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Original article

Facilitating central line–associated bloodstream infection prevention: A qualitative study comparing perspectives of infection control professionals and frontline staff

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Background: Infection control professionals (ICPs) play a critical role in implementing and managing healthcare-associated infection reduction interventions, whereas frontline staff are responsible for delivering direct and ongoing patient care. The objective of our study was to determine if ICPs and frontline staff have different perspectives about the facilitators and challenges of central line-associated bloodstream infection (CLABSI) prevention program success.

Methods: We conducted key informant interviews at 8 hospitals that participated in the Agency for Healthcare Research and Quality CLABSI prevention initiative called "On the CUSP: Stop BSI." We analyzed interview data from 50 frontline nurses and 26 ICPs to identify common themes related to program facilitators and challenges.

Results: We identified 4 facilitators of CLABSI program success: education, leadership, data, and consistency. We also identified 3 common challenges: lack of resources, competing priorities, and physician resistance. However, the perspective of ICPs and frontline nurses differed. Whereas ICPs tended to focus on general descriptions, frontline staff noted program specifics and often discussed concrete examples.

Conclusions: Our results suggest that ICPs need to take into account the perspectives of staff nurses when implementing infection control and broader quality improvement initiatives. Further, the deliberate inclusion of frontline staff in the implementation of these programs may be critical to program success.

A central line-associated bloodstream infection (CLABSI) can occur when a central venous catheter, a procedure often associated with intensive care unit (ICU) settings,[1] is not inserted correctly or not maintained properly. CLABSIs result in significant financial and nonfinancial costs to health systems and society because such infections increase risk of prolonged hospitalizations, morbidity, and death.[2,3] Fortunately, the implementation of standardized, evidence-based protocols can lead to dramatic and sustained reductions of CLABSIs in hospital ICUs.[4-8] However, success rates vary between organizations.[8,9] Some hospitals have virtually eliminated CLABSIs, and have sustained a rate of 0 infections for more than 24 months, whereas others have had less consistent results.[10]

Infection control in hospitals and their ICUs is extremely challenging. Many people are involved (nurses, physicians, administration personnel, patients, and their families), and this certainly contributes to the problem of infection control. For example, these different individuals and groups of providers may have different opinions about how to reduce healthcare-associated infection (HAI) rates. Infection control professionals (ICPs) play a critical role in leading HAI-reduction interventions, and are responsible for the implementation and ongoing management of such interventions across hospitals and their ICUs. At the same time, frontline staff are responsible for delivering direct and ongoing patient care, and must determine how to incorporate infection control interventions within daily practice.

Single hospital case studies of CLABSI reduction programs have engaged frontline staff in intervention design and implementation

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and reported this as a critical success factor.[11,12] Further, leadership has been a frequently mentioned attribute of success, and nonclinical factors such as leadership and management practices have been posited as a potential explanation for between-organization variability in program outcomes.[8,13,14] For ICPs to assume their critical leadership role in CLABSI prevention programs, they must understand the perspective of frontline staff. Studies have suggested that there is potential for disparity in perspectives between managers and their clinical staff with respect to the implementation and effects of patient safety initiatives,[15,16] but this area is largely understudied in the infection prevention literature.

To advance this line of research, our study explored the question, do ICPs and frontline staff have different perspectives about the facilitators and barriers associated with implementation and effects of a CLABSI prevention protocol? We analyzed interviews with ICPs and staff across 8 hospitals that participated in a CLABSI prevention program funded by the Agency for Healthcare Research and Quality (AHRQ) called "On the CUSP: Stop BSI." Comprehensive unit-based safety program (CUSP), is a formal model for translating CLABSI reduction evidence into practice. We wanted to examine if and how the perspectives of ICPs and frontline nurses varied to improve our understanding about the factors that may contribute to successful CLABSI prevention efforts.

Table 1
Interview questions about facilitators and challenges of healthcare-associated infection (HAI) initiatives

- Do you have any stories about barriers to introducing and implementing these HAI efforts at this organization?
  - How were these barriers overcome?
- Were there new problems introduced with the implementation of the HAI initiative?
  - How did these problems get resolved?
  - Do any of problems or barriers remain?
  - What could have been done differently to improve what happened with these changes?
- Were there things that occurred before implementation of these HAI efforts that needed to be addressed to facilitate implementation?
- What were the most important things that you think went well with introduction and use of the HAI initiative?
  - What went right with this introduction of HAI efforts in this organization?
- What suggestions do you have for improvements in the use of these HAI initiatives?
  - Do you have ideas about how work roles could be changed to improve the process?
  - Do you have other ideas about how the process could be improved?

