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Does Certification in Vascular Access Matter? An Analysis of the PICC1 Survey

Study reveals differences in practices and views between certified and noncertified inserters.

Accreditation or certification by an external agency is common in many professions. In the field of health care, certification denotes that a person has specific qualifications for performing a certain job or set of activities. First, it signifies the completion of a prescribed course of study and the resultant acquisition of specialized knowledge and skills. Second, it attests to some demonstration of such learning, usually through a qualifying examination. Lastly, it serves to assure the public and other stakeholders of competence in a domain. Although some controversy regarding the expense and value of certification has recently emerged,[1,2] there is substantial evidence linking certification to greater job satisfaction, knowledge, and sense of empowerment among both physicians and nurses.[3,4] Among nurses, certification has also been associated with improved attitudes, better practice, and greater financial compensation.[5,6]

In the specialty of vascular access, the most common certifications are those administered by the Vascular Access Certification Corporation (which offers Vascular Access–Board Certified [VA-BC] certification) and by the Infusion Nurses Certification Corporation (which offers Certified Registered Nurse Infusion [CRNI] certification). Although these certifications vary in content and emphasis, they share certain essential features. Both require a minimum number of hours of clinical experience in planning, managing, and evaluating intravenous infusions and in inserting vascular access devices. Both also emphasize evidence-based approaches; and both certifications are often obtained by clinicians who specialize in inserting peripherally inserted central catheters (PICCs).

Although state boards of nursing require health care facilities to have written policies and procedures that ensure demonstration of competency by vascular access specialists, certification is not mandatory for practice. Some organizations encourage certification as a condition of employment, but others do not. To our knowledge, no study has examined whether certified and noncertified PICC inserters differ with respect to their practices and views about PICC use.

Study purpose. Understanding whether and how certification might affect PICC practices and outcomes is critical to informing policy and improving patient safety. Using data from a national survey of vascular access specialists, we compared the characteristics of certified PICC inserters to those of noncertified inserters. Our objective was to gather information regarding whether and how certified and noncertified PICC inserters differ with respect to their practices and views about PICC use. We hypothesized that, compared with noncertified inserters, certified inserters would report having greater experience and would be more likely to work in leadership positions. We also hypothesized that certified inserters would report greater use of evidence-based practices.

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ABSTRACT

Background: Although certification by an accredited agency is often a practice prerequisite in health care, it is not required of vascular access specialists who insert peripherally inserted central catheters (PICCs). Whether certification is associated with differences in practice among inserters is unknown.

Purpose: The purpose of this study was to gather information regarding whether certified and noncertified PICC inserters differ with respect to their practices and views about PICC use.

Methods: We conducted a national survey of vascular access specialists, identifying certified PICC inserters as those who had received board certification from the Association for Vascular Access, the Infusion Nurses Society, or both. The 76-item survey asked about PICC policies and procedures at respondents' facilities, use of insertion technologies, device management, management of complications, perceptions about PICC use, and relationships with other health care providers. Additional data about respondents, including years in practice and primary practice settings, were also gathered. Bivariable comparisons were made using χ^2 tests; two-sided α with $P \leq 0.05$ was considered statistically significant.

Results: Of the 1,450 respondents in the final sample, 1,007 (69%) said they were certified inserters and 443 (31%) said they were not. Significantly higher percentages of certified than noncertified inserters reported having practiced for five or more years (78% versus 54%) and having placed 1,000 or more PICCs (58% versus 32%). Significantly more certified than noncertified inserters also reported being the vascular access lead for their facility (56% versus 44%). Reported practice patterns for insertion, care, and management of PICCs varied based on certification status. Some evidence-based practices (such as the use of ultrasound to measure catheter-to-vein ratios) were more often reported by certified inserters, while others (such as the use of maximal sterile barriers during PICC insertion) were not. Asked about their perceptions of PICC use at their institution, certified inserters reported higher percentages of inappropriate insertion and removal than noncertified inserters.

Conclusion: Certified PICC inserters appear to be a distinct group of vascular access specialists. A better understanding of how and why practices differ between certified and noncertified inserters is necessary to ensuring safer, high-quality patient care.

