20)
Once per 3 mo	78 (8)
Once per year	10 (1)
None in the past year	0 (0)
Inserted arterial catheter in the following settings in the past year	
ICU	1,020 (99)
Emergency department	257 (25)
Operating room	262 (26)
Supervised a resident or fellow inserting an arterial catheter within the past year	
Yes	805 (78)
No	180 (18)
Not applicable	44 (4)

and 8) geographic region. In the analysis of our primary outcome (self-reported compliance with CDC guidelines), we also included participants' estimate for the relative risk of infection associated with ACs as an additional covariate. In our logistic regression analyses, several subcategories were merged: 1) NPs and PAs and 2) frequency of AC insertion once per month, once per 3 months, and once per year. Prior to merging these predictor variables, Fisher exact test was used to verify that there were no significant differences for each outcome variable of interest ($p > 0.05$). All individual results of the subgroup analyses are reported as predicted (model-based) probabilities. Similarly, all p values reported are derived from adjusted data. We considered p value less than 0.05 as significant in statistical analyses.

RESULTS

The survey was sent to 11,361 clinician members of the SCCM. There were a total of 1,265 responses, corresponding to a response rate of 11%. There were 1,029 eligible respondents after exclusions were applied (151 clinicians from outside the United States, 65 clinicians who had not inserted an AC within the past year, 14 clinicians who provided incomplete responses, and six clinicians who only insert ACs in the operating room setting). In our subgroup analyses, resident physicians ($n = 13$) and clinicians who indicated ICU size as "not applicable" ($n = 3$) were also excluded because the sample sizes were too small for accurate modeling. The majority of eligible respondents were attending physicians (69%). Participants were well distributed across multiple critical care specialties from each region of the United States. However, a disproportionate number of responses were from clinicians practicing in teaching hospitals (82%) and hospitals with university affiliation (78%) (**Table 1**).

Compliance With CDC-Recommended Precautions

Forty-four percent of respondents reported using the CDC-recommended precautions for AC insertion, consisting of hand hygiene, sterile gloves, a surgical cap, a surgical mask, and a small sterile fenestrated drape. Level of training ($F(3, 1009) = 6.23$; $p = 0.0003$) was significantly related to self-reported compliance with CDC guidelines during AC insertion (**Fig. 1**). Otherwise, there were no statistically significant variations in self-reported compliance with CDC guidelines with respect to specialty, critical care training, hospital size, ICU size, frequency of AC insertion, status as a teaching hospital, geographic region, or perceived risk of infection associated with ACs.

The predicted probabilities of compliance with CDC guidelines during AC insertion for attending physicians, fellows, RNs, and the combined group consisting of NPs and PAs were 0.40 (95% CI, 0.37–0.44), 0.56 (0.48–0.63), 0.35 (0.18–0.56), and 0.55 (0.46–0.64), respectively. Pairwise comparison revealed that compliance with CDC precautions by attending physicians was lower than for fellows (odds ratio [OR] = 0.54; 95% CI, 0.34–0.86; $t(1009) = -3.47$; $p = 0.003$) as well as for NP/PAs (OR = 0.55; 95% CI, 0.32–0.94; $t(1009) = -2.94$; $p = 0.02$). No other pairwise comparisons reached statistical significance (**supplemental tables**, Supplemental Digital Content 1, http://links.lww.com/CCM/B407).

Perceived Risk of Infection Associated With ACs

Clinicians in this survey significantly underestimated infectious risk posed by ACs. The mean and median estimates of the relative risk of BSIs associated with ACs when compared with CVCs (in terms of occurrence rate) were 0.15 and 0.05, respectively (**Table 2**). Using the reference occurrence rate provided to participants of 2.2 BSIs per 1,000 catheter-days associated with CVCs, these correspond to a mean estimated occurrence rate of BSIs associated with ACs of 0.3/1,000 catheter-days and a median estimated occurrence rate of 0.1/1,000 catheter-days.

