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Challenges for Nurses Caring for Patients With Peripherally Inserted Central Catheters in Skilled Nursing Facilities

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Abstract

Objectives—To understand frontline nurses' (registered nurses and licensed practical nurses), unit nurse managers' and skilled nursing facility (SNF) administrators' perceived preparedness in providing care for patients with peripherally inserted central catheters (PICCs) in SNFs.

Design—An exploratory, qualitative pilot study.

Setting—Two community based SNFs.

Participants—Patients, frontline nurses (registered nurses and licensed practical nurses), unit nurse managers and SNF administrators.

Methods—Over 36-weeks, we observed and conducted informal interviews with 56 patients with PICCs and their nurses focusing on PICC care practices and documentation. In addition, we collected baseline PICC data including placement indication (e.g., antimicrobial administration), placement setting (hospital vs. SNF), and dwell time. We then conducted focus groups with frontline nurses and unit nurse managers and semi-structured interviews with SNF administrators to evaluate perceived preparedness for PICC care. Data were analyzed using a descriptive analysis approach.

Results—During weekly informal interviews and observations variations in documentation were observed. Differences between patient-reported PICC concerns (quality-of-life) and those described by frontline nurses were noted. Deficiencies in communication between hospitals and

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Conflict of Interest

The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper.

Author Contributions

All authors contributed to this paper.

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None.

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 in improving practice and safety.

Conclusion—Our study suggests that 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 patient safety.

Keywords

Skilled nursing facility; peripherally inserted central catheter; nursing care; communication

INTRODUCTION

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 patient acuity in SNFs.² Compounding such volume and acuity issues are well known problems, such as lack of adequate discharge information,³ limited family and patient engagement,⁴ and medication discrepancies in as many as 1 in 3 patients who are transferred to SNFs.⁵ Whether SNF staff are equipped to provide care for these patients is, thus, an important and relatively unanswered question.

Peripherally inserted central catheters (PICCs) are vascular access devices that facilitate prolonged intravenous therapies.⁶ Increasingly, PICCs serve as conduits to provide ongoing treatments (e.g., antimicrobial administration) in patients 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 patients of greater acuity. These knowledge gaps are also particularly relevant as PICCs are associated with important complications and appropriate care may offset risk of such harms.⁷⁻⁹

As we recently conducted a study evaluating use of PICCs in SNFs, we had the unique opportunity to explore the perceptions of patients and providers caring for these devices.¹⁰ Therefore, we conducted an exploratory qualitative study to (a) understand patient experiences with having a PICC and problems encountered by nurses with device care, (b) evaluate resources available to care for patients with PICCs and (c) 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 patient experiences regarding PICCs. Two local and unrelated community-based SNFs were selected for the study. These consisted of a non-profit 161-bed facility and a for-profit 180-bed facility that were owned by separate companies. Neither SNF has an academic or hospital institutional

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 patients, nurses and administrators, provided written informed consent.

Data Collection

Weekly Informal Interviews, Bedside Observations, and Medical Chart Review

—Data collection occurred over two distinct phases. The first 36-week phase included patient interviews followed by informal interviews¹¹ with frontline nurses (Registered Nurses and Licensed Practical Nurses) and observations of the PICC care they provided. The second phase followed the initial patient and nurse interviews and consisted of formal qualitative data gathering using focus groups and semi-structured interviews after the initial period of patient and nurse interviews.

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, we evaluated patients and asked them about their experiences with having a PICC. We then asked frontline nurses (n=82) about concerns or problems they experienced with a patient's PICC (164 unique informal interviews during the course of the study). These interviews focused on knowledge of patient-related PICC concerns, problems experienced with the PICC (e.g., trouble using catheter, inability to flush, etc.) and approaches they used to mitigate these issues (e.g., flushes or contact external agencies for support). Additionally, during weekly visits, trained study team members observed frontline nurses as they cared for patients with PICCs, focusing on how they flushed the catheter, performed dressing changes, gave medications (RNs only), or assessed the condition of the device. These observations provided a deep contextual understanding of how PICC care is performed within these settings and was subsequently used to inform the development of guides for the focus-group discussions and semi-structured interviews.