Keywords: certification, peripheral catheterization, peripherally inserted central catheter, vascular access specialist

METHODS

Study setting and participants. We partnered with the Association for Vascular Access (AVA) and the Infusion Nurses Society (INS) to distribute a survey aimed at vascular access specialists who insert PICCs (the PICC1 survey). The AVA is a multidisciplinary professional organization for vascular access specialists, and the INS is a professional nursing organization for nurses who participate in various aspects of infusion therapy. Both organizations maintain membership directories accessible for practice-relevant surveys. They have a combined membership of over 8,300 specialists, although not all members insert PICCs. These agencies represent the most common sources of certification in vascular access.

Development and dissemination of the survey. First, a literature search was conducted to identify relevant evidence regarding vascular access practices. These data were used to inform the development of survey questions related to inserting, caring for, and troubleshooting PICCs, as well as questions regarding policies, practices, and various other relevant topics.

The initial survey was pretested with four nurses who had experience in inserting PICCs and expertise in the field. Based on their feedback, the instrument was revised and edited for clarity. The final survey instrument consisted of 76 questions on PICC policies and procedures at the inserters' facilities, the use of technologies for PICC insertion, device management (including management of complications), inserters' perceptions about PICC use, and inserters' relationships with other health care providers. Information about respondents, such as number of years in practice, certification or noncertification status, and the primary practice setting, was also collected. The survey instrument made use of skip logic, allowing respondents to skip questions that were contingent on a prior response.

Following its approval by the AVA and the INS, the instrument was programmed into an online survey administration tool (SurveyMonkey) to facilitate electronic dissemination. We tested the online survey to ensure its functionality. It was then announced and disseminated by the AVA and the INS to their members via an e-mail that contained an electronic link.

Advertisements publicizing the survey were also placed on the organizations' websites. Over the next five weeks, each organization sent timed reminder e-mails to encourage participation. Data were collected over a three-month period from June through August 2015. No identifiable information was collected from respondents, but a $10 Amazon gift card was offered to those who completed the survey.

The study was reviewed and deemed exempt from regulation by the University of Michigan's institutional review board before data collection began.

Identification of certified PICC inserters. To distinguish certified from noncertified PICC inserters, we first restricted the sample to respondents who indicated that they insert PICCs. We then evaluated these respondents' answers to the question "Do you currently hold a dedicated vascular access certification?" Respondents who answered yes were asked to identify which certification they held. Those who indicated holding VA-BC or CRNI (or both) certification were categorized as certified PICC inserters. Conversely, those who lacked such certification were categorized as noncertified inserters.

Significantly more certified inserters than noncertified inserters felt that a higher percentage of PICCs (10% or more) were unnecessarily removed when a patient developed a fever, without compelling evidence to suggest catheter infection.

Data analysis. Descriptive statistics were used to tabulate results. Since respondents weren't required to answer all questions, the response rate for individual questions was calculated based on the total number of responses to that question. Responses for certified and noncertified PICC inserters were compared across work settings, practice patterns, and views regarding PICCs. (Given that this was our focus, we did not analyze the data in terms of nurses and nonnurses.) Bivariable comparisons were made using χ^2 or Fisher's exact tests, as appropriate, for categorical data. Two-sided significance tests with α set at 0.05 was considered statistically significant. All statistical analyses were conducted using Stata/MP version 13 (StataCorp, College Station, TX).

RESULTS

Sample. The survey link was e-mailed to a combined 8,386 members of the AVA and the INS. Of these, 2,762 accessed the survey and 1,698 (61%) indicated that they inserted PICCs and were eligible for participation in the study. Of those eligible, 1,450 (85%) provided data regarding certification and made up the final cohort used for analysis. Of these, 1,007 (69%) reported being certified and 443 (31%) indicated they were not certified. Most respondents (96%) reported practicing within the United States, and all 50 U.S. states and the District of Columbia were represented. A small number of respondents (4%) practiced outside the United States.

General characteristics of PICC inserters. Most certified and noncertified PICC inserters identified as vascular access nurses (89% in both groups). Nonnurse inserters included respiratory therapists, physicians, and advanced practice providers. Significantly higher percentages of certified than noncertified inserters reported having five or more years' experience with inserting PICCs (78% versus 54%) and having placed 1,000 or more PICCs (58% versus 32%). A significantly higher percentage of certified than noncertified inserters worked in a facility that was affiliated with a medical school (52% versus 46%). But there was no significant difference between the groups regarding their facility's affiliation with a nursing school. Significantly higher percentages of certified than noncertified inserters reported being on a vascular access team with 10 or more members (35% versus 19%) and being the vascular access lead for their team (56% versus 44%).

