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Why Don't We Talk About Catheters? *Characterizing Contextual Barriers to Communication between Physicians and Nurses about Catheter Use*

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Abstract

Background: Many healthcare-associated infections (HAIs) are caused by indwelling urinary and vascular catheters; device-associated infections account for approximately 25% of all HAIs. Despite extensive efforts, reducing unnecessary catheter use remains an important challenge. The impact of interventions to reduce catheter use often varies by how well they were integrated into the workflow and communication streams of busy clinicians.

Objectives: The purpose of this study was to characterize communication-related barriers between physicians and nurses and understand how these barriers affect appropriate use and/or removal of indwelling urinary and vascular catheters.

Methods: Clinicians who provided care for patients on a progressive care unit participated in individual or small group semi-structured interviews. Content analysis was used to identify

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common themes which were placed into a conceptual framework highlighting contextual barriers to communication (organizational, cognitive, and social complexity).

Results: We identified several different types of communication-related barriers between physicians and nurses that contributed to inappropriate use and lack of timely removal of indwelling urinary and vascular catheters. Organizational complexity contributed to communication barriers through workflow misalignment between clinicians. Cognitive complexity caused by pager usage and social complexity caused by communication silos were other identified communication barriers.

Conclusions: A conceptual framework that describes contextual barriers to communication helped uncover obstacles to appropriate use of indwelling catheters that otherwise may have remained hidden. Communication is contextual and improving physician-nurse communication about appropriate catheter use may require innovations that attend to the barriers we identified.

Keywords

catheters; catheter-related infections; infection control; patient safety; quality of health care

Introduction

Hospitalized patients frequently need medical devices such as indwelling urinary and vascular catheters as part of a therapeutic treatment plan. In the United States, 60–90% of patients in intensive care units (ICUs) and 10–30% of patients outside ICUs have urinary catheters.^{1–3} Vascular catheters are just as common, found in 43–80% of patients in ICUs and 7–39% of patients outside ICUs.⁴ Many healthcare-associated infections (HAIs) are caused by indwelling urinary and vascular catheters, with device-associated infections accounting for approximately 25% of all HAIs.⁵ Thus, reducing unnecessary urinary and vascular catheter use is an important goal. The impact of interventions to reduce catheter use often varies by how well they are integrated into the workflow and communication streams of busy clinicians. Communication now routinely involves several types of human interaction, some mediated by technology such as alerts and messaging in the electronic record system, notification by pager, text messages, and phone calls, as well as the traditional but increasingly infrequent face-to-face communication during bedside rounds.^{6,7}

Our team is interested in using new technologies to improve awareness and prompt effective communication between clinicians about catheter use. Technologies such as the electronic medical record (EMR) have the potential to standardize catheter documentation and prompt reminders for removal, but can disrupt communication by causing interruptions in workflow and using unintuitive user interfaces.⁸ As part of a multi-phase study to inform how to use technology to improve communication between physicians and nurses, we conducted a qualitative study to: (1) characterize communication-related barriers between physicians and nurses, and (2) understand how these barriers affect appropriate use and/or removal of indwelling urinary and vascular catheters.

Methods

Our study is being conducted at a large academic medical center in the Midwestern region of the United States. The first phase of the study consisted of conducting a problem analysis which took place from May to August of 2016. During that time we interviewed physicians, nurses, physician assistants (PAs), and nurse practitioners (NPs) to learn about the challenges they experience in the monitoring and surveillance of indwelling urinary and vascular catheters, and to gather their suggestions for how to improve these activities through the use of technology. Interestingly, all clinicians described communication as one of several persistent barriers to removing unnecessary catheters; we were struck by the number and variety of barriers specifically related to communication and reported by study participants.

We used purposeful sampling because our goal was to understand the phenomena of interest by selecting information rich cases rather than generalizing to a population using statistical inference.⁹ We recruited all nurses, PAs, and NPs who provided care for patients on a single progressive care unit of our academic medical center. Since physicians provided care for patients not only on this unit but also on other units, we purposefully recruited a variety of physicians as well (e.g., physician leaders, hospitalists, residents). The diversity of professions provided a variety of perspectives on catheter workflow and catheter management activities important to understanding how catheters are used and/or removed.

All clinicians were invited to participate in face-to-face individual or small group semi-structured interviews, conducted from June – August 2016. Participants were interviewed either individually or in pairs to accommodate busy clinical schedules. We recruited interviewees via email and in person, and obtained written informed consent prior to each interview, which were conducted in private offices. All interviews were led by one of three experts in qualitative methods (JF, MQ, or JM). One other member of the research team (JA) was also present during interviews to assist with consenting, audio-recording and note taking. Questions focused on monitoring and communicating indwelling urinary and vascular catheter-related information among members of the care team (see Figure 1 for representative questions from the semi-structured interview guide). All interviews were audio-recorded, and professionally transcribed. We preserved participant anonymity by stripping transcripts of all identifying information and by using role as the only identifier. The Institutional Review Board at our institution's medical school (IRBMED) approved this study (HUM00106108).

A qualitative content analysis was conducted on interview data using both inductive and deductive approaches.¹⁰ An inductive approach was taken to develop code reports and identify themes, while a deductive approach was used to identify a conceptual framework and organize our findings. Four members of the research team read a sample of interviews and developed a preliminary coding scheme (MM, JA, MQ, JF). Then, two members of the research team (MQ, JA) read all interview transcripts and independently coded them and, in an iterative process, developed a codebook that included overarching themes identified prior to coding as well as themes identified inductively from the transcripts. Coders (MQ, JA) met regularly to discuss and resolve any discrepancies in coding. Qualitative data were entered

into NVivo 11 software (QSR International Pty. Ltd) to help organize, classify, and sort the aggregated data. Common themes were identified across all clinician interviews. The first author (MM) then independently reviewed the code reports, identified emerging themes related to communication, and discussed them with the wider team to develop findings.

The use of theory in qualitative research is variable, sometimes entering into a study after themes are generated, and such was the case for us.¹¹ We looked in the literature for sensitizing concepts¹² around which to organize our main themes, using a deductive approach to characterize our findings. We placed results within a conceptual framework that describes communication space by focusing on how information and communication technology (ICT) can be used to enhance communication in healthcare.¹³ Pirnejad maintains that in addition to a communicator, information, and the medium needed to transmit information, three other concepts are equally as important to achieving communication objectives: organizational, cognitive, and social complexity.

Results

Eight nurses, seven physicians, three PAs, and one NP participated in a total of 13 individual and three small group interviews. On average, nurses had about four years of experience in their current positions. The seven physicians who participated included: one resident, one fellow, and five attending-level physicians, representing general medicine and surgery. Participants commented on both indwelling urinary and vascular catheters. We used the concepts of organizational, cognitive, and social complexity to describe the types of communication barriers we found, as displayed in Table 1.

Organizational complexity creates communication barriers

According to Pirnejad's communication space framework, organizational complexity arises from time and resource constraints imposed by an organization that require healthcare personnel to coordinate their activities with each other to deliver care.¹³ Within this complexity, urgent problems must be addressed and unforeseen conflicts resolved, requiring frequent negotiation and adjustment of workflow patterns to meet evolving patient care needs. We found that the workflow misalignment between nurses and physicians, as well as between different physician specialties, contributed to barriers to communication about catheters during rounds. Although patient rounds were reported as the most likely time for nurse-physician communication, differences in workflow patterns between physicians and nurses made it difficult for nurses to attend patient rounds.

When the physicians were rounding, nurses were busy with patient care activities. Both physicians and nurses described this misalignment. A physician said, "It's just impossible and like not something I can do and actually keep up with my flow of work because like finding the nurse, getting them to the bedside, making sure you are actually there when that happens is next to impossible." A nurse commented that "They rounded when I was in my other room for about 35 seconds so we didn't talk about [the] Foley. We didn't get a chance to have a conversation." For surgeons, their operating room schedules determined their rounding time, which was not compatible with nurses' workflow, because nurses were in

shift change during surgeon rounds. A nurse interviewee told us that, “The surgeons round very early in the morning so I don’t get a chance to see them.”

Differences in workflow patterns among physician specialties also acted as a barrier to nurse participation during rounds, limiting opportunities for communication about catheters. One nurse said, “There’s like two teams and they don’t follow a pattern, you know.” Differences between workflow patterns across physician teams also affected quality improvement activities, specifically hampering the effectiveness of a communication tool developed in an attempt to overcome lack of nursing presence during rounds: “It [communication tool] kind of worked with the pulmonary service but it totally didn’t work with surgeons.”

Cognitive complexity contributes to communication barriers

The cognitive load required for communicators to convey and understand a message also contributes to the complexity of interpersonal communication.¹³ Adding to that complexity in this setting was the use of a wide variety of communication channels (e.g., verbal, non-verbal) and media (e.g., paper, EMR, pagers) through which healthcare professionals communicated. We found several communication barriers related to cognitive complexity: (1) some reliance on paper in an organization that had an EMR, (2) training and usability issues with the EMR, and (3) pager usage that added to cognitive load.