METHODS

Study data collection

We conducted a comprehensive qualitative study of 8 hospitals that participated in the same cohort of the AHRQ CLABSI prevention initiative, "On the CUSP: Stop BSI." Across the 8 sites in our study, we interviewed 194 key informants with different jobs and roles in the hospitals. Among these informants were 50 frontline nurses, and 26 ICPs (including interviewees with job titles of infection preventionist; hospital epidemiologist; infectious disease physician; coordinator of infection control; and directors, managers, and staff in infection control departments). We focused on the comments from these 76 informants because their roles in the organizations are relevant to our research question focusing on the perspectives of ICPs and frontline staff.

Interviews lasted 30-60 minutes, and the majority were conducted with at least 2 interviewers. We used a standard interview guide to ensure consistency in our data collection. With informants' permission, all interviews were recorded and then transcribed verbatim to ensure accuracy and reliability. We received approval from the Institutional Review Board of The Ohio State University to conduct this study. For the results we report here, we focused on questions related to facilitators of and barriers to CLABSI prevention efforts to compare the responses of ICPs and frontline staff. These interview questions are shown in Table 1.

Data analysis

We analyzed our data using a combination of inductive and deductive methods.[17] We reviewed notes and transcripts from interviews as the study progressed and discussed preliminary findings. Themes emerged from these ongoing discussions and allowed us to develop additional question probes to include in subsequent interviews. At the conclusion of data collection we developed a coding dictionary with main coding themes and specific subcodes with detailed definitions specifying when to apply those codes. The lead study investigator and two research assistants coded the transcribed interview data using this dictionary. Throughout the coding process the research team met periodically to discuss issues, resolve discrepancies, and develop new codes and definitions for emergent themes and subthemes. We used Atlas.ti qualitative analysis software (Leicester, United Kingdom) to support all parts of our analysis.

RESULTS

Across sites and informants we found four facilitators of CLABSI prevention initiatives, with perspectives about these facilitators varying between ICPs and frontline staff. We also identified 3 main challenges of CLABSI prevention programs, characterized differently by respondent group and 2 additional challenges identified only by ICPs. Below we describe our results in greater detail. We provide additional evidence supporting our characterization of these facilitators and challenges with representative verbatim comments presented by theme and by respondent type in Tables 2 and 3.

Facilitators of CLABSI prevention initiatives

We found 4 facilitators of CLABSI prevention commonly mentioned across interviewee groups: education, leadership, data and technology, and consistent clinical processes. These facilitators were noted across sites, and their absence was often mentioned as a barrier to CLABSI prevention. Interestingly, whereas both interviewee groups identified these 4 facilitators, groups' perspectives about these facilitators differed. For 3 of these 4 facilitators, we also identified subcategories of facilitators within the larger theme category, as we describe in further detail below. In Table 2 we present verbatim quotations as additional evidence about the salience of these facilitator themes and subthemes, by interviewee group.

Education

We found 2 main subthemes associated with education as a facilitator of CLABSI prevention: the importance of staff education and reeducation, and the importance of an inclusive education process. Both the ICPs and frontline staff emphasized the importance of continuing education, but the focus differed between the

Table 2
Representative comments characterizing facilitators of central line-associated bloodstream infection (CLABSI) prevention initiatives, by interviewee group

Theme Subtheme	Verbatim comments from infection control specialists	Verbatim comments from frontline staff
Education		
Staff education and reeducation	*Emphasis on learning from mistakes* "How do we move forward so this doesn't happen again? I think that whole process of letting them know is really key." "Definitely keep everyone in the loop. Don't just report it out and move on. Let the people involved know ahead of time, so it wasn't or maybe it was, maybe something was going on…"	*Emphasis on continuing education* "Continuous education…The proper way. Sometimes we forget. Always a reminder of the proper way of changing the dressing, when the dressing needs to be changed. Scrubbing the hub. …Even the simple things you think we would remember, but, you know." "Education definitely. And make it frequent…. Newsletters, they use newsletters, which are great because you can pull those up on your own personal time. You can't always do things here and I know when I go home and I read an e-mail that has a link and then you can get the update. So education is definitely important."
Inclusive education	*Multidisciplinary education process* "We also have noticed, going back to CLABSI, where there was some education needed with anesthesia or the operating room nurses as they accessed these lines. But it kind of helped that we already had a relationship built in with some of these operating room folks because we have to address line access." "I think it's a combination of all of the education, the collaborative…"	*Include patients in education process* "And we also tell the patients. I tell the patients after I've put a line into them or if I've done a dressing, 'Make sure that anyone who touches you washes their hands before they touch you.' I tell them all the time, 'Make sure that whoever's taking care of you washes their hands.' They can use the alcohol if they want." "I think the most important is involving everyone and the patient."
Leadership		
Attention from administration	*Engagement with supportive leadership* "We've gotten more administrative support for making our recommendations actually happen and go through the entire system as part of it. … Now we can deal with people at an administrative level, who understand the importance of our intervention, and they put up policy to make sure it continues. That's part of it." "[One success factor is] strong support from administration, including [our chief nursing officer], who actually goes down when there's a problem. She goes down there. Everybody knows automatically this is a big deal. People pay attention."	*Emphasis on audits and monitoring* "And usually there's people going around, just, you know…[They are checking.] That's our quality, one of our quality improvement control…. someone will go in there, randomly pick a room, and look at the central line and peripheral lines. See if they're dated, time, and if they're expired or not." "Policing." "We call them the infection control Nazis who secretly like to walk around to check and see if everybody—the nurses—are being good about checking; you know, are we garbed appropriately wearing our stuff while we're in an isolation room and are we wiping off equipment and all that sort of thing."
Support from clinical infection control champions	*Importance of having an infection control champion* "… having somebody like Dr XX, both as a champion for our CLABSI project and also as a constant presence in the intensive care unit." "The infection control prevention nurse down in [the unit] because she is very passionate about what she does and she is very good at what she does." "We have a very good advocate with Dr XX … And we have really been able to work well together as a team."	*Value of approachable, hands-on champions* "You want someone who can keep the group cohesive in terms of going in the right direction. Yes, we understand your frustration. However, how about if you try? You put that initiative out there and you're still going to have someone say, 'Why are we doing this? It's not going to work.'" "It makes quite a bit of difference when you have somebody who worked in the unit for so many years step up into that position. She knows exactly how things are done in this unit and is not afraid to come out and lead by example."
Data and technology		
Importance of data on infection rates	*Importance of timely access to data* "Data mining, which helps us get our information quicker, so we can address any issue." "I think the fact that they can get that data relatively quickly, rather than 3 months after the patient is discharged…. So it's a little bit better that they're able to get it in real time and see that."	*Using data to make the case for infection control* "I think nurses respond better to facts than just saying, 'Oh well we're just going to rule this out and try it out.' …if they say with the [name] dressing, 'Oh you know what? Evidence shows that by applying this we have like 50% less infections.' But yeah, come with the facts. If you have the facts then I think nurses will respond more." "Having some kind of a place where you are counting it on the days without infection or something that you're really going to get the staff on board with it."
Value of new products and technologies	*New technologies help reduce infection rates* "One of my faculty members, Dr XX who's also in pulmonary critical care, I made him my simulation czar. So he and I have met with the School of Nursing. They have simulation equipment and they have a wonderful simulation lab. That's some of it." "A good example would be the use of the ultraviolet machine. That machine cost over $100,000. We had to convince them. … We were kind of in a bad zone. …I think it's made a real difference."	*New products involve changes in practice* "I love the biopatch because then you don't have to do as much dressing. With biopatch, it has antibiotics on it and it usually protects…I guess that's why we didn't have as many infections." "That was one of our biggest struggles in the neonatal intensive care unit was getting nurses to switch over to chlorhexidine … That for us was a huge change that they were not happy about in the beginning."

(*continued on next page*)

Table 2
Continued

Theme	Verbatim comments from infection control specialists	Verbatim comments from frontline staff
Consistent clinical processes		
Standardization of processes	*Standardize practice around the right thing* "Consistency with the protocols for preventing central line, for preventing infection. People need to know what they need to do and they need to be consistent in doing that every time." "Looking at what's best practice and having evidence-based guidelines, and you know catheter insertion guidelines really do prevent infections and save lives."	*Make it easy to do the right thing* "The fact that it comes in kit, we don't have to look for it. There's less room for error. There's no excuse that there's no biopatch because it's in the kit." "We get a central line cart that assists us and we have all of our lines typically on top and then drawers of all the things that we need so I think that helps. Also where you push it to outside the room so you have everything necessary so you don't skip a step."

groups. The majority of ICPs' comments in this subtheme focused on the importance of education in the context of quality improvement processes, specifically learning from mistakes. At 1 site an interviewee noted, "When we have an infection, we will go through and have staff come in and say, do you remember this case? How do you think we could have avoided this infection?" This sentiment was echoed by a director of infection control who said, "Instead of being punitive, …we brought them (the staff) into the process and had them look at what their processes are that could have broken down."

The majority of staff members, on the other hand, mentioned the need for continuous education on the clinical processes of CLABSI prevention. As 1 ICU nurse noted, a main facilitator was "… teaching, education, continuing education, just to staff." Another staff nurse highlighted the need for "repetition of the procedure, the goals, what we're supposed to do, how we're supposed to do it, why we're doing it." Staff nurses across sites also noted that the lack of continuing education was a barrier to success. One interviewee explained this need as wanting "maybe a little more frequency in education. Maybe instead of once or twice a year maybe a little bit more repetitive with that…".

Another element of education mentioned by both interviewee groups was an inclusive education process that included people beyond the frontline staff. However, the definition of inclusive education differed, with frontline staff exclusively discussing patient education and ICPs focusing on including a multidisciplinary team in the education process. ICPs discussed the need to develop multidisciplinary infection prevention programs. An ICP from 1 site, for instance, remarked that a facilitator of CLABSI prevention was "just involving everybody, from the bedside nurse, environmental services, administration, they all work together." ICPs mentioned this repeatedly across the sites; a few interviewees even mentioned the inclusion of dietary services. ICPs also noted the lack of a consistent, multidisciplinary team, including ICPs, nurses, and physicians, as a barrier to successful CLABSI prevention. In contrast, the staff nurse focus on including patients as part of the infection prevention team was evident across sites. As a staff nurse at 1 site said, "We spend a lot of time patient educating," a staff nurse at another site similarly reported, "We recently also had a letter about preventing infections that we started to give to families so that they too are a part of the team."

Leadership

We also found 2 subthemes associated with leadership as a facilitator of CLABSI prevention efforts: attention from administration and importance of clinical infection control champions. First, although attention from hospital administration to CLABSI prevention was another commonly noted facilitator for both interviewee groups, the focus differed. The ICPs typically noted the importance of engagement with supportive hospital management. As 1 ICP interviewee said, "I think the support of the administration, obviously that's critical. And then you really need the buy-in and the support in particular of the physician leadership, the various department chairs, the executive committee, the president of the medical staff. You need those individuals to be behind you and support the program." Additionally, the chair of the Infection Prevention Committee at 1 study site commented that the role of management in supporting infection control is: "to recognize the importance of the infection control activities across the board not just for the patients but for everyone in the institution. They need to not only recognize it, but they really need to be fully supportive, especially when we can show them issues and opportunities for improvement that are not just a whim but that are based on good science; that if there is a problem, there is a solution. It may take some dollars and it may take their support, that's what we really need…".

Frontline staff often mentioned a more punitive aspect of attention from administration, audit, and monitoring policies. A staff nurse at 1 site commented, "We know that if somebody develops a CLABSI [our clinical nurse specialist] is going to hunt through that chart and find out what nurses took care of her." One staff nurse at another site noted that facilitators of success were "education and policing," summing up this sentiment. Both staff nurse and ICP interviewees commented that when supportive leadership was lacking, this was a barrier to CLABSI program success. For instance, as 1 staff nurse noted when leadership was not a facilitator, "I feel like it's more of a threat. It's kind of like, 'You should be happy to have a job right now.'"