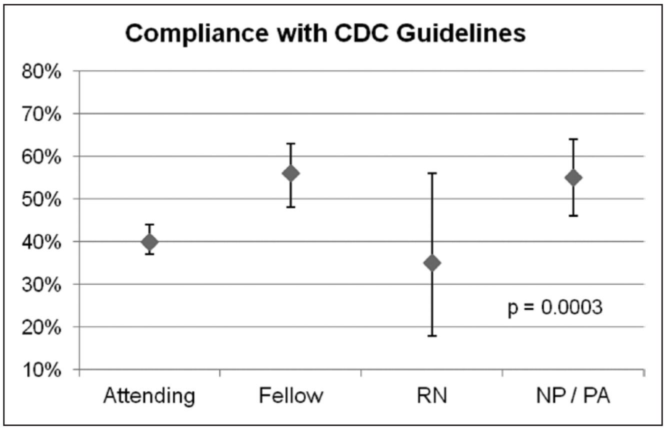

Figure 1. Compliance with Centers for Disease Control and Prevention (CDC) guidelines for arterial catheter insertion, stratified by level of training. All statistics are derived from adjusted data. Error bars indicate 95% CIs. *p* values represent global tests for differences between groups. NP = nurse practitioner, PA = physician assistant, RN = registered nurse.

Two analyses were performed to explore the relationship between clinicians' perceived risk of infection associated with ACs and their behaviors during AC insertion. First, participants' continuous estimates of the relative risk of infection associated with ACs were included as a covariate in the logistic regression analysis of self-reported compliance with CDC precautions during AC insertion while controlling for other variables. This analysis revealed that self-reported compliance with CDC precautions during AC insertion was not significantly related to perceived risk of infection ($p = 0.67$).

In addition, we compared the perceived risk of infection of the eligible participants in our study with respondents who were otherwise excluded because they had not inserted an AC within the past year ($n = 65$), again controlling for the effects of other covariates. There was no significant difference in perceived infectious risk between clinicians who had and had not inserted an AC within the past year (mean estimated relative risks of 0.11 and 0.16, respectively; $p = 0.30$).

Use of Full Barrier Precautions

Fifteen percent of respondents reported use of full barrier precautions during AC insertion, consisting of hand hygiene, cutaneous antisepsis using alcoholic chlorhexidine, sterile gloves, sterile gown, surgical cap, surgical mask, and full body sterile drape. Specialty ($F(6, 983) = 3.27$; $p = 0.003$) was significantly related to self-reported use of full barrier precautions during AC insertion (**Fig. 2**). The predicted probabilities of indicating use of full barrier precautions for clinicians specializing in anesthesiology, emergency medicine, internal medicine, pediatrics, surgery, neurology, and other were 0.03 (95% CI, 0.01–0.08), 0.20 (0.09–0.38), 0.19 (0.15–0.24), 0.18 (0.13–0.23), 0.15 (0.10–0.20), 0.10 (0.02–0.31), and 0.26 (0.15–0.41), respectively. By level of training, there were no significant differences between attending physicians, fellows, and the combined group consisting of NPs and PAs. Of note, zero out of 23 RNs indicated use of full barrier precautions during AC insertion. However, due to the small sample size and uniformity of responses, RNs were excluded from the modeling of self-reported use of full barrier precautions. No other subgroups were associated with statistically significant variations in self-reported use of full barrier precautions during AC insertion (supplemental tables, Supplemental Digital Content 1, http://links.lww.com/CCM/B407).

Support for Mandatory Full Barrier Precautions

Thirty-nine percent of clinicians surveyed indicated that they would support mandatory use of full barrier precautions for AC insertion. Specialty ($F(6, 999) = 9.21$; $p < 0.0001$), level of training ($F(3, 999) = 2.96$; $p = 0.03$), and geographic region ($F(4, 999) = 2.95$; $p = 0.02$) were all predictors of support for mandatory use of full barrier precautions during AC insertion. The predicted probabilities of indicating support for full barrier precautions by clinicians specializing in anesthesiology, emergency medicine, internal medicine, pediatrics, surgery, neurology, and other were 0.11 (95% CI, 0.07–0.18), 0.39 (0.22–0.58), 0.46 (0.37–0.54), 0.38 (0.30–0.48), 0.31 (0.24–0.39), 0.33 (0.16–0.56), and 0.49 (0.34–0.63), respectively (**Fig. 3**). Within level of