A significantly higher percentage of certified than noncertified inserters reported that their facility had a written medical or nursing process for reviewing the necessity of PICCs on a daily basis (71% versus 58%). With respect to relationships with other providers, there was a significant difference between certified and noncertified inserters in their rating of support received from hospital leadership but not in their relationships with physicians and bedside nurses. See Table 1 for more on the general characteristics of certified and noncertified inserters in this study.

Variations in practice between certified and noncertified PICC inserters. Several important differences in reported practices were noted. For instance, a significantly higher percentage of certified than noncertified inserters reported receiving assistance from another vascular access specialist when inserting a PICC (52% versus 41%). A significantly

Table 1. General Characteristics of Certified and Noncertified Inserters

	Certified Inserter n (%)	Noncertified Inserter n (%)	*P*
Which of the following best describes you?	**n = 1,007**	**n = 443**	0.82
Vascular access nurse	896 (89)	396 (89)	
Other	111 (11)	47 (11)	
Which of the following best describes your primary work location?	**n = 1,007**	**n = 443**	0.01
Academic medical center	174 (17)	75 (17)	
For-profit community hospital	186 (18)	87 (20)	
Nonprofit community hospital	488 (48)	216 (49)	
VA medical center	82 (8)	16 (4)	
Other	77 (8)	49 (11)	
Is your facility affiliated with a medical school?	**n = 949**	**n = 410**	0.05
Yes	493 (52)	189 (46)	
No	456 (48)	221 (54)	
Is your facility affiliated with a nursing school?	**n = 936**	**n = 418**	0.21
Yes	558 (60)	234 (56)	
No	378 (40)	184 (44)	
Does your facility have hospitalists?	**n = 956**	**n = 405**	0.20
Yes	890 (93)	369 (91)	
No	66 (7)	36 (9)	
Number of hospital beds in your primary work location	**n = 885**	**n = 382**	0.07
Less than 250	384 (43)	187 (49)	
250 or more	501 (57)	195 (51)	
How many vascular access nurses are on your team?	**n = 993**	**n = 428**	< 0.001
Less than 10	645 (65)	346 (81)	
10 or more	348 (35)	82 (19)	
How many years have you been inserting PICCs?	**n = 1,003**	**n = 441**	< 0.001
Less than five	216 (22)	202 (46)	
Five or more	787 (78)	239 (54)	
How many PICCs have you placed in your career?	**n = 1,007**	**n = 443**	< 0.001
Less than 1,000	418 (42)	300 (68)	
1,000 or more	589 (58)	143 (32)	
Are you the vascular access lead for your facility?	**n = 1,007**	**n = 440**	< 0.001
Yes	562 (56)	193 (44)	
No	445 (44)	247 (56)	
Does your facility have a written medical or nursing process to review the necessity of PICCs on a daily basis?	**n = 946**	**n = 402**	< 0.001
Yes	669 (71)	232 (58)	
No	277 (29)	170 (42)	
Does your facility track the number of PICCs placed each month?	**n = 988**	**n = 431**	0.02
Yes	922 (93)	416 (97)	
No	66 (7)	15 (3)	

Table 1. Continued

	Certified Inserter n (%)	Noncertified Inserter n (%)	*P*
Does your facility track the duration or dwell time (in number of days) of PICCs?	**n = 939**	**n = 393**	0.02
Yes	659 (70)	249 (63)	
No	280 (30)	144 (37)	
How would you rank the overall support (such as staffing, financial, and political) that your vascular access service receives from hospital leadership?	**n = 1,007**	**n = 443**	0.04
Poor	105 (10)	47 (11)	
Fair or good	500 (50)	249 (56)	
Very good or excellent	402 (40)	147 (33)	
How would you describe your relationship with physicians when it comes to communicating recommendations for management of PICCs?	**n = 1,007**	**n = 443**	0.07
Poor or very poor	73 (7)	26 (6)	
Fair or good	599 (59)	292 (66)	
Very good	335 (33)	125 (28)	
How would you describe your relationship with bedside nurses when it comes to communicating recommendations for management of PICCs?	**n = 1,007**	**n = 443**	0.10
Poor or very poor	81 (8)	24 (5)	
Fair or good	534 (53)	256 (58)	
Very good	392 (39)	163 (37)	

PICC = peripherally inserted central catheter; VA = Department of Veterans Affairs.
Note: Because not all respondents answered every question, total N may be less than 1,450; because of rounding, percentages may not sum to 100%.

higher percentage of certified than noncertified inserters reported having placed a PICC in a patient receiving dialysis (63% versus 51%). In doing so, certified inserters more frequently reported consulting with a nephrologist before placement (92% versus 88%). While a significantly lower percentage of certified inserters reported that their facility tracked the total number of PICCs placed each month (93% versus 97%), a significantly higher percentage indicated that it tracked PICC dwell times (70% versus 63%).