The second leadership subtheme was support from infection control champions. Both the frontline staff and the ICPs frequently mentioned the importance of infection control champions among the clinical staff, but whereas ICPs emphasized the champion role itself, frontline staff also noted the importance of having an infection control champion who was approachable and hands-on. When asked about the role of a specific infection control champion an interviewee was describing at 1 site, an ICP explained, "She was just on everybody all the time. All the time She's tenacious." An ICP at another site described how the infection control champion "has been able to help the nursing staff focus on the importance of this." In contrast, frontline staff tended to mention that approachability and good interpersonal skills were important in a champion, a sentiment not mentioned by ICPs. One staff nurse said, "I think that helps when you have had somebody who's worked in this unit as a nurse and who will come in and help you turn and things like that. I think that makes them good mentors in their positions so people do listen." A staff nurse from another site expressed the same sentiment, "Dr XX, I think he's head of the infection. He's a real nice guy, you know, and does stuff, you know? I mean you can have a question, call him anytime, and he'll tell you, you know? Things like that."

Data and technology

We identified 2 facilitators associated with the use of data and technology across sites: the importance of data on infection rates and the value of new products and technologies. Within these

Table 3
Representative comments characterizing challenges of central line-associated bloodstream infection prevention initiatives, by interviewee group

Theme	Verbatim comments from infection control professionals	Verbatim comments from frontline staff
Need more resources	*Need for financial resources* "I almost never meet resistance on the 'I don't agree that's something we should do level.' I meet resistance on 'we don't have the money to pay for it." "I just brought last week to the committee this new device that I want to buy. But when you do that, you need to have all your ducks in a row before you present anything to anyone. You've got to make sure you know the pros, the cons, the costs. The cost is a biggie…at some point in time they're going to say, 'Okay we have to reign those back in because you can't special order those anymore.'"	*Need for human resources* "We're so shorthanded. And in this area, you know, like who's going to help us and make sure these policies get done? So, if you're going to put into, if you're going to put a policy in place, make sure that you know, the resources are there to implement those policies. So the human resources are there to implement." "We need to make sure that our staffing levels are appropriate because 1 of the biggest breakdowns in not following the infection is when you are understaffed and you are really rushed through your tasks because you don't have enough support on the unit. That is key."
Competing priorities	*General challenge of adding 1 more thing* "Sometimes it's very hard for me to be doing infection prevention and trying to keep up with all of the new things that are coming out, directives that we need to be abiding by in a timely fashion." "There's always a bit of a time strain. You know, a constraint of how much can you get done and what are the priorities?"	*Specifics of what is added to practice* "I don't know what's to come, but there seems to be a new piece of paper every day. And we chart on the computer, so it seems like there's more paperwork than there used to be." "I think we had a hurdle with the arterial lines only because it was a quick process and it took them minutes to stick in the arterial line and now it has become a central line and it's a big process. So from the nursing standpoint, I really don't have 45 minutes to stand in here. I can't afford the hour but you don't have a choice."
Physicians resistant	*Administrative focus* "We really feel like they're using some poor practices. I don't know what it's going to take to have them on board. I really think having some hard data from another facility saying, 'Hey, we don't have these issues' is what's going to be the eye opener for them. I'm hoping we'll have it soon." "The doctors rule … that's what makes it difficult because it's politically run…it's just tough, it's very tough."	*Personal focus* "You have to know who you're talking to. Some of them you might have to go straight to a supervisor. …Some of them are very high strung and have been here for a very long time so they're kind of set in their ways and you're not telling them anything. So if they're going to do it they're just going to do it." "You have your doctors yet who feel they don't need to use the bundle. You know how that always is? 'I don't need to do that. I just want to do it my way, the way I've always done it, the way I'm happy doing it.' So you still struggle with that in trying to encourage them or help them along to doing that."

subthemes, the perspectives of ICPs and frontline staff again differed. For ICPs, a frequently mentioned facilitator was timely access to data on infection rates. Two ICPs in an interview at 1 site noted that access to infection data "allows us to implement or enforce certain issues that needed to be done to change the circumstance." The director of infection control at a different site said, "We do have a really good report that we do give the units. We meet with them in their unit boards and present our data. We do have the days between infections posted in the units, so they can keep track of that." Nurses, although similarly appreciative of data, did not mention timely access to data on infection rates. Instead they discussed the specific use of the data to make a case for infection control. As 1 frontline nurse summarized this message: "I mean, just come with the facts." However, when data were not easily available, this created a problem. One ICP noted, for example, "I think the 1 challenge that I have always had is just how to pull the information, pull the data. It is not always easy and sometimes you have to go in a roundabout way or kind of in the back door, because certain computer systems don't communicate. Sometimes it is very difficult."

We found that perspectives about the second facilitator involving data and technology also varied by interviewee group. Although ICPs emphasized the importance of new technologies in reducing infection rates, frontline staff more commonly discussed these new products in the context of how they needed to change their practice to accommodate the new technologies. One ICP described this emphasis and explained, "Once we started realizing there were issues, we redesigned our dressing change kit to match all the different sizes of patients. We actually have 3 different kinds, like 1 for a small infant, more of toddler-sized kit, and then more of an adult-sized kit. Nurses had input on how it was stacked, so that the first thing you grab is the first thing you need. You don't have to look for other things. …That was a new thing that we did. And they [the product vendor] designed the kit specifically for us." In contrast, a frontline nurse described the introduction of new technologies in the context of all the changes staff were required to make: "Since I started the processes have changed multiple times. Not only do we secure the device, but we secure it at another point now with tape on a patient. We use different caps. We use flow caps now. That was a change from regular intravenous lines."

Consistent clinical processes

We also found a fourth facilitator theme that involved standardization of clinical processes. Similar to the prior reported facilitators, we found distinctions between how ICPs and frontline staff described consistent clinical processes as facilitators of CLABSI prevention. Across sites, ICPs commonly described this facilitator in the context of standardizing practice around doing the right thing. Their comments focused on the importance of standardized protocols and consistent implementation, summed up by a statement from an ICP: "Standard practice each and every time. No lapses." Many frontline staff, in contrast, noted how making it easy to be consistent in clinical processes was a facilitator. For instance, 1 nurse talked about how it was helpful to have supplies organized and easily available: "To have the tools and the systems and place. Like, just don't have a policy saying you have to wash your hands before you do it, have like, you're going to wash your hands, you're going to use this equipment, you're going to use this cart and keep it all together." Another nurse explained how doing the right thing around hand hygiene was made easier: "We've got the products in the room. We've got soap at the sink, automatic sinks. We've got the waterless gel stuff, alcohol-based in every room and lying around everywhere. Everywhere you look there's a bottle of that stuff."

CHALLENGES OF CLABSI PREVENTION INITIATIVES

Perspectives about challenges also differed between ICPs and frontline staff, but each noted challenges in 3 main areas: the need for more resources, the problem of competing priorities, and the

issue of physician resistance. In addition, ICPs noted 2 major challenges of which frontline staff appeared unaware, and these challenges were related to definitions and standardization. Below we first describe the challenges that were common across interviewees, noting the distinctions between ICPs' perspectives and those of frontline staff, and we present additional evidence to support these distinctions in Table 3. We then provide further detail about the challenges that were noted only by ICPs.

Challenges for both ICPs and frontline staff

With respect to the issue of scarce resources, ICPs were more likely to note the need for more financial resources to properly focus on infection control and CLABSI prevention. Frontline staff were most concerned about the need for additional staff. They noted feeling overwhelmed by the amount of work they had to do, and this contributed to their sense of limited resources being a challenge. As 1 staff nurse recounted, "I think we're always short-staffed. Sometimes you don't get a chance to change the dressings and you're like hurried or you know… so short-staffing."

The issue of competing priorities was also framed differently by the different groups of interviewees. Although ICPs commented about a general sense of 1 more thing being added, frontline staff more often mentioned specific tasks such as additional paperwork, needing more people to do the work, and more time required for certain processes. For instance, an ICP explained, "Over the years you don't lose anything that you are collecting, you just add to it. You don't drop anything off. It has just gotten bigger and bigger." Frontline staff also commented about the specifics: "Probably the biggest thing was with changing the way we did our line changes. It more needed to be like a 2-person process to make it happen correctly so that was a change because it kind of slowed down the workflow so that was hard."

Third in the list of challenges perceived differently by interviewee groups was the topic of physicians' reluctance to change practices. Respondents in neither group named names, but whereas ICPs tended to talk in generalities, the frontline staff had concrete examples from their experiences or stories from colleagues. The ICPs might refer to these stories in a discussion about physician resistance, but their concern about the challenge tended to be more administrative and system-oriented. For the frontline nurses, depending on the level of resistance, their issues were more personal, and included concern about job security and how their personalities did or did not lend themselves to speaking up and challenging poor practice.

Challenges for ICPs

Two additional challenges of CLABSI prevention were noted by ICPs. First, these interviewees often expressed frustration at the lack agreement about the definition of a CLABSI. In an interview at 1 site an ICP noted, "There are always discussions we have to go through in terms of clinical diagnosis versus what the surveillance definition is. So there is always discussion as to what they feel is an infection." Her colleague agreed, explaining, "It is difficult, because there are times even when our infectious disease physician will say, 'You know what, that person did not get treatment …based on these stats … it is a clinical. If it fits the surveillance definition, and we are recording it, we have to do the same internally.' So we are ultimately following the surveillance definition." An infection control coordinator at a different site similarly commented, "So, you know, it's not just as simple. I mean, originally you start out with 'ok, was there a line—yes or no—at the time that this blood culture was positive—yes or no?' If there was no line present and the line hadn't been discontinued within 48 hours, it's not a line infection. It's sepsis, but it's not a line infection. So then it's like 'nope, move on.' But, yeah, if there's been a line, if the line was recently discontinued—but then you need to look at what else is going on." Another echoed, "you know, the Centers for Disease Control and Prevention says one INS thing, says another, so that's a little frustrating, too."

The issue of process standardization was also noted as a challenge by ICPs across sites both because of the need to agree upon processes and standards as well as the need to keep the processes current and standards clearly communicated. An ICP at 1 site described how this process often led to debates: "The ultrasound was very interesting. We had people on both sides saying, 'absolutely we should require ultrasound,' because not just from infection reduction but more so from the safety standpoint. We had others who made the point that many people had never been trained using ultrasound. … We sat in a room and basically said, 'What is our standard?' We had people who said, 'If we don't do ultrasound, this is unacceptable.' 'If we do require it, this is not tenable.'" At another site an ICP noted how the challenge of process standardization played out on the floors: "You could ask 4 different nurses or 5 different nurses, 'How do you flush that? How do you do that?' and you'll have 4 different answers. I'm like, 'How often do you do the dressing?' You'll have 4 answers. Why would that be?" At a site expressing particular frustration with this issue, 1 specialist lamented, "Oh clearly there's policies. We've just rewritten every one of them. We're in the process of writing all ours and the port policy is now being rewritten because apparently it needed to be rewritten." One site's ICP summarized this challenge by explaining, "Sometimes it's very hard for me to be doing infection prevention and trying to keep up with all of the new things that are coming out, directives that we need to be abiding by in a timely fashion."

DISCUSSION

The emergence of the themes of education, leadership, data, and consistency as facilitators fits with prior research that posits these supportive context and management factors as success factors in CLABSI prevention programs.[8,18] Our study is unique because we explored the perspectives of different groups about these themes and identified differences in perceptions about how these factors facilitate CLABSI program success.

Our results indicate that for ICPs to effectively implement patient safety initiatives it is important to understand and incorporate the perspectives of frontline staff in areas where staff views on success factors differ from views of ICPs. In the areas of leadership and education, the frontline staff is focused on different issues that must be considered during program implementation. For example, frontline staff frequently mentions the importance of continuous reeducation of clinical protocols. Thus for the program to be successful ICPs must develop a continuing education program that focuses not just on learning from mistakes, an important facilitator valued by ICPs, but on continual reeducation for frontline staff. Another example is the role of clinical infection control champions. Both frontline staff and ICPs noted their importance for program success, but only staff mentioned the importance of the approachability and social/interpersonal skills of the champions. As a result, when ICPs are implementing a patient safety program, they may need to focus not just on recruiting clinical infection control champions, but on recruiting champions with the leadership and hands-on skills the frontline staff believe facilitate the program's success.

Beyond understanding and incorporating the perspectives of frontline staff, our results point to the need to include nurses in the implementation of infection control initiatives. Single hospital case studies of CLABSI reduction programs have engaged frontline staff

in intervention design and implementation and reported this as a critical success factor.[11,12] We propose that this success may be due to the focus of frontline staff on the specifics of program implementation. For example, when discussing the challenges of implementing CLABSI prevention programs, ICPs tended to talk in generalities and take a systems perspective whereas frontline staff spoke of personal issues and gave concrete examples. This was evident across the 3 themes of scarce resources, competing priorities, and physician resistance to change. The distinction between conceptual and concrete thinking about infection prevention control and prevention may provide another avenue to explore in the development and implementation of these types of initiatives. Moreover, given these differences in perspective, it is important that frontline staff be included in any implementation team because they contribute a critical real-world perspective that may facilitate the success of patient safety interventions.

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