For all patients who gave consent, baseline PICC data including placement indication (antimicrobial administration, TPN administration, etc.), placement setting (hospital vs. SNF), device type (single vs. multi-lumen) and dwell time was obtained from medical chart review at each SNF. We also reviewed medical charts for documentation regarding PICC care (e.g., frequency of flushing), the occurrence of complications (e.g., exit-site infection, migration) and whether the PICC had been used since our last visit for any therapeutic purpose (e.g., blood draw, infusion of therapy). To ensure consistency, data from the semi-structured interviews, observations and medical charts reviews were collected using standardized templates.

Focus Groups and Semi-Structured Interviews—Following the initial 36-week period of patient visits and informal interviews we conducted one focus group at each SNF with frontline nurses (n=two focus groups; n=13 frontline nurses). We chose to talk with RNs and LPNs together because we found during our informal interviews and observations that the PICC-related activities they perform are similar with the exception of administering medications. We also held one focus group at each SNF with unit nurse managers (n=two

focus groups; n=11 unit nurse managers). We 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 as they interacted with such issues daily. Conversely, unit nurse managers appeared to better understand organizational issues such as staffing requirements to care for patients with PICCs. To facilitate participation in the focus groups, SNF administrators posted signs with the time, date, purpose and, rationale of the sessions. To prevent bias, however, SNF administrators did not select, assign or "volunteer" participants.

Because there were only three administrators across both SNFs, semi-structured interviews rather than focus groups were used for this group. Interviewing SNF administrators was important as it allowed us to understand how organizational concerns such as cost, availability of resources or nursing ratios influenced care of patients with PICCs. Audio-recording of focus groups or interviews and transcription of sessions were not permitted by the SNFs. Therefore, members of the study team took detailed hand-written notes during focus group and interview sessions with nurses and administrators. Each study team member produced their own set of 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

A descriptive analysis was used to analyze the data. A descriptive analysis approach is one where "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. We then used these codes to develop the focus group and semi-structured interview guides for exploring the issues surrounding PICC care. Finally, we applied these codes to the focus group and interview data.

Because the focus group and interview data were more detailed and comprehensive, additional codes were necessary. When this occurred, we returned to previously coded data to apply new codes, if necessary, thus, employing an iterative approach.¹³ The process was implemented by utilizing multiple team members to independently analyze the focus group and semi-structured interview data, and apply codes that best highlighted barriers and facilitators to PICC care. The team then met to compare and group codes into larger themes. Themes related to problems encountered by patients and frontline nurses with device care and management, resources available for PICC care and opportunities for PICC training/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

We approached 69 residents at 2 SNF facilities and 56 (81%) of them 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 semi-structured interviews provided consent; no nursing staff declined to participate in the study.

Weekly Semi-Structured Interviews, Bedside Observations and Medical Chart Review

Of the 56 PICCs evaluated, most patients (n=36, 64%) in our sample received PICCs for antimicrobial administration, a fact well known to the frontline nurses caring for patients as they often administered these treatments. The mean dwell time of PICCs was 40.5 days with a range of 7-310 days. Although more than half of all PICCs were inserted in hospitals (n=33, 59%), 17 (30%) were ordered and placed while the patient was at the SNF. For these 17 patients, intravenous antimicrobial administration (n=7), hydration (n=4) and need for frequent blood draws/poor venous access (n=6) were documented reasons for placement (**Table 1**).

During semi-structured interviews, frontline nurses reported PICC problems in 25% of patients (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, we observed room for improvement. For example, PICC site evaluations were only documented in 41% (n=23) of patients. When asked about this discrepancy, frontline nurses expressed uncertainty regarding how best to evaluate PICC dressings, exit sites or arm girth. Additionally, patients and frontline nurses often reported different complications; for instance, patients 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 or thrombosis, however, were well known to both patients and nursing staff (**Tables 2 and 3**).

In order to evaluate PICC safety, we examined the appropriateness of continued PICC use with each weekly site visit. In 17 patients (30%), no evidence of PICC use between such visits (e.g., no blood draw or infusions for at least 7 days) was observed, suggesting that these devices may have been safely removed, potentially decreasing risk of complications. Only one such patient, however, had his/her PICC removed during the course of our 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. Further, 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.