Important differences specific to insertion practices were also found. For instance, a lower percentage of certified than noncertified inserters reported using all five sterile barriers (cap, mask, gown, sterile gloves, and full body drapes) (78% versus 84%). Although 96% of inserters in both groups reported using ultrasound to find a suitable vein for PICC insertion, significantly more certified than noncertified inserters indicated using ultrasound to estimate a catheter-to-vein ratio before placement (86% versus 76%) and documenting this ratio in the PICC insertion note (43% versus 30%). Similarly, significantly more certified inserters reported the use of electrocardiographic guidance to place PICCs (67% versus 55%). But the percentages of certified and noncertified inserters who reported the use of chlorhexidine for skin antisepsis at the insertion site (96% in both groups) and the routine trimming of PICCs to an appropriate length following insertion (94% versus 92%) were similar.

Some care and maintenance practices also varied between the two groups. For instance, significantly fewer certified than noncertified inserters reported using a combination dressing and securement device for routine care following placement (18% versus 26%). Most certified and noncertified inserters reported using securement devices to prevent PICC migration (95% versus 93%). But there were differences in the type of securement devices used, with noncertified inserters more often using wing-based products than certified inserters (89% versus 80%). With respect to flushing protocols, a significantly higher percentage of certified than noncertified inserters reported using a "targeted" strategy (flushing only those lumens that weren't being actively used or were only used for blood draws) (33% versus 24%). Differences in recommended flushing techniques were also noted:

Table 2. Variations in Reported Practice Between Certified and Noncertified Inserters

	Certified Inserter n (%)	Noncertified Inserter n (%)	*P*
Do other vascular access nurses routinely assist you when you insert a PICC?	**n = 1,007**	**n = 443**	< 0.001
Yes	527 (52)	181 (41)	
No	480 (48)	262 (59)	
Do you use ultrasound to find a suitable vein prior to PICC insertion?	**n = 1,007**	**n = 443**	0.94
Yes	963 (96)	424 (96)	
No	44 (4)	19 (4)	
Do you use ultrasound to estimate the catheter-to vein ratio prior to PICC insertion?	**n = 1,007**	**n = 443**	< 0.001
Yes	869 (86)	337 (76)	
No	138 (14)	106 (24)	
When using ultrasound, do you document the catheter-to-vein ratio in the PICC insertion note?	**n = 869**	**n = 337**	< 0.001
Yes	371 (43)	100 (30)	
No	498 (57)	237 (70)	
Do you use ECG guidance-assisted systems to place PICCs?	**n = 1,007**	**n = 443**	< 0.001
Yes	670 (67)	244 (55)	
No	337 (33)	199 (45)	
In the past few months, have you placed a PICC in a patient who was receiving dialysis?	**n = 1,007**	**n = 443**	< 0.001
Yes	636 (63)	225 (51)	
No	371 (37)	218 (49)	
When placing PICCs in patients on dialysis, do you discuss placement with a nephrologist before inserting the PICC?	**n = 636**	**n = 225**	0.04
Yes	588 (92)	198 (88)	
No	48 (8)	27 (12)	
Which of the following hand hygiene practices and products do you use before inserting PICCs?	**n = 1,007**	**n = 443**	0.68
Handwashing without use of an alcohol-based sanitizer	409 (41)	185 (42)	
An alcohol-based sanitizer only	598 (59)	258 (58)	
Which of the following products do you use to disinfect the patient's skin prior to PICC insertion?	**n = 1,007**	**n = 443**	0.74
Chlorhexidine-containing product	967 (96)	427 (96)	
Other	40 (4)	16 (4)	
Do you routinely trim the PICC to length?	**n = 1,007**	**n = 443**	0.19
Yes	946 (94)	408 (92)	
No	61 (6)	35 (8)	
Do you routinely use all five sterile barriers (cap, mask, gown, gloves, drapes) when placing a PICC?	**n = 1,007**	**n = 443**	0.01
Yes	789 (78)	374 (84)	
No	218 (22)	69 (16)	