TABLE 2. Arterial Catheter Use in the ICU: A National Survey of Antiseptic Technique and Perceived Infectious Risk (n = 1,029)

Variable	%
Barrier and antiseptic techniques used	
Hand hygiene with soap and water	53.9
Hand hygiene with alcohol-based product	65.2
Hand hygiene (either of above)	96.5
Skin prep using alcohol	5.1
Skin prep using alcoholic chlorhexidine solution	95.1
Skin prep using povidone-iodine	3.7
Skin prep (any of above)	98.0
Allow skin prep solution to dry before proceeding	81.8
Nonsterile gloves	4.7
Sterile gloves	95.6
Sterile gown	52.7
Surgical mask	80.7
Surgical cap	71.7
Shaving the area prior to insertion	6.0
Small sterile drape (only covering area around insertion site)	73.7
Full body sterile drape (including head, feet, and hands)	20.1
None of the above	0.0
Not applicable	0.4
Use of ultrasound during arterial catheter insertion	
> 50% of insertions	18.5
25–50% of insertions	17.8
< 25% of insertions	47.0
Never	16.6
Not applicable	0.1
Use of sterile ultrasound probe cover	
Always	82.5
Sometimes	13.4
Never	4.1
Preferred arterial catheter insertion site	
Femoral	3.6
Radial	93.5
Brachial	0.8
Axillary	1.8
Dorsalis pedis	0.3

(*Continued*)

TABLE 2. (*Continued*). Arterial Catheter Use in the ICU: A National Survey of Antiseptic Technique and Perceived Infectious Risk (n = 1,029)

Variable	%
Estimation of relative risk of bloodstream infections associated with arterial catheters compared with central venous catheters	
Mean	15.2
Median	5.0
Routinely discuss appropriateness of arterial catheter removal every day on rounds for each patient	84.7
Employ an "absolute removal" policy of all arterial catheters after a predetermined number of days	2.5
Compliant with Centers for Disease Control and Prevention–recommended antiseptic techniques (hand hygiene, skin prep with chlorhexidine, sterile gloves, surgical cap, surgical mask, small sterile drape)	44.2
Use full barrier precautions (hand hygiene, skin prep with chlorhexidine, sterile gloves, sterile gown, surgical cap, surgical mask, full body sterile drape)	15.4
Would support mandatory use of full barrier precautions during arterial catheter insertion	39.0

training, there was less variation; predicted support for mandatory use of full barrier precautions ranged from 0.27 (fellows) to 0.39 (attending physicians). Similarly, by geographic region within the United States, the predicted probabilities of indicating support for mandatory use of full barrier precautions during AC insertion ranged from 0.29 (Southeast) to 0.41 (Northeast).

DISCUSSION

Our study, the first large-scale survey of AC insertion practice by critical care clinicians, revealed that less than half of clinicians reported using current CDC-recommended barrier precautions during AC insertion. This represents a significant deviation from clinical guidelines, on a national level, with regard to a commonly performed procedure in critically ill patients.

One possible explanation for this poor compliance with CDC guidelines is an apparent misconception about the infectious risk posed by ACs. On average, clinicians in this survey underestimated the risk of infection associated with ACs by a factor of 3, and the majority of clinicians surveyed (based on the median) underestimated the risk of infection by a factor of 10 or greater. However, in our subgroup analyses, we found no statistically significant correlation between compliance with CDC guidelines during AC insertion and perceived infectious risk associated with ACs, nor did we find a significant difference in perceived infectious risk between clinicians who had and had not inserted an AC within the past year. A limitation of this analysis is the relative complexity of the survey question in which participants were asked to estimate the risk of infection associated with ACs. Subsequently, misperception of

