

Challenges for Nurses Caring for Individuals with Peripherally Inserted Central Catheters in Skilled Nursing Facilities

Molly Harrod, PhD,* Ana Montoya, MD,^{†‡} Lona Mody, MD, MS,^{†‡} Helen McGuirk, MPH,[§] Suzanne Winter, MS,[§] and Vineet Chopra, MD, MSc*[§]

OBJECTIVES: To understand the perceived preparedness of frontline nurses (registered nurses (RNs), licensed practical nurses (LPNs)), unit nurse managers, and skilled nursing facility (SNF) administrators in providing care for residents with peripherally inserted central catheters (PICCs) in SNFs.

DESIGN: Exploratory, qualitative pilot study.

SETTING: Two community based SNFs.

PARTICIPANTS: Residents with PICCs, frontline nurses (RNs, LPNs), unit nurse managers, and SNF administrators.

METHODS: Over 36 weeks, 56 residents with PICCs and their nurses were observed and informally interviewed, focusing on PICC care practices and documentation. In addition, baseline PICC data were collected on placement indication (e.g., antimicrobial administration), placement setting (hospital vs SNF), and dwell time. Focus groups were then conducted with frontline nurses and unit nurse managers, and semistructured interviews were conducted with SNF administrators to evaluate perceived preparedness for PICC care. Data were analyzed using a descriptive analysis approach.

RESULTS: Variations in documentation were observed during weekly informal interviews and observations. Differences were noted between resident self-reported PICC concerns (quality of life) and those described by frontline nurses. Deficiencies in communication between hospitals and SNFs with respect to device care, date of last dressing change, and PICC removal time were also noted. During focus group sessions, perceived inadequacy of information at the time of care transitions, limited availability of resources to care for PICCs, and gaps in training and

education were highlighted as barriers to improving practice and safety.

CONCLUSION: Practices for PICC care in SNFs can be improved. Multimodal strategies that enhance staff education, improve information exchange during care transitions, and increase resource availability in SNFs appear necessary to enhance PICC care and safety. *J Am Geriatr Soc* 64:2059–2064, 2016.

Key words: skilled nursing facility; peripherally inserted central catheter; nursing care; communication

From 1996 to 2010, discharge to post-acute care facilities such as skilled nursing facilities (SNFs) has grown by nearly 50% in the United States.¹ This increase in volume has brought a corresponding rise in acuity of illness in SNFs.² Compounding such concerns about volume and acuity of illness are well-known problems such as lack of adequate discharge information,³ limited family and resident engagement,⁴ and medication discrepancies in as many as one in three individuals transferred to a SNF.⁵ Whether SNF staff are equipped to provide care for these individuals is thus an important and relatively unanswered question.

Peripherally inserted central catheters (PICCs) are vascular access devices that facilitate prolonged intravenous therapy.⁶ PICCs are often used to provide ongoing treatments (e.g., antimicrobial administration) in individuals who transition from hospitals to SNFs. They are also often used in SNFs to provide durable venous access. For these reasons, PICCs are an excellent model through which to understand SNF readiness to care for individuals who are acutely ill. These knowledge gaps are also particularly relevant because PICCs are associated with important complications, and appropriate care may offset risk of such harms.^{7–9}

A study evaluating use of PICCs in SNFs was recently conducted, providing the unique opportunity to explore the perceptions of residents and providers caring for these

From the *Center for Clinical Management Research, VA Ann Arbor Health Care System, Ann Arbor, Michigan; [†]Geriatric Research, Education and Clinical Center; [‡]Division of Geriatric and Palliative Care Medicine, University of Michigan, Ann Arbor, Michigan; and [§]Patient Safety Enhancement Program, Division of General Medicine, University of Michigan Health System, Ann Arbor, Michigan.

Address correspondence to Vineet Chopra, North Campus Research Complex, University of Michigan School of Medicine, 2800 Plymouth Road, Building 16 Room 432W, Ann Arbor, MI 48109. E-mail: vineetc@umich.edu

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devices.¹⁰ An exploratory qualitative study was conducted to understand resident experiences with having a PICC and problems that nurses encountered with device care, to evaluate resources available to care for individuals with PICCs, and to examine the training and education nurses receive to manage these devices.