In this study retrieval of catheter-related information from the EMR, such as catheter indication, was cognitively complex and time-consuming. This problem was magnified because there was still some reliance on paper even though the organization had an EMR. A PA commented, “It’s part of our duty that if we see a Foley bag at bedside, we should know [the indication for the catheter] ...but there is not a section in our [paper] printout that says that.” As a result, reliance on paper generated more cognitive work for clinicians who, to make decisions about the ongoing need for catheters, had to first remember whether the necessary information was to be found on paper or the EMR.

Training and usability issues with the EMR also contributed to cognitive complexity. One issue was that although all clinicians received formal didactic training in the EMR, the training alone was insufficient to assure competence. As one physician said, “You have to learn how to find that information, and that’s another barrier to getting that information you need to actually make the [clinical] decision.” In terms of usability a nurse said, “It would be interesting to see how many clicks it actually is from booting up, clicking to find where you actually get to the PICC [peripherally inserted central catheter] line information. Right now, everything is so buried but that’s the one thing [in the EMR] we all have to go to.” Another EMR-related barrier was the way in which information was displayed. One nurse said, “Sometimes, in the charting it’s hard to tell when some of them [catheters] are placed.” Another nurse said, “You can’t even see it. You have to hover on it to discover it,” suggesting that although information may be available, it is not always visible.

Unlike the EMR, pagers are used primarily for communication purposes, but in this study pager use also presented communication-related barriers to appropriate catheter use and removal, for two reasons. First, nurses often felt the need to consult physicians before removing catheters despite being empowered to remove indwelling urinary catheters without

a physician order. Instead of using a communication medium that would facilitate discussion such as the telephone, nurses frequently used pagers as a substitute for having a discussion with physicians, and then did not know whether or not to take the catheter out if physicians did not acknowledge the page. Second, pagers did not have any mechanism for prioritizing incoming pages, so the task of deciding which page to respond to and when added to physicians' cognitive burden. Physicians were paged in the context of an already high cognitive load, causing them at times to miss pages, further increasing the potential for delayed catheter removal.

Social complexity contributes to communication barriers

In Pirnejad's communication space framework there is a social dimension to every communication exchange because of the myriad social complexities brought about by different roles, responsibilities, and professional hierarchies, all of which have the potential to create communication barriers.¹³ This study identified two sub-themes related to social complexity: (1) interpersonal relationships between physicians and nurses, and (2) a social hierarchy with both professional and organizational components.

Interpersonal relationships between physicians and nurses were noted by several interviewees to be less than ideal, and to contribute to communication barriers as when a nurse commented, "Just the communication with nursing and vice versa is just really poor." The nurse went on to say, "I have been verbally abused by physicians." Unit leadership had recognized this problem and was working to address it. According to one unit leader: "We are working on that. That's a work in progress...it just takes some time."

Communication barriers between nurses and physicians stemmed in part from a complex social hierarchy that has both professional and organizational components. As part of the professional hierarchy, nurses are expected to follow physician "orders" unless they believe that following orders would not be in their patients' best interests, in which case nurses are required to communicate their concerns to physicians. We found examples of physician orders not being followed and of nurses neglecting to share their concerns about the orders for various reasons. Abdicating a nursing responsibility to communicate with physicians when disagreeing with a physician order occurred from time to time for reasons which were unclear to the ordering provider. One PA said, "We will just pre-emptively say, oh, the patient doesn't need a Foley, get the Foley out. That happens frequently and, usually, that order is obeyed—but sometimes it's not and there's a reason and it didn't get communicated and that creates a problem."

This healthcare organization has a complex organizational hierarchy with clear lines of authority for reporting concerns. However, the organizational hierarchy may make it difficult to address concerns about catheter maintenance or removal if the people who need to communicate with each other do not report through the same line of authority. One physician described a situation in which direct communication between frontline staff was stifled, "For example, I can't talk to a certain person about this but I can go to their supervisor and they can talk to them about it."

Discussion

Through qualitative analysis we identified several barriers and classified them under three concepts identified by Pirnejad's communication space framework as being crucial to meeting communication objectives: organizational, cognitive, and social complexity.¹³ In most cases, barriers were not unique to either indwelling urinary or vascular catheters, but spanned both catheter types. These findings may help identify potential targets for improvement, and are graphically summarized in Figure 2.