Table 2. Continued

	Certified Inserter n (%)	Noncertified Inserter n (%)	*P*
Which of the following dressings do you use after inserting a PICC?	**n = 1,007**	**n = 443**	< 0.001
Clear transparent dressing	324 (32)	137 (31)	
Chlorhexidine-containing dressing	439 (44)	185 (42)	
Combination dressing and securement	169 (17)	108 (24)	
Other	75 (7)	13 (3)	
Does your facility use a securement device to prevent PICC migration?	**n = 1,007**	**n = 443**	0.16
Yes	957 (95)	413 (93)	
No	50 (5)	30 (7)	
Which of the following securement devices does your facility use?	**n = 958**	**n = 413**	0.001
Wing-based devices (such as StatLock, Grip-Lok, WingGuard)	762 (80)	366 (89)	
Transparent dressing with adhesive-based securement (such as Tegaderm)	76 (8)	15 (4)	
Advanced securement device (such as SecurAcath)	62 (6)	19 (5)	
Tape or other	58 (6)	13 (3)	
Which of the following dressings are used at your facility for routine care after PICC placement?	**n = 1,007**	**n = 443**	< 0.001
Clear transparent dressing	314 (31)	137 (31)	
Chlorhexidine-containing dressing	422 (42)	175 (40)	
Combination dressing and securement	185 (18)	117 (26)	
Other	86 (9)	14 (3)	
Who is most responsible for scheduled weekly dressing changes for PICCs?	**n = 1,007**	**n = 443**	< 0.001
Vascular access nurses	448 (44)	162 (37)	
Bedside nurses	421 (42)	248 (56)	
Interventional radiology staff	58 (6)	6 (1)	
Other	80 (8)	27 (6)	
Who is responsible for administering and adhering to a flushing protocol at your facility?	**n = 1,007**	**n = 443**	< 0.001
Bedside nurses	784 (78)	387 (87)	
Vascular access nurses	77 (8)	25 (6)	
Interventional radiology staff	78 (8)	10 (2)	
Nonnurse providers (such as LPNs and medical technicians)	39 (4)	10 (2)	
Other	29 (3)	11 (2)	
Which of the following best describes your recommended PICC flushing protocol?	**n = 892**	**n = 371**	0.002
Targeted flushing based on use	290 (33)	88 (24)	
Flush all lumens daily regardless of use	602 (67)	283 (76)	
Which of the following best describes your flushing technique?	**n = 1,007**	**n = 443**	0.04
Pulsatile (stop-and-go) flushing	764 (76)	360 (81)	
Rapid push flushes	142 (14)	40 (9)	
Slow flushes	89 (9)	35 (8)	
Other	12 (1)	8 (2)	

Table 2. Continued

Which of the following best describes the frequency at which you recommend flushing?	**n = 1,007**	**n = 443**	0.84
Before and after each use of the PICC	310 (31)	136 (31)	
Every eight hours	168 (17)	80 (18)	
Every 12 hours	270 (27)	123 (28)	
Daily	119 (12)	44 (10)	
Other	140 (14)	60 (14)	
Which of the following agents are most often used for flushing PICCs at your facility?	**n = 993**	**n = 438**	0.002
Normal saline	630 (63)	302 (69)	
Heparin	73 (7)	10 (2)	
Both heparin and normal saline (based on device or patient characteristics)	287 (29)	124 (28)	
Other or unknown	3 (< 1)	2 (< 1)	

ECG = electrocardiogram; PICC = peripherally inserted central catheter.
Note: Because not all respondents answered every question, total N may be less than 1,450; because of rounding, percentages may not sum to 100%.

fewer certified than noncertified inserters practiced pulsatile flushing (76% versus 81%), while more certified than noncertified inserters practiced rapid push flushes (14% versus 9%). Although frequency of flushing was similar in the two groups, there were some differences in use of flushing agents, with fewer certified than noncertified inserters using normal saline (63% versus 69%) and more certified than noncertified inserters using heparin (7% versus 2%). See Table 2 for more on variations in reported practices between certified and noncertified inserters.

Variations in approach to complications and views about PICC practice. Several differences in reported management of PICC complications were noted. Similar percentages of certified and noncertified inserters reported the use of a tissue plasminogen activator to treat catheter-related occlusions (92% versus 91%). But their approaches to managing PICC-related phlebitis varied somewhat. For instance, fewer certified than noncertified inserters said they would discuss the situation with a physician (41% versus 46%), but more certified than noncertified inserters said they would do so with a nurse (10% versus 7%). The two groups also differed regarding the management of PICC-related deep vein thrombosis, with more certified than noncertified inserters recommending ultrasound evaluation (59% versus 45%) and notification of all caregivers (59% versus 45%).

The two groups also expressed somewhat different views about PICC practice. For instance, a significantly higher percentage of certified than noncertified inserters reported being empowered to remove PICCs that were idle or not clinically indicated without physician approval (26% versus 18%). Significantly more certified inserters also felt that a higher percentage of PICCs (10% or more) were unnecessarily removed when a patient developed a fever, without compelling evidence to suggest catheter infection (75% versus 63%). Similarly, significantly more certified inserters felt that a higher percentage of PICCs (10% or more) were placed for inappropriate reasons and could have been avoided (44% versus 34%). See Table 3 for more on variations in the reported approaches and views of certified and noncertified inserters.

More certified than noncertified inserters reported working in larger facilities and on larger vascular access teams.

DISCUSSION

To our knowledge, this is the first study to examine associations between certification in vascular access and reported practices and views related to PICC insertion and use. In our analysis of 1,450 vascular access specialists who insert PICCs, the majority of respondents (69%) reported holding certification by an accredited external agency. We found that more certified than noncertified inserters reported working in larger facilities and on larger vascular access teams. In accordance with our hypotheses, we found that significantly higher percentages of certified inserters reported having more practice experience and greater

Table 3. Variations in Reported Approach to Complications and in Views Regarding PICC Practice

	Certified Inserter n (%)	Noncertified Inserter n (%)	*P*
What is your preferred approach to treating catheter occlusion?	**n = 1,007**	**n = 443**	0.45
Use a tissue plasminogen activator product	928 (92)	403 (91)	
Other	79 (8)	40 (9)	
What is your preferred approach when you suspect a patient has PICC-associated phlebitis?	**n = 1,007**	**n = 443**	0.01
Discuss with physician	411 (41)	202 (46)	
Discuss with nurse	96 (10)	30 (7)	
Supportive measures	338 (34)	125 (28)	
Remove PICC	114 (11)	70 (16)	
Other	48 (5)	16 (4)	
What is your preferred approach when you suspect a patient has PICC-related DVT?	**n = 1,007**	**n = 443**	< 0.001
Notify all caregivers (including physicians, bedside nurses, residents, and students)	595 (59)	198 (45)	
Notify bedside nurse and physician in charge	364 (36)	230 (52)	
Notify bedside nurse only	1 (< 1)	3 (1)	
Other	47 (5)	12 (3)	
Are vascular access nurses empowered to remove PICCs that are idle or clinically unnecessary without physician authorization?	**n = 1,007**	**n = 443**	0.001
Yes	262 (26)	80 (18)	
No	745 (74)	363 (82)	
Some reports suggest that PICCs are unnecessarily removed when a patient develops a fever. In your experience, what percentage of PICCs may have been removed in this manner?	**n = 1,007**	**n = 443**	< 0.001
10% or more	752 (75)	281 (63)	
Less than 10%	255 (25)	162 (37)	
Reports suggest that PICCs are sometimes placed for inappropriate reasons and could be avoided. In your experience, what percentage of PICCs are inappropriate or could have been avoided?	**n = 1,007**	**n = 443**	< 0.001
10% or more	447 (44)	152 (34)	
Less than 10%	560 (56)	291 (66)	

DVT = deep vein thrombosis; PICC = peripherally inserted central catheter.
Note: Because not all respondents answered every question, total N may be less than 1,450; because of rounding, percentages may not sum to 100%.

use of certain evidence-based practices (such as ultrasound to determine catheter-to-vein ratio). Certain care and maintenance practices, including approaches to managing complications such as thrombosis and phlebitis, also varied significantly between the two groups. Collectively, these data suggest that certification in vascular access is associated with important differences in work settings, practice patterns, and views regarding PICCs. Whether or not these variations influence the quality of patient care and patient outcomes is a question that deserves further scrutiny.

In nursing, a substantial body of evidence suggests that specialty certification is associated with several improved patient outcomes. For example, a 2014 study reported a direct association between certification status among surgical and anesthetic RNs and rates of central line–associated bloodstream infections—specifically, hospitals with higher percentages

of specialty-certified RNs had lower rates of such infections.[7] In acute care settings, another study found a significant relationship between increased rates of unit-level nursing specialty certification and fewer patient falls.[8] And in an analysis of risk-adjusted surgical discharges, specialty certification in nurses with baccalaureates or higher degrees was associated with decreased mortality and failure-to-rescue rates after multivariable adjustment.[9]

Despite such findings, barriers to obtaining specialty certification—including lack of financial or logistical support for review courses and examinations, time constraints, and fear of failure—persist.[10] With regard to vascular access certification specifically, the fees for certification, recertification, and maintenance of credentials aren't trivial, ranging from $300 to $700 at this writing.[11-13]

patients receiving dialysis, although current guidelines indicate that this is contraindicated and associated with adverse outcomes, regardless of nephrologist approval.[20,21]

Such findings highlight the importance not only of transmitting up-to-date evidence through certification programs, but also of ensuring that such knowledge influences practice. For example, in accordance with current INS guidelines, certified inserters might recommend an alternative device rather than a PICC in patients receiving dialysis.[22] The focus thus shifts from a device-centric view to one that prioritizes the appropriateness of use.[23,24] Our findings that higher percentages of certified inserters were likely to perceive inappropriate PICC placement and to feel empowered to remove clinically unnecessary devices suggest that certification may help guide

Certified inserters were more likely to use certain evidence-based practices that reduce complication risks, including using ultrasound to evaluate catheter-to-vein ratios, using ECGs to guide PICC placement, and receiving assistance from another team member during insertion.

Although the knowledge base in this specialty varies in quality, specific evidence-based practices have been associated with improved outcomes when it comes to inserting PICCs. For example, it's been demonstrated that "real-time" guidance of the PICC tip during insertion and measurement of vein size can reduce complications such as malposition and thrombosis.[14-16] Similarly, using alcohol-containing chlorhexidine for cutaneous antisepsis and having multiple team members trained in placing vascular catheters has been shown to reduce the risk of catheter-related infection.[17-19]

In general, it seems reasonable to presume that providers with certification will be more likely to use evidence-based practices than their noncertified counterparts. Our analysis of data from the PICC1 survey supports this in part. For example, certified inserters were more likely to use certain evidence-based practices that reduce complication risks, including using ultrasound to evaluate catheter-to-vein ratios, using ECGs to guide PICC placement, and receiving assistance from another team member during insertion. But certified inserters also reported some practices that either aren't clearly supported by evidence or contradict best practice. For example, fewer certified inserters reported using all five sterile barriers when placing PICCs than noncertified inserters did. And more certified inserters reported placing PICCs in

decisions about the suitability of PICC use. Exploring ways to further enable PICC inserters to apply evidence to practice, communicate such knowledge to physicians, and act as vanguards for patient safety is paramount.[23,25]

Policy implications. Given that certified inserters more frequently reported engaging in key evidence-based practices, our findings also have important policy implications. Essential next steps might include working with health care system leaders to remove financial barriers to obtaining certification, encouraging the adoption and implementation of practices taught in certification programs, and measuring key outcomes based on certification status. Given our finding that more certified inserters are leaders on their vascular access teams, encouraging certification as an adjunct to career advancement might also improve staff satisfaction and retention, important factors in organizational planning and sustainability.

Limitations. This study has several limitations. First, we used data from a survey that targeted vascular access specialists belonging to two large professional organizations; thus, selection bias might affect our findings. Second, we defined certified inserters as those who reported current certification by one or both of two agencies; findings may differ if reporting was inaccurate or if different standards are used to define certification status. Third, although we observed

differences in practice patterns and views by certification status, we cannot attribute these differences solely to this characteristic. Nor can certification status be separated from employer or site-specific requirements that might influence practice and views. Studies that examine these relationships in more detail are necessary.

CONCLUSION

Certification in vascular access appears to be associated with important differences among PICC inserters with regard to their practices and views. Encouraging broader adoption of this credential—which is currently often voluntary—may be warranted. Further research to foster a better understanding of the impact of certification on patient outcomes is essential. In particular, studies aimed at clarifying how certification influences thinking and practice in clinical settings are needed if we are to unlock the potential of this professional training. ▼

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