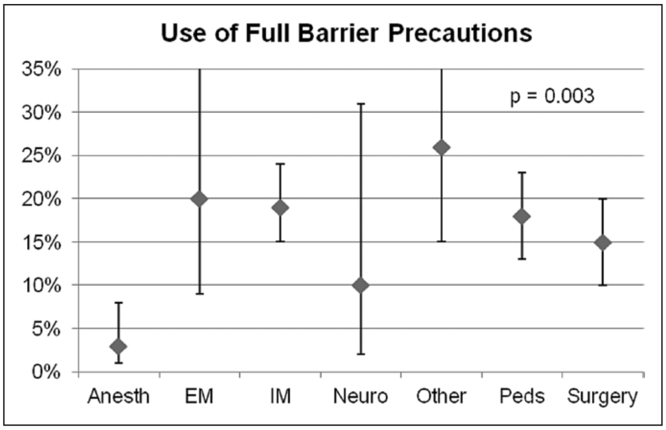

Figure 2. Self-reported use of full barrier precautions during arterial catheter insertion, stratified by specialty. All statistics are derived from adjusted data. Error bars indicate 95% CIs. *p* values represent global tests for differences between groups. Anesth = anesthesiology, EM = emergency medicine, IM = internal medicine, Peds = pediatrics.

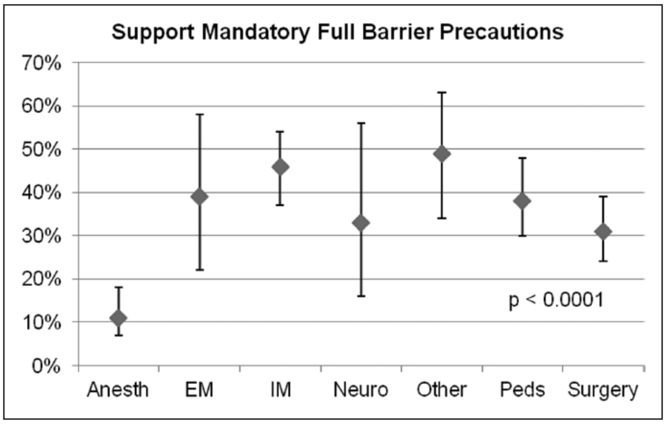

Figure 3. Support for mandatory use of full barrier precautions during arterial catheter insertion, stratified by specialty. All statistics are derived from adjusted data. Error bars indicate 95% CIs. *p* values represent global tests for differences between groups. Anesth = anesthesiology, EM = emergency medicine, IM = internal medicine, Peds = pediatrics.

infectious risk associated with ACs cannot be definitely ruled out as a contributing factor to the poor compliance with CDC guidelines reported by the cohort surveyed.

Another potential explanation of the poor compliance with recommended precautions is that clinicians may be simply unaware of the updated CDC guidelines published in 2011. Clinicians in this study were not asked whether they were aware that CDC guidelines existed due, in part, to concerns that such a question might alter their responses. Subsequently, the contribution of lack of knowledge of current guidelines by clinicians in this study is unknown. Interestingly, a multicenter survey of CVC insertion policies in 2002, prior to the implementation phase of the Surviving Sepsis campaign, revealed only 28% compliance with then-current CDC guidelines (22). This study highlights the potential of large-scale educational initiatives to propel change.

In summary, the source of low compliance with CDC guidelines during AC insertion could not be determined from the data in this study. The reasons for poor compliance may be multifactorial, including clinicians' unawareness of current guidelines, misperception of infectious risk, disbelief in the efficacy of current guidelines, or other motivating factors yet to be determined. Regardless of the root cause, if the results of our survey are representative of clinical practice in the United States, then our current level of compliance with CDC guidelines for AC insertion represents a missed opportunity to prevent BSIs in the intensive care setting. Efforts to improve compliance are needed. In addition, understanding the reasons for the differences in compliance and attitudes that we noted among the different groups of respondents may assist in future efforts aimed at mitigating risk posed by AC use.