Organizational complexity manifested itself in three ways: nurse presence during rounds, differences in workflow patterns, and models of care. At academic medical centers, patient care rounds are used as a daily period of formal communication¹⁴ and would seem to be an appropriate forum for discussing catheter presence and the ongoing need for catheters. In our study nurses did not routinely participate in rounds, which has implications for catheter awareness because studies have shown that physicians are often unaware of which of their patients have indwelling catheters.^{15,16} When nurses, who would be the most familiar with catheter presence, do not routinely participate in rounds an important source of information for physicians about catheters goes untapped. Workflow pattern differences between physicians and nurses and even between different physician specialties made it difficult for physicians to locate nurses when they came to the unit for rounds and for nurses to participate. Others have also found that physicians and nurses who work on general care units are not usually in the same place for long periods of time and face obstacles to discussing patient care issues in person.¹⁷

Organizational complexity was also evident by the open model of care on the study unit. Strategies to improve communication and reduce infectious complications may be more challenging to implement in "open" units, such as the progressive care unit in our study, where patients' primary physician teams had patients on several floors of the hospital. Primary teams physically visit and round in "open" units at various times of day, depending on their case load and other factors, making it difficult for nurses and physicians to align their schedules to be together at the bedside for communication purposes.¹⁸ Alternatively, closed units are staffed by a single, consistent team of physicians and this type of care model facilitates standardization of care delivery and consistent rounding times for discussions that may result in fewer infectious complications.¹⁹

In this study the EMR and multiple forms of communication added cognitive complexity to clinicians' tasks and contributed to communication barriers. Our findings echo those of others who have reported how communication practices can change when organizations move from a paper-based to electronic patient record keeping system.²⁰ Structuring communication exchanges in electronic format can create ambiguity and reduce flexibility,²¹ so it is not surprising that some of our interviewees were unable to determine through documentation if a patient had a catheter or not. The nurses in our study reported using the paging system to communicate with physicians, but we heard from physicians that they could be inundated with pages, sometimes missing messages. Interrupting one's work to view a pager message causes disruption in working memory,⁸ so some physicians may have avoided pager interruptions in an attempt to stay focused on the task at hand. But in not

responding in a timely manner, communication about catheter presence and the ongoing need for catheters was delayed or sometimes missed entirely.

Social complexity contributed to communication barriers because of two factors: poor interpersonal relationships between nurses and physicians, as well as professional and organizational hierarchies. Differences in social status between physicians and nurses have long been recognized as a barrier to communication because lower status individuals such as nurses do not always initiate a message about their concerns with those higher in status such as physicians.²² More recently, albeit in a pediatric setting, interpersonal relationships and hierarchy created barriers to communicating concerns about an unfolding clinical situation.

²³ Implications

Our study has several important implications for clinical practice. To mitigate professional hierarchies, one of the strategies with perhaps the most promise to prompt timely urinary catheter removal is to empower nurses to remove urinary catheters that no longer meet pre-specified criteria without requiring an additional physician order.²⁴ However, despite having a nurse empowerment protocol in place prior to this study, nurses still did not feel comfortable removing catheters without at least notifying the physicians. Our finding aligns with research suggesting that the success of a nurse empowerment strategy depends on nurse and physician engagement in CAUTI reduction initiatives.^{24,26–28}

Another implication for clinical practice is to consider implementing strategies to provide some structure for discussion topics during rounds. Potential organizational strategies that help structure discussion topics include the use of either synchronous or asynchronous checklists. For example, implementing synchronous checklists such as “daily goals” in the intensive care unit has met with some success,²⁹ which we suggest could be enhanced by including information on catheter presence and the ongoing need for a catheter. An alternative approach would be to adapt checklists for asynchronous communication purposes, either via paper tool taped to the door, or through the use of a display such as an electronic white board.³⁰ A final strategy we recommend would be to incorporate the use of technology to bring clinicians together and communicate during rounds. Notifying a nurse via a wearable communication device that rounds will be starting in five minutes on his/her patient may give that nurse enough time to finish the current task without undue disruption to the nurse’s workflow.

Our study has some limitations. Some of the organizational, cognitive, and social complexities that we identified were likely unique to the single site in which the study was conducted and thus our findings lack generalizability.³¹ For example, a unique characteristic of this single site was that advanced practice providers, and not residents, had more interactions with nurses. However, many of the workflow characteristics of nurses and physicians, including rounding patterns and use of EMR, may be similar across academic medical centers. Also, Pirnejad’s communication space framework may apply to other sites even if some of the specific barriers we found were unique to our context.

In summary, we identified several different types of communication-related barriers between physicians and nurses that contributed to inappropriate use and lack of timely removal of

indwelling urinary and vascular catheters. We found that organization, cognitive, and social complexity were the contextual barriers to physician-nurse communication about catheters. Communication is contextual and improving physician-nurse communication about appropriate catheter use may require innovations that attend to these barriers.

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1. We're interested in how you monitor and communicate about indwelling urinary catheters (commonly known as Foley catheters).

Interviewer Questions:

- a) Is there a process currently for monitoring who has a catheter and how long they've been in place? Please describe.
- b) How do you decide if a patient's urinary catheter is being used for an appropriate reason? (If they ask what appropriate means, it means providing the patient more benefit than risk of harm.)
- c) Who usually recognizes that a urinary catheter is no longer needed?
- d) Who decides when to remove them?
- e) Is communication between nurses and physicians needed to remove a catheter? If so, what does that look like?
- f) How well does the process work?

2. Now let's talk about monitoring venous catheters (CVCs or PICCs).

Interviewer Questions:

- a) Is there a process for monitoring who has a CVC or PICC and how long the catheter has been in place?
- b) Who decides when it's time to remove a CVC or PICC?
- c) How did you usually communicate with the physician/nurse about removing a CVC or PICC catheter? When in your daily workflow?
- d) How well does the process work?

Figure 1.
Main interview questions

Organizational Complexity	Cognitive Complexity	Social Complexity
Nurse/physician workflow misalignment	Reliance on paper despite fully-integrated EMR	Strained relationships between physicians and nurses
Variable physician rounding schedules	Training and usability issues with EMR	Professional, social hierarchies hinder communication
Communication challenges with open units vs. closed units	Overuse of paper	

Figure 2:
Communication Barriers in Three Contextual Dimensions

Table 1.

Contextual Barriers to Communication by Theme and Sub-theme

Theme	Sub theme	Representative quotes
Organizational complexity:	(a) Rounds may be the best time to discuss catheters, but such communication does not commonly occur	Interviewer: So is there a certain time in the day when you are more likely to talk about PICCs and Foleys and CVCs? Physician Assistant: Probably during rounds
	(b) Nurse and physician workflow patterns are not aligned	... still trying to get my teams to actually make sure the nurse is present on our rounds, which is tough because they are often trying to get done with their [unit] patients to go to [next unit] or vice versa. (Physician) ...you would break the momentum of your rounds. If you have 25 patients, you couldn't stop constantly to talk to the clerk, say, hey, who is the nurse for this patient, go find her or him, you hope they are available. (Physician Assistant)
	(c) Physician services do not follow the same workflow pattern...	We are very early and I would say—and it's hard—it would be very hard to pull the nurse for each patient over to say we are rounding right now. (Physician Assistant) Like they might round on two patients and then go to the other end of the unit, and then go downstairs and then—it's just like—it's hard for me to round with them. (Nurse)
Cognitive Complexity:	...so (d) a standard communication tool may not work.	They [surgeons] had like a whole different way that they operate with their rounds. (Nurse)
	(a) Reliance on paper	... and the circle rounds are pretty quick so a lot of times you don't have time [to look in the EMR], which is why we rely heavily on the paper. (Physician Assistant) Are you aware that phlebotomy doesn't use [the EMR]? So phlebotomy has no way of knowing that a patient even has a PICC if there is no [paper] sign over the bed. (Nurse) ...like on the flowsheet ...the stuff is buried! Lines, drains, and airways. You've got five clicks before you can actually get to that. (Nurse)
	(b) Training and usability issues with the EMR	There is a sticky note [in the EMR] but there's no way to know whether they will look at it or whether they will act on it. (Physician)
Social Complexity:	(c) Pager usage adds to cognitive overload	Sometimes, we get so many pages that we I mean, probably once every two weeks I'll get a page and somebody will say I paged you about this and why didn't you page back. And I'll be like I never got a page and then I'll look back and I did get a page. I was that busy. I didn't see the page. (Physician Assistant)
	(a) Interpersonal relationships between physicians and nurses	I think staff members have been treated in a condescending manner at times if they asked a question. (Nurse)
	(b) A social hierarchy with both professional and organizational components	I think my nurses just need to be a little bit more forceful and really get up in there and get involved in rounds. (Nurse) ... sometimes they [nurses] won't listen to the order and it will be because they can't get—you know, they have a legitimate, you know, what they feel is a legitimate reason and they didn't have time [to let us know]. (Physician Assistant) And, sometimes, you will go back and you will find out the Foley is not out and you haven't had communication from nursing as to why and you'll find, oh, the patient didn't want it out, maybe I was too busy right away—and that's a communication breakdown. (Physician Assistant) And, honestly, we have done a number of things to try and improve this but it's a culture and...it needs to come from the top down. (Nurse)