METHODS

Study Design and Setting

This qualitative pilot study was designed to explore SNF practices and resident experiences with PICCs. Two local, unrelated community-based SNFs were selected for the study: a nonprofit 161-bed facility and a for-profit 180-bed facility owned by separate companies. Neither SNF had an academic or hospital affiliation. The institutional review board of the University of Michigan Medical School and local ethics review boards of both SNFs reviewed and provided regulatory oversight for the study (UM-HUM079723). All participants, including residents, nurses, and administrators, provided written informed consent.

Data Collection

Data collection occurred over two distinct phases. The first 36-week phase included resident interviews followed by informal interviews¹¹ with frontline nurses (registered nurses (RNs), licensed practical nurses (LPNs)) and observations of the PICC care they provided. The second phase followed the initial interviews and consisted of formal qualitative data gathering using focus groups and semistructured interviews after the initial period of interviews.

Weekly Informal Interviews, Bedside Observations, and Medical Chart Review

Each week for 36 consecutive weeks, members of the study team visited both SNFs to evaluate care, practices, and documentation related to PICCs. During these visits, residents were evaluated and asked about their experiences with having a PICC. Frontline nurses (n = 82) were then asked about concerns or problems they experienced with PICCs (164 unique informal interviews during the course of the study). These interviews focused on knowledge of PICC concerns raised by residents, problems experienced with the PICC (e.g., trouble using catheter, inability to flush), and approaches they used to mitigate these issues (e.g., flushing, contacting external agencies for support). During weekly visits, trained study team members also observed frontline nurses as they cared for residents with PICCs, focusing on how they flushed the catheters, performed dressing changes, administered medications (RNs only), and assessed the condition of the devices. These observations provided deep contextual understanding of how PICC care is performed within these settings and was subsequently used to inform the development of guidelines for the focus group discussions and semistructured interviews.

For all residents who provided consent, baseline PICC data including placement indication (e.g., antimicrobial

administration, total parenteral nutrition administration), placement setting (hospital vs SNF), device type (single- vs multilumen), and dwell time were obtained from medical chart review at each SNF. Medical charts were also reviewed for documentation regarding PICC care (e.g., frequency of flushing), complications (e.g., exit-site infection, migration), and whether the PICC had been used since the last study visit for any therapeutic purpose (e.g., blood draw, infusion of therapy). To ensure consistency, data from the semistructured interviews, observations, and medical charts reviews were collected using standardized templates.

Focus Groups and Semistructured Interviews

After the initial 36-week period of resident visits and informal interviews, one focus group was conducted at each SNF with frontline nurses (two focus groups; n = 13 frontline nurses). It was decided to talk with RNs and LPNs together because it was found during the informal interviews and observations that the PICC-related activities they perform are similar with the exception of administering medications. One focus group was also held at each SNF with unit nurse managers (two focus groups; n = 11 unit nurse managers). It was decided to include unit nurse managers because, despite being nurses, the concerns they perceived often differed from those of frontline nurses. For example, frontline nurses appeared to better understand clinical nuances associated with PICCs because they used them daily. Conversely, unit nurse managers appeared to better understand organizational challenges such as staffing requirements to care for individuals with PICCs. To facilitate participation in the focus groups, SNF administrators posted signs with the time, date, and purpose of and rationale for the sessions. To prevent bias, SNF administrators did not select, assign, or “volunteer” participants.

Because there were only three administrators across both SNFs, semistructured interviews rather than focus groups were used for this group. Interviewing SNF administrators was important because it allowed how organizational concerns such as cost, availability of resources, and nursing ratios influence care of individuals with PICCs to be understood. The SNFs did not permit audiorecording of focus groups and interviews or transcription of sessions. Therefore, members of the study team took detailed handwritten notes during focus group and interview sessions with nurses and administrators. Study team members produced their own notes, which were then combined into a comprehensive document for analysis. To ensure completeness, team members reviewed the final document to determine whether all data were captured.

Data Analysis

Descriptive analysis was used to analyze the data. A descriptive analysis approach is one in which “researchers conducting qualitative descriptive studies stay closer to their data and to the surface of words.”¹² A list of preliminary codes was initially derived from reading the informal interviews, observations, and medical chart reviews from Phase 1 and grouping similar text to formulate codes. These codes were then used to develop the focus group

and semistructured interview guides for exploring challenges regarding PICC care. Finally, these codes were applied to the focus group and interview data.

Because the focus group and interview data were more detailed and comprehensive than anticipated, additional codes were necessary. To generate additional codes, previously coded data were reexamined to apply new codes if necessary using an iterative approach.¹³ The process was implemented by using multiple team members to analyze the focus group and semistructured interview data independently, and apply codes that best highlighted barriers to and facilitators of PICC care. The team then met to compare and group codes into larger themes. Themes were related to problems that residents and frontline nurses encountered with device care and management, resources available for PICC care, and opportunities for PICC training and education for nurses and unit nurse managers. Through discussion, the team rank-ordered themes based on saliency. Two authors (MH, VC) involved in team coding then reviewed the codes and themes to confirm findings.

RESULTS

Of 69 residents approached at two SNFs, 56 (81%) provided written informed consent and were successfully enrolled. All participating frontline nurses ($n = 13$), unit nurse managers ($n = 11$), and SNF administrators ($n = 3$) in the focus groups and semistructured interviews provided consent; no nursing staff declined to participate in the study.

Weekly Semistructured Interviews, Bedside Observations, and Medical Chart Review

Thirty-six of the 56 residents with PICCs (64%) in the sample had received them for antimicrobial administration, which was well known to frontline nurses because they often administered these treatments. The mean dwell time of PICCs was 40.5 days (range 7–310 days). Although 59% of all PICCs were inserted in hospitals ($n = 33$), 17 (30%) were ordered and placed while the individual was at the SNF. For these 17 residents, intravenous antimicrobial administration ($n = 7$), hydration ($n = 4$), and need for frequent blood draws or poor venous access ($n = 6$) were documented reasons for placement (Table 1).

During semistructured interviews, frontline nurses reported PICC problems in 25% of residents ($n = 14$), including inability to flush the line or obtain blood and migration of the catheter at the exit site. Although these concerns were often well documented in the medical chart, there was room for improvement. For example, PICC site evaluations were documented in only 41% ($n = 23$) of residents. When asked about this discrepancy, frontline nurses expressed uncertainty regarding how best to evaluate PICC dressings, exit sites, or arm girth. Additionally, residents and frontline nurses often reported different complications; for instance, residents often focused on PICC concerns related to quality of life (e.g., difficulty with mobility, sleeping), whereas frontline nurses often focused on device function or dressing problems. Major complications such as accidental removal, infection, and thrombosis, were well

Table 1. Participant and Facility Characteristics

Characteristic	Value
Residents, $n = 56$	
Age, mean \pm SD	67.0 \pm 24.8
Male, n (%)	26 (46)
PICC	
Indication for placement	
Antimicrobial administration	36 (64)
Total parenteral nutrition	8 (14)
Chemotherapy	1 (2)
Other (hydration, blood draws)	12 (20)
Power-injectable PICC ^a	51 (91)
Placement setting	
Hospital	33 (59)
SNF	17 (30)
Dwell time, days, mean \pm SD (range)	43.0 \pm 54.0 (7–310)
Informal interview participants, n^b	
Frontline nurses (RNs, LPNs)	82
Unit nurse managers and SNF administrators	11
Focus group and semistructured interview participants, n	
Frontline nurses	13
Nurse managers	11
SNF administrators	3
Facility details ^c	
Certified beds, n	341
Participates in Medicare and Medicaid	Yes
Within a hospital	No
Centers for Medicare and Medicaid Services quality ratings ¹⁶	
Overall, average	3.5
Health inspection, average	3
Staffing, average	3.5
Quality measures, average	4
RN turnover, %	30
LPN turnover, %	24

^aPeripherally inserted central catheter (PICC) made of special materials such that it may withstand contrast or dye injection through a power injector, as is often used for radiographic studies.

^bBecause nurses had multiple resident assignments, some were interviewed more than once.

^cData from Nursing Home Compare (nursinghomecompare.gov) and personal communication with study sites.

SD = standard deviation; SNF = skilled nursing facility; RN = registered nurse; LPN = licensed practical nurse.

known to residents and nursing staff alike (Tables 2 and 3).

To evaluate PICC safety, the appropriateness of continued PICC use was examined at each weekly site visit. In 17 residents (30%), no evidence of PICC use between such visits (e.g., no blood draw or infusion for at least 7 days) was observed, suggesting that these devices could have been safely removed, potentially decreasing risk of complications, but only one such PICC was removed during the course of the study. When asked why clinically unnecessary PICCs were not removed, frontline nurses indicated that determination of PICC necessity was not in their scope of practice. Furthermore, frontline nurses and unit nurse managers indicated that hospitals rarely provided information regarding when the PICC could be removed, further confounding this decision. Consequently, PICC removal regularly occurred at the time of SNF discharge rather than on the basis of clinical necessity.

Table 2. Outcomes and Evaluations Associated with Use of Peripherally Inserted Central Catheters (PICCs) in Skilled Nursing Facilities

Outcome	N (%)
Medical chart review	
Flushing protocol in place	50 (89)
If present, adherence to flushing protocol	46 (82)
Assessment of line necessity by nurse or physician ^a	41 (73)
Lack of ongoing PICC use ^b	39 (70)
PICC site evaluations	23 (41)
Lumen occlusion	13 (23)
Accidental removal or dislodgement	7 (12)
Dressing disruption	6 (11)
Migration	3 (5)
Central line-associated bloodstream infection	1 (2)
Exit-site infection	1 (2)
Informal interviews	
Resident-reported PICC problems ^c	26 (46)
Nurse-reported PICC problems ^d	14 (25)
Additional reviewer-noted PICC problems ^e	11 (20)
PICC appropriateness [in reviewer's opinion] ^f	42 (75)

^aAssessment refers to presence of documentation in the chart that indicated that the PICC in question was clinically in use or still clinically necessary.

^bDefined as no use of the PICC for at least 7 days or between two weekly visits.

^cDifficulty using the arm where catheter was inserted for daily activities, arm swelling, pain, redness, tenderness, itching or irritation, crusting at exit site, occlusion, migration, dislodgment, dressing concerns, inability to flush or use PICC.

^dTrouble using catheter, migration at exit site, inability to flush or use PICC.

^eArm swelling, redness over PICC entry site, dressing disruption (wet, soiled, loose).

^fHad not been used for >1 week or was removed within a week of insertion.

Focus Group and Semistructured Interviews

Four salient themes emerged from the focus groups and semistructured interviews: lack of information during the transition process, lack of centralized information within the SNF, inconsistent availability of resources, and perceived gaps in training and education (Table 3).

Lack of Information During the Transition Process

In examining transitions of residents with PICCs, frontline nurses and unit nurse managers highlighted the paucity of information that accompanied individuals with PICCs at the time of SNF admission. SNF administrators were also aware of this problem. Although both SNFs generally used established screening procedures and admission policies to obtain such data, participants stated that information regarding PICCs was often “buried” within the medical record. Compounding this problem was the fact that hospital documentation often lacked relevant data. For instance, details such as PICC catheter length, flushing schedule, and dates of last dressing change were often not included. Thus, frontline nurses stated that they had no way of knowing when the PICC was last flushed or when dressings were last changed when individuals arrived at their facility.

Lack of Centralized Information within the SNF

In addition to the lack of information during the transition process, frontline nurses, unit nurse managers, and SNF administrators stated that PICCs were not tracked at the organizational level; that is, there was no formal list or master document that informed staff of the presence of a PICC. Such lack of tracking had clinical implications. For example, although all participants believed that individuals with PICCs required more time for clinical care, these devices were not routinely considered when assigning frontline nurses.

Related to lack of information, frontline nurses stated that institutional data regarding PICC-associated infections or problems were limited. For example, a unit nurse manager stated that such information was available to frontline staff only when an “outbreak investigation” occurred. Frontline nurses stated that “we were only made aware of it” but that instructions regarding how to assimilate these data into clinical care “were not clear.”

Inconsistent Availability of Resources

Lack of immediate availability of certain PICC supplies and reliance on external contracted care services to provide specific PICC services were noted as factors that led to delays in care of residents with PICCs. Specifically, access to dressing materials and sterile prefilled flushes were at times limited, because supplies came from external pharmacies on an as-needed basis. In the event of delays, frontline nurses stated that they often used another resident's supplies to provide PICC care. Although frontline nurses removed PICCs at the time of discharge, both SNFs relied on external contractors (e.g., a vascular access company) to manage problems such as catheter migration and dislodgement. Unit nurse managers noted that the availability of such services was limited during nights and weekends, gaps that occasionally led to delayed medication delivery or laboratory tests.

Perceived Gaps in Training and Education

Frontline nurses and unit nurse managers felt that training to care for individuals with PICCs could be improved. For example, frontline nurses stated that the majority of training and education related to PICCs occurred in nursing school, with few subsequent updates. Both SNFs required yearly competencies (mandatory trainings), but these modules did not include PICC assessments or dressing evaluations. Frontline nurses and unit nurse managers consequently perceived gaps in PICC training and education, especially regarding best practices for blood draws, flushes, and trouble-shooting the device.

DISCUSSION

This qualitative pilot study examining care of individuals with PICCs sheds new light on the myriad challenges that healthcare providers face in SNFs. Multiple areas for improving clinical care of PICCs were identified during weekly observations and informal interviews. For instance, although frontline nurses were aware of major PICC complications, they were often less familiar with residents'

Table 3. Themes, Codes, and Illustrative Examples of Statements from Focus Groups and Semistructured Interviews

Themes and Codes	Example(s)
Lack of information during the transition process	
Upon admission	Moderator: Are you [nurses] notified that a patient who has a PICC is being admitted? Unit Nurse Manager: About 50% of the time. Frontline Nurse 1: Not the floor nurses. SNF Administrator: During the referral process, information does not always come with the patient.
Information difficult to find or absent	Moderator: How do you find information regarding the PICC? Frontline Nurse 2: If you looked in the chart, you wouldn't find it. There are a lot of notes to look through. Frontline Nurse 3: And we have to go through admission fast so we don't have time to search through the notes. Moderator: Do you also take measurements of the line? Frontline Nurse 1: We measure after we pull it out, but there is no way to confirm the whole measure. It's really hard to find it. You don't have time to go through [the notes] and look. Frontline Nurse 4: I make a note of what it was measured at [after it's pulled out] in case there are any complications later.
Orders may vary between hospital and SNF doctors	Moderator: How do you decide if a patient no longer needs a PICC? Frontline Nurse: We don't really have a big part of that. For the most part the [SNF] doctor takes care of that. We have no way of knowing when the PICC should be removed.
Lack of information within the SNF: effect on work load	Moderator: Have any of you ever had more than one patient with a PICC at a time? Frontline Nurse 3: She (pointing to another nurse) will have three and I won't have any. Frontline Nurse 7: It's definitely not evenly divided. Frontline Nurse 1: I don't have time to listen if a patient needs to say something. Frontline Nurse 5: We are more task oriented. . . Moderator: Are patients with PICCs considered in your staffing decisions? SNF Administrator: No, not really, but we do get more PICCs than we do ortho (orthopedics) patients.
Inconsistent availability of resources	
PICC supplies	Moderator: Will [PICC] kits come with a patient's name on it? Frontline Nurse: Yeah, but sometimes you have to use another patient's kit because we are low on stock and no one had reordered or restocked.
Outside care services	Moderator: When do you call the [care services nurse]? Unit Nurse Manager: The process is, we flush it ourselves. . . If that doesn't work, than we call the [care services nurse]. We communicate that in our notes especially if [the patient] missed a dose of antibiotics.
Perceived gaps in training and education	
Current training opportunities	Moderator: What types of training or education is offered for PICC care? Frontline Nurse 1: Just what we went through in nursing school. Frontline Nurse 2: Every year we have an evaluation. I can't remember the last time someone watched me do it [PICC care] though. Moderator: What types of training or education is offered for PICC care? Unit Nurse Manager: Skills fair is once a year, but it's not mandated.
Need for training	Moderator: Is there anything else you would like to talk about? Frontline Nurse: Across the board, a lot of people don't know how to draw [blood] off the PICC. Moderator: Is there anything else you need to provide care for patients with PICCs? Unit Nurse Manager 1: We need updates, [education] on sterile procedures. Unit Nurse Manager 2: How and when to correctly saline flush.

PICC = peripherally inserted central catheter; SNF = skilled nursing facility.

concerns regarding PICCs. Similarly, many PICCs were idle, possibly exposing residents to greater or unnecessary risk of complications. Subsequent focus groups and semistructured interviews affirmed these findings and revealed important perceived gaps in process and knowledge related to caring for individuals with these devices.

In keeping with other studies,¹⁴ findings from the focus groups and semistructured interviews confirmed that lack of information during transitions between the hospital and SNF is an important problem for residents with PICCs and their frontline nurses. Furthermore, lack of standardized content and accessibility were barriers to

retrieving such data. Frontline nurses also stated that resources for PICC care were scarce and that the absence of these materials led to delays in care. Limited feedback regarding infection rates coupled with perceived limitations in training and education in PICC care were specific concerns that frontline nurses and unit nurse managers expressed. These insights suggest that transitions of hospitalized individuals with PICCs to SNFs are not straightforward. Rather, in accordance with the literature,^{15,16} attention during transitions is needed to ensure that SNFs are able to provide the complexity of care that such individuals require.

Frontline nurses and unit nurse managers helped identify concrete ways in which PICC care could be improved. For example, training on frequency and type of flushing for PICCs and how to draw blood to prevent occlusion were mentioned as domains in which further education would be helpful. Similarly, better transmission of important information (date of PICC placement, anticipated date of removal, catheter length) in discharge summaries or other readily accessible documents was also cited as helpful. Interventions leveraging these domains, such as pre-populated fields in discharge summaries and patient cards, are straightforward, and SNF staff would welcome them. Partnerships with local SNFs that target education, appropriate information transmission, and availability of critical supplies may thus improve PICC safety. In the current era of accountable care organizations,¹⁷ such partnerships are feasible and necessary to improve care quality.

This study has important limitations. First, because only two facilities were studied, the findings have limited generalizability. Second, because physicians and certified nursing assistants do not directly provide PICC care, they were not included in the study, but future efforts should include these personnel. Third, information was not collected regarding frontline nurses' background (e.g., training, employment history), nor was their role or background information connected to individual responses. The extent to which either group or their relative training and education may have influenced responses is therefore not known. Finally, discharging hospital staff were not interviewed, which limits understanding of hospital-based perspectives regarding transitions.

This study also has important strengths. To the knowledge of the authors, this is one of the first studies to highlight challenges associated with transitions and care of residents with PICCs in SNFs. Although preliminary, the findings suggest that larger studies including multiple facilities would be valuable. Second, the study identifies important areas such as documentation, information, resources, and knowledge that are amenable to improvement. Targeting these gaps through relatively simple interventions (e.g., "PICC cards," nursing-oriented training and education related to PICCs) may improve PICC safety in SNFs. Hospitals across the country should begin to partner with discharge destinations to determine how best to convey this information, especially within an accountable care organization framework.

In conclusion, the use of PICCs in SNFs is not without inherent problems. Future studies that corroborate these findings and develop and test interventions to ameliorate these complications are needed. In the interim, evaluation of current practices in post-acute care settings appears necessary.

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