In light of recent studies suggesting that the risk of BSIs associated with ACs is comparable to CVCs, a compelling argument can be made that the insertion of ACs should require the same barrier precautions as CVCs. In addition, a propensity-matched cohort study of AC use in mechanically ventilated ICU patients failed to identify a subset of patients in which ACs offered a mortality benefit (23). Secondary analysis found that AC use was associated with increased mortality in patients receiving vasopressors. Although not definitive, these findings, if corroborated by randomized controlled trials, may in part be attributable to AC-related infections. However, compared with the infection prevention bundle used for CVCs, the CDC-recommended precautions for ACs are less stringent and less evidence-based (19). Of the three studies cited in support of the CDC's recommendation of limited barrier precautions during AC insertion, two are single-arm studies in which more stringent precautions were used than those recommended by the CDC (13, 24). The third supporting study is a small, randomized controlled trial that compared limited barrier precautions with full barrier precautions for the insertion of ACs (25). This study showed no difference in colonization and a nonsignificant decrease in AC-related infections in the full barrier precaution arm (relative risk = 0.4; $p = 0.11$). However, with only 272 participants, this trial was underpowered; the authors of the study estimated that 2,200 randomized participants would have been required to detect a 50% reduction in AC-related BSIs. Of note, this is the only randomized controlled trial that has evaluated the efficacy of full barrier precautions for the insertion of ACs.

Among the clinicians surveyed in this study, 39% reported that they believed full barrier precautions should be mandatory for AC insertion, and 15% reported that they routinely use full barrier precautions during AC insertion. These findings indicate that if the CDC guidelines for AC insertion are further revised to require full barrier precautions, such changes may be met by considerable resistance. The major limiting factor in adoption of full barrier precautions by clinicians in this study was use of the full body sterile drape, which was used by only 20% of respondents. To date, no randomized controlled trials have compared the efficacy of different drape sizes in decreasing the incidence of BSIs associated with ACs. However, it seems unlikely that a small area drape can ensure equivalent sterility of both the proceduralist and procedural field, especially when ultrasound guidance is used for AC insertion. Adequately powered, prospective, randomized studies are needed to develop an evidence-based infection prevention bundle for AC insertion (26, 27).

The major potential limitation of this study is that the results are based on provider self-reports and may not accurately reflect true clinical practice. There have been multiple reviews which have concluded that, in general, clinicians are often inaccurate in their self-assessments (28–30). However, it should be noted that the studies from which these conclusions were drawn are limited in number and heterogeneous in terms of subject matter and research methodology (31, 32). Several trends were also noted in each of these reviews which are pertinent to our study. One finding is that clinicians were better able to provide self-assessments of specific, practical skills (such as procedures) than knowledge-based or more subjective activities (28, 33, 34). An additional finding, reproduced in multiple studies, is that those who are least competent (as determined by external assessment) are also the least accurate in their self-assessments and often prone to overestimation of their abilities (28, 30, 35, 36). In the context of our study, this latter finding suggests that true compliance with CDC guidelines may be even lower than the mean reported in our results.

Other potential limitations of this study are the low response rate (11%) and the high proportion of respondents from medium to large, university-based, teaching hospitals. There is a high likelihood that a selection bias exists among those who elected to participate in the survey. If one assumes that these clinicians were more concerned about AC-related infections than clinicians who chose not to participate, then the participants in this study may represent a cohort that uses more infection prevention precautions than the general population of critical care clinicians. Subsequently, it is possible that the statistics cited in this study again may overestimate the prevalence of barrier precaution usage during AC insertion. Finally, the survey did not allow respondents to indicate distinct sets of infection prevention methods used for different catheter insertion sites. This is pertinent because the CDC recommends use of full barrier precautions for insertion of ACs in the femoral and axillary sites (19). Four respondents noted in correspondence that they used full barrier precautions when inserting ACs in the femoral site but used fewer barrier precautions when accessing the radial site.

CONCLUSIONS

This national survey of critical care clinicians suggests that barrier precautions are used inconsistently during AC insertion in the ICU setting. Less than half of critical care clinicians surveyed were in compliance with current CDC guidelines for AC insertion. Clinicians significantly underestimated the infectious risk posed by ACs, and support for mandatory use of full barrier precautions was low. Further studies are warranted to determine the optimal preventive strategies for reducing BSIs associated with ACs.

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