Focus Group and Semi-Structured Interviews

Four salient themes emerged from the focus group and semi-structured interview sessions: first, lack of information during the transition process; second, lack of centralized information within the SNF; third, inconsistent availability of resources, and fourth, perceived gaps in training and education (**Table 3**).

Lack of information during the transition process

In examining transitions of patients with PICCs, frontline nurses and unit nurse managers both highlighted the paucity of information that accompanied patients 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, or 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 patients 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, no formal list or master document that informed staff on presence of PICC existed. Such lack of tracking had clinical implications. For example, while all participants believed patients with PICCs required more time for clinical care, these devices were not routinely considered when assigning frontline nurses to patients.

Related to lack of information, frontline nurses stated that institutional data regarding PICC-associated infections or problems was limited. For example, a unit nurse manager stated that such information was only available to frontline staff when an "outbreak investigation" occurred. Frontline nurses stated that "we were only made aware of it," but 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 for patients with PICCs. Specifically, access to dressing materials or sterile prefilled flushes were at times limited, as supplies came from external pharmacies on an as-needed basis. In the event of delays, frontline nurses stated that they often used another patient'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 or 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

Both frontline nurses and unit nurse managers felt that training to care for patients 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. Importantly, both SNFs required yearly competencies, 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, or trouble-shooting the device.

DISCUSSION

This qualitative pilot study examining care for patients with PICCs sheds new light on the myriad of challenges for a number of healthcare providers in SNFs. Through weekly observations and informal interviews multiple areas for improving clinical care of PICCs were identified. For instance, although frontline nurses were aware of major PICC complications, they were often less familiar with patient concerns regarding PICCs. Similarly, many PICCs were idle, possibly exposing patients to greater or unnecessary risk of complications. Subsequent focus groups and semi-structured interviews affirmed these findings and revealed important perceived gaps in process and knowledge related to caring for patients with these devices.

In keeping with other studies,¹⁴ findings from our focus group and semi-structured interviews confirmed that lack of information during transitions between the hospital and SNF is an important problem for patients with PICCs and their frontline nurses. Furthermore, lack of standardized content and accessibility posed barriers in retrieving such data. Frontline nurses also stated that resources for PICC care were scarce and absence of these materials did lead to delays in patient care. Limited feedback regarding infection rates coupled with perceived limitations in training and education in PICC care were specific concerns also brought forward by frontline nurses and unit nurse managers. These insights suggest that transitions of hospitalized patients with PICCs to SNFs are not a straightforward process. Rather, in accordance with other literature,^{15, 16} attention during transitions is needed to ensure that SNFs are able to provide the complexity of care required for such patients.

Importantly, frontline nurses and unit nurse managers in our study 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 brought forward as domains where further education would be helpful. Similarly, improved transmission of key information (date of PICC placement, anticipated date of removal, catheter length) in discharge summaries or other readily accessible documents was also singled out as helpful. Interventions leveraging these domains such as pre-populated fields in discharge summaries or patient cards are straightforward and would be welcomed by SNF staff. Partnerships with local SNFs that target education, appropriate information transmission and availability of key supplies may, thus, offer untold promise in improving PICC safety. In the current era of Accountable Care Organizations,¹⁷ such partnerships are feasible and necessary to improve care quality.

Our study has important limitations. First, because we only included two facilities, our findings have limited generalizability. Second, because physicians or certified nursing assistants do not directly provide PICC care, we did not include these staff in our study; however, future efforts should include these personnel. Third, we did not collect information regarding frontline nurses' background (e.g., training, employment history), nor relate their

role or background information to individual responses. The extent to which either group or their relative training and education may have influenced responses is, therefore, not known. Finally, we did not interview discharging hospital staff, a factor that limits our understanding of hospital-based perspectives regarding transitions.

Our study also has important strengths. To our knowledge, this is among the first studies to highlight challenges associated with transitions and care of patients with PICCs in SNFs. Although preliminary, our findings suggest that larger studies spanning multiple facilities would be valuable. Second, our study identifies key areas such as documentation, information, resources and knowledge that are amenable to improvement. Targeting these gaps through relatively simple interventions (e.g., "PICC cards" or 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, 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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REFERENCES

- [1]. Burke R, Juarez-Colunga E, Levy C, et al. Patient and hospitalization characteristics associated with increased postacute care facility discharges from US hospitals. *Med Care*. 2015; 53:492–500. [PubMed: 25906015]
- [2]. Jenq G, Tinetti M. Post-acute care: Who belongs where? *JAMA Intern Med*. 2015; 175:296–297. [PubMed: 25437105]
- [3]. King B, Gilmore-Bykovskiy A, Roiland R, et al. The consequences of poor communication during transitions from hospital to skilled nursing facility: A qualitative study. *J Am Geriatr Soc*. 2013; 61:1095–1102. [PubMed: 23731003]
- [4]. Popejoy L, Dorman Marek K, Scott-Cawiezell J. Patterns and problems associated with transitions after hip fracture in older adults. *J Gerontol Nurs*. 2013; 39:43–52.
- [5]. Tjia J, Bonner A, Briesacher B, et al. Medication discrepancies upon hospital to skilled nursing facility transitions. *J Gen Intern Med*. 2009; 24:630–635. [PubMed: 19291332]
- [6]. Cotogni P, Barbero C, Garrino C, et al. Peripherally inserted central catheters in non-hospitalized cancer patients: 5-year results of a prospective study. *Support Care Cancer*. 2015; 23:403–409. [PubMed: 25120012]

- [7]. Chopra V, Anand S, Hickner A. Risk of venous thromboembolism associated with peripherally inserted central catheters: A systematic review and meta-analysis. *Lancet*. 2013; 382:311–325. [PubMed: 23697825]
- [8]. Chopra V, Anand S, Krein S, et al. Bloodstream infection, venous thrombosis, and peripherally inserted central catheters: Reappraising the evidence. *Am J Med*. 2012; 125:733–741. [PubMed: 22840660]
- [9]. Chemaly R, de Parres J, Rehm S, et al. Venous thrombosis associated with peripherally inserted central catheters: A retrospective analysis of the Cleveland Clinic experience. *Clin Infectious Dis*. 2002; 34:1179–1183.
- [10]. Chopra V, Montoya A, Joshi D, et al. Peripherally inserted central catheter use in skilled nursing facilities: A Pilot Study. *J Am Geriatr Soc*. 2015; 63:1894–1899. [PubMed: 26312402]
- [11]. Turner D III. Qualitative interview design: A practical guide for novice investigators. *Qual Rep*. 2010; 15:754–760.
- [12]. Sandelowski M. Whatever happened to qualitative description? *Res Nurs Health*. 2000; 23:334–340. [PubMed: 10940958]
- [13]. Dey I. *Qualitative data analysis: A user friendly guide for social scientists*: Routledge. 2003
- [14]. Jones CD, Vu MB, O'Donnell CM, et al. A failure to communicate: a qualitative exploration of care coordination between hospitalists and primary care providers around patient hospitalizations. *J Gen Intern Med*. 2015; 30:417–424. [PubMed: 25316586]
- [15]. Ward KT, Eslami MS, Garcia MB, et al. Do internal medicine residents know enough about skilled nursing facilities to orchestrate a good care transition? *JAMDA*. 2014; 15:841–843. [PubMed: 25282630]
- [16]. Simmons SF, Schnelle JF, Saraf AA, et al. Pain and Satisfaction with pain management among older patients during the transition from acute to skilled nursing care. *Gerontologist*. Jul 16.2015 pii: gnv058. [Epub ahead of print].
- [17]. Lage DE, Rusinak D, Carr D, et al. Creating a network of high-quality skilled nursing facilities: Preliminary data on the postacute care quality improvement experiences of an accountable care organization. *J Am Geriatr Soc*. 2015; 63:804–808. [PubMed: 25900492]

Table 1

Patient, Participant and Facility Characteristics

PATIENT PARTICIPANTS^a (N=56)	Total
Average Age (mean \pm SD)	67 (\pm SD=24.8)
Male Gender	26 (46%)
PICC CHARACTERISTICS	
<i>Indication for Placement</i>	
Antimicrobial administration	36 (64%)
TPN	8 (14%)
Chemotherapy	1 (2%)
Other (hydration, blood draws)	12 (20%)
Power PICC	51 (91%)
<i>Placement Setting</i>	
Hospital	33 (59%)
SNF	17 (30%)
Mean PICC dwell time (days), \pm SD [range]	43.0, 54.0 [7-310]
INFORMAL INTERVIEW PARTICIPANTS^b	
Frontline Nurses (RNs, LPNs)	82
Unit Nurse Managers/SNF Administrators	11
FOCUS GROUP AND SEMI-STRUCTURED INTERVIEW PARTICIPANTS^c	
Frontline Nurses	13
Nurse Managers	11
SNF Administrators	3
FACILITY DETAILS^d	
Total number of certified beds	341
Participates in Medicare & Medicaid	Yes
Within a hospital	No
<i>Average CMS quality ratings¹⁶, ^d</i>	
Overall	3.5
Health inspection	3
Staffing	3.5
Quality measures	4
RN turnover	30%
LPN turnover	24%

\pm SD=Standard Deviation; TPN=total parenteral nutrition; SNF=skilled nursing facility; RN=registered nurse; LPN=licensed practical nurse; CMS=Centers for Medicare & Medicaid Services

^aNumber of patient participants enrolled throughout the 36-week study

^bNumber of unique frontline nurses (registered nurses and licensed practical nurses), unit nurse managers and SNF administrators with whom we interacted during the course of the 36-week study. Because of nurses multiple patient assignments; some were interviewed more than once.

^cNumber of frontline nurses (registered nurses, licensed practical nurses), unit nurse managers and SNF administrators which participated in focus group sessions and interviews conducted at the end of the 36-week study

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

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Table 2

Outcomes and Evaluations Associated with Use of PICCs in SNFs

PICC N=56	
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%)
CLABSI	1 (2%)
Exit-site infection	1 (2%)
INFORMAL INTERVIEWS	
Patient-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%)

CLABSI=central line-associated bloodstream infection; PICC=peripherally inserted central catheter

^a Assessment refers to the presence of documentation in the chart that indicated that the PICC in question was clinically in use or still clinically necessary. We have added this to a footnote in the table

^b Lack of ongoing PICC use was defined as no use of the PICC for at least 7 days or between 2 weekly visits

^c Patient-reported PICC problems include difficulty using the arm where catheter was inserted for daily activities, arm swelling, pain, redness, tenderness, itching/irritation, crusting at exit site, occlusion, migration, dislodgment, dressing concerns, inability to flush PICC or inability to use PICC

^d Nurse-reported PICC complications include trouble using catheter, migration at exit site, inability to flush PICC or inability to use PICC

^e Additional PICC complications observed by reviewer upon examination of PICC site that were not documented included arm swelling, redness over PICC entry site and dressing disruption (wet, soiled, loose)

^f PICCs were considered inappropriate if they had not been used for > 1 week or if they were removed within a week of insertion.

Table 3

Themes, Codes and Illustrative Examples of Statements From Focus Groups and Semi-structured Interviews

Theme	Code	Example(s)
<i>Lack of information during the transition process</i>	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.
<i>Lack of information within the SNF</i>	Impact 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.
	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 re-ordered or re-stocked.
	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.
<i>Perceived gaps in training and education</i>	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.

Theme	Code	Example(s)
		<p>Moderator: What types of training or education is offered for PICC care?</p> <p>Unit Nurse Manager: Skills fair is once a year, but it's not mandated.</p>
	Need for training	<p>Moderator: Is there anything else you would like to talk about?</p> <p>Frontline Nurse: Across the board, a lot of people don't know how to draw [blood] off the PICC.</p> <p>Moderator: Is there anything else you need to provide care for patients with PICCs?</p> <p>Unit Nurse Manager 1: We need updates, [education] on sterile procedures.</p> <p>Unit Nurse Manager 2: How and when to correctly saline flush.</p>

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