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Effectiveness of a Technology-Based Communication Intervention for Suddenly Speechless Patients in Critical Care Units: Nurses Perceptions and Experiences

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Effectiveness of a technology-based communication intervention for suddenly speechless patients in critical care units: Nurses perceptions and experiences

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Abstract: Background: Currently, patients who develop sudden inability to verbalize needs (sudden speechlessness), rely on ineffective non-verbal strategies to communicate. Nurses caring for suddenly speechless (SS) patients report personal inadequacy, frustration, and time-management challenges as they attempt to decipher patients' non-verbal communication. Technology-enhanced communication may be of assistance to address challenges experienced by patients and nurses.
Objective: Specific aims: (1) to understand nurses' perceptions about the effectiveness of a TEC device in facilitating communication with SS patients, and (2) to utilize nurses' feedback to improve and identify new uses for the TEC device.
Methods: Qualitative study design with focus groups and thematic analysis. Critical care nurses with ≥3 months' experience caring for SS patients, and who had cared for at least one patient using the TEC device participated in the study. Digital audio recordings were obtained from focus groups.
Results: Salient themes: TEC device use with patients with various levels of functioning, effects of using the device on patient/nurse frustration, noticing whether using the device saved time, and using the device for assessment.
Conclusions: Focus groups captured nurses' perspectives about the effectiveness of the TEC device in facilitating communication with SS patients. Future research should focus on the impact of TEC on safe and quality care of SS patients.

Subjects: Communication Technology; Nonverbal Communication; Acute Care; Nursing Research

ABOUT THE AUTHORS

Rodriguez Carmen S. PhD, Heather J. Spring PhD, and Meredeth Rowe PhD are researchers with interest on improving the communication process of suddenly speechless patients in the critical care setting. Research initiatives associated with the development of communication strategies tailored to the needs of suddenly speechless patients, nurses, and family caregivers is ongoing. Findings associated with research reported in this paper are supportive of integrating critical care nurses' perspectives in the development and evaluation of technology-enhanced communication interventions for suddenly speechless patients.

PUBLIC INTEREST STATEMENT

Sudden inability to verbalize needs as a result of surgery or airway intubation (sudden speechlessness) is often experienced by patients admitted to the intensive care unit. Currently, suddenly speechless patients rely on time consuming strategies, such as mouthing words, gesturing, or alphabet boards to communicate their needs and symptoms. These strategies are particularly ineffective when a patient needs to summon a health care provider rapidly. This article describes nurses' perceptions about the effectiveness of our team's newly developed technology-enhanced device in facilitating communication with hospitalized suddenly speechless patients.

Keywords: sudden speechlessness; communication; nurses' experiences

1. Introduction

Despite national initiatives supporting enhancement of communication for vulnerable patients across healthcare settings, to date, hospitalized patients experiencing sudden inability to speak face major challenges communicating their needs (Institute of Medicine, 2013; Joint Commission, 2010; Joint Commission, 2011; Patak et al., 2009). Currently, suddenly speechless (SS) patients rely on a variety of less than adequate non-verbal strategies, such as mouthing words, gesturing, or alphabet boards to communicate. These methods are particularly ineffective when there is an enhanced need for advanced nursing care, such as after head and neck cancer surgery, intubation to maintain a respiratory airway, and/or neurodegenerative diseases affecting structures critical for speech (Patak et al., 2009; Rodriguez et al., 2016; Rodriguez & VanCott, 2005). Unfortunately, the communication strategies commonly used by SS patients are particularly ineffective during pain management, respiratory care, and when a patient needs to summon a health care provider rapidly (Rodriguez, 2003; Rodriguez & Blischak, 2010). Nurses are challenged to maintain effective communication with SS patients as a critical component of safe, quality care (Institute of Medicine, 2013; Joint Commission, 2010; Joint Commission, 2011; Patak et al., 2009; Thomas & Rodriguez, 2011).

In an effort to address these challenges, members of our research team initiated a multi-phased, mixed-methods research program designed to understand communication challenges faced by SS patients and their nurses, and to determine whether the use of our team's newly developed technology-enhanced communication (TEC) device improved communication between SS patients and nurses (Rodriguez, Rowe, & Koeppel, 2011). The first phase of the qualitative component, the results of which are reported elsewhere, was a set of focus group interviews conducted with nurses prior to use of the TEC device (Rodriguez, Spring, & Rowe, 2014). In these focus groups, nurses described the many challenges and frustrations they experienced while caring for SS patients. These challenges included: continuing inability to understand the needs of SS patients even while using current communication tools, feelings of personal inadequacy when they were unable to understand the needs of their SS patients, and frustrations over the time-consuming nature of communication attempts.

In an effort to enhance communication options and address some of the limitations of current communication tools, a TEC device was developed (Rodriguez et al., 2012). The device was designed to be used with minimal training and could be placed at a SS patient's bedside to facilitate communication with health care providers. The TEC device consisted of an iPad with three different strategies to communicate: (1) touchable icons representing various commonly occurring patient care needs; (2) a blank screen upon which patients could write out a message with a stylus or their finger; and (3) a screen that allowed patients to type out messages that could be "spoken" by the TEC device. The feasibility and usability of the device was tested in the study's quantitative component using a quasi-experimental non-equivalent control group design study (Rodriguez et al., 2012). We found that, compared with participants in the control group, participants using the TEC device reported lower communication frustration levels, higher satisfaction with their ability to communicate, and an increase in perception of communication ease.

In this paper we report findings from two additional sets of focus groups conducted about a year apart to assess nurses' perceptions of the effectiveness of the TEC device in facilitating communication with hospitalized critical care patients who had become SS subsequent to trauma, stroke, intubation, or head and neck surgery. One set of focus groups was conducted during the intervention phase of a mixed methods clinical trial designed to test the effectiveness of the TEC device (clinical trial phase). Because of the study inclusion and exclusion criteria, there were limited numbers of patients in each unit that were enrolled and using the device, and thus use of the TEC device by the clinical nursing staff was also limited. In order to increase use of the device, subsequent to the clinical trial, the TEC devices were left in the critical care units for nurses to freely use with SS patients.

Another set of focus groups was conducted after three months of freely available use (freely available phase). Our specific aims were to: (1) understand nurses' perceptions related to the effectiveness of the TEC device in facilitating communication with SS patients in critical care, and (2) to utilize the nurses' feedback to improve and identify new uses for the TEC device.

2. Study design and methods

A qualitative study design with focus groups and thematic analysis was utilized for clinical trial and freely available phases of the study (Patton, 2002). We selected a qualitative study design with focus groups to allow participants who are familiar with SS patients in the critical setting to share their perspectives, thus providing data to facilitate a deeper understanding of the topic. This method proved effective for the authors, in previous studies and the present study, in ascertaining the perspectives and experiences of nurses working with SS patients and was deemed an expedient way to obtain the feedback of a larger number of nurses whose time was at a premium (Rodriguez et al., 2014). Four focus groups were conducted for each of the study phases: clinical trial phase (n = 11 nurses), and freely available phase (n = 18 nurses). We obtained Institutional Review Board approval prior to the start of the clinical trial and freely available phases.

2.1. Participants for both phases

Research personnel associated with the study provided information to all nursing staff via written advertisements on the unit, staff notice books, and materials announcing the focus groups. Participants had worked in the critical care units involved in both phases and had a minimum of three months' experience caring for patients with sudden speechlessness. Additional inclusion criteria were that participants had cared for at least one SS patient and were willing to participate in an audio-recorded focus group session. All focus groups were conducted in critical care units at a tertiary care institution in the southeast region of the United States. Four focus groups were conducted for each of the study phases: clinical trial phase (n = 11 nurses), and freely available phase (n = 18 nurses). Written informed consent was obtained at the beginning of each focus group session after the study was orally explained and potential participants had the opportunity to read the informed consent document and seek clarification as needed. Nurses completed the Healthcare Staff Demographic Survey, which provided demographic and work experience data that included: age, gender, educational level, profession, years in current profession, years working with SS patients, race/ethnicity, and experience with electronic speech devices.

2.2. Procedures

2.2.1. Clinical trial phase procedures

During the clinical trial phase, nurses working on the units were trained to use the TEC device. After three months of patient participants using the TEC device, nurses who had cared for them were invited to participate in the first set of four focus groups. A total of 11 critical care nurses, who had cared for either one or two research patients, participated in the focus groups. Two of the focus groups were attended by a total of four nurses who had actually not cared for patients who were assigned the TEC device. As a result, data obtained by the focus group moderator from these nurses, who had not cared for research patients using the TEC device, were not included in the analysis.

Initially, the research team planned to use feedback from the nurses in the clinical trial phase to initiate enhancements to the technology, however, it was deemed prudent to obtain additional feedback from nurses who had more experience using the TEC device as a communication tool with SS patients. Additionally, team members wondered how nurses' experiences might be impacted should they themselves be able to assign the TEC device to patients they felt could most benefit. Therefore, a "Freely Available" phase was initiated.

2.2.2. Freely available phase procedures

During the freely available phase, TEC devices were placed in several critical care units so as to be readily available to nurses for use with their SS patients. Nurses received 30 min training in use of the TEC device, and after three months, four focus groups were again convened. Eighteen critical care nurse participants had used the device with at least one SS patient, with majority caring for three patients that used the device (range 1–5). These nurses reported using the TEC device in caring for at least 49 SS patients; because we did not collect identifiable information on the patients, it was unclear whether some of them had cared for the same patient, potentially reducing the number of patients represented.

2.3. Focus Group Process

Prior to beginning each focus group, the moderator explained the purpose of the study and that the session would be digitally recorded for later transcription into written form. The moderator, which was the same person for all sessions in both phases, then described the format for the ensuing focus group and encouraged participants to freely express their views.

An interview schedule was used for all groups that included open-ended and semi-structured questions to elicit responses regarding nurses' perceptions of the effectiveness of the TEC device in facilitating communication. Based upon responses we received during the clinical phase focus groups, we amended interview questions for the freely available phase, in order to clarify and add to our understanding of nurses' experiences with the TEC device. Questions used to facilitate the discussions for both sets of focus groups are outlined in Table 1.

2.4. Data analysis

Data consisted of digital audio recordings that were obtained from each focus group session. Each recording was transcribed, de-identified, and checked for accuracy before the beginning of the analysis phase. Initially, each focus group transcript was printed out with a wide right margin and hand coded line by line, noting codes in participants' own words when possible. Codes were then grouped into conceptual themes. As new codes emerged in the data, they were either added to an existing theme or grouped into new ones. Once each transcript was analyzed in this manner, the process was repeated electronically by using the cut and paste function of Microsoft Word, to again group codes into themes and attach relevant participant quotes. Using both hand and electronic coding allowed us to take advantage of both the creative flow of ideas that occurs during hand coding and the organizational and retrieval benefits of the electronic method.

2.5. Credibility of findings

The authors made provisions to support that they have accurately documented the phenomenon of interest, nurses' perceptions related to effectiveness of the TEC device in facilitating communication with SS patients in critical care (Glasser & Strauss, 2017; Shenton, 2004). Both the focus group moderator and the qualitative data analyst were naive to the literature and care regarding SS patients, limiting the likelihood of preconceived ideas or bias in their questioning or interpretation of the data. Our confidence in the credibility of these findings was also enhanced as we noted the similarities in the responses of participants among the various focus groups in each phase and in the consistency of responses between participants in both phases. Moreover, prior to finalizing the results, four nurses who had participated in the focus groups, were asked to read a summary of our findings and comment on whether it seemed representative of their own experiences. The nurses reported agreement on how their experiences and insights were correctly represented by our documentation of findings, validating the authenticity and representativeness of the data.

Table 1. Interview schedules for clinical trial and freely available phases

Clinical trial phase
1) All of you have now cared for (at least) some SS patients who have used the TEC device. Are there things that SS patients are able to communicate using the TEC device that they are unable to communicate without the particular technology? If so, can you give me some examples?
2) How has the use of the TEC device changed your experience of caring for SS patients, if it has? Specifically, how has the use of the TEC device by some SS patients changed your ability to understand and care for those patients?
3) In what ways is communicating with these patients similar to communicating with SS patients who do not use the TEC device? NOTE: IF the use of the TEC device seems to enhance the nurses communication experiences with SS patients ask:
4) Compared to the other communication tools available to you, what is it about the TEC device that most enhances your ability to provide quality care to the SS patients who use it?
5) Compared to your other SS patients, what is your biggest challenge in caring for patients who use the TEC device?
6) During focus groups conducted last year, many nurses expressed strong feelings about what it was like for them to communicate with patients who had become SS. Tell me about any differences in your feelings when caring for patients who use TEC device versus SS patients who do not?
7) Is there any part of the care experience that seems particularly affected by the use of the TEC device? For example, is it any different assessing pain levels, assessing general patient needs, obtaining consents for procedures, or doing discharge planning with patients who have the TEC device available?
8) In your estimation, is the TEC device better suited to some patients than others? In other words, what kinds of patients seem to benefit most from using this technology? Can you give a specific example? Which patients seem to benefit least? Example?
9) In your opinion, what changes in the TEC device would facilitate better communication or easier use?
Freely available phase
1) Before we get started, we would like to find out the extent to which each of you have actually used the TEC device to communicate with your SS patients. As we go around the room, could each of you tell me a) how many patients you have communicated with using the TEC device and b) what was the specific condition that rendered each of these patients suddenly speechless?
2) I'm going to go around the room now and ask each of you three questions. I would like each of you to answer all three before moving on to the next person. I understand that the TEC device is now readily available in your unit or on your floor. a) What led you to decide to use the TEC device to communicate with each of your patients? In other words, what made you think that this patient would be a good candidate to use the TEC device? (Let participant answer this part before going on to next part.) b) In what other ways did you try to communicate with each of these patients? c) Please contrast your experience using the TEC device with your experience using other tools to communicate with each of these patients.
3) What kind of things were your patients most easily able to communicate using the TEC device?
4) In what ways, if any, did the use of the TEC device help you assess those patients who used it?
5) Were there some screens that your patients used more easily than others and, if so, which ones were they? In other words, what features are most and least useful for which patients?
6) We would like to understand more about the difficulties some patients have using the TEC device. Please give me some examples of specific things your patients tried unsuccessfully to communicate via the TEC device.

(*Continued*)

Table 1. (*Continued*)

7) What was it about your patient or the TEC device that made that particular type of communication difficult?
8)* Bring out the TEC device. Now, as we go through each screen of the TEC device, please tell me/us: a) What types of patients are most able to use this screen? b) What types of patients are least able to use this screen? c) How could we improve this screen to make it easier for patients in your particular unit to use?
Run through each of these questions for each of the 4 screens.
9) How could we improve—or add to—TEC device in general to make it more useful to you in your work with SS patients?
10) In the focus groups we conducted last year, nurses talked about how time-consuming it was to try to decipher communications with SS patients. Have you notice that using the TEC device saves you any time in communicating with SS patients versus those who don't use it? Please explain.
11) What modifications could we make to this technology to save you time in communicating with SS patients?
12) When you think of caring for SS patients in general, how could the TEC device be modified to better help you care for patients that are acutely ill or have just recently gotten out of surgery?
13) How could the TEC device be modified for patients who are a little further along in their recovery process?
14) Were there enough TEC device units to meet the needs of patients on your unit? What number would be ideal?
15) Is there anything else you think we should know about your experiences in using the TEC device to communicate with SS patients?

* (Data associated with this question (#8) will be published in another manuscript.)
Key: SS = suddenly speechless patients; TEC = Technology-enhanced communication.

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3. Results

3.1. Demographics

A total of 29 registered nurses participated in the study. Most of the participants were female (*n* = 26; 86.2%), White (*n* = 21; 72.4%), with a mean age of 37 years (range, 22–59). The highest educational level obtained by most participants was 16 years of education 66 %; (*n* = 19). On average participants had 12.3 years (range: 1–36) nursing experience with an average of 9.5 years of experience working with SS patients.

3.2. Using the TEC device with SS patients with various levels of functioning

The first theme identified in these focus groups was using the TEC device with SS patients of various levels of physical and mental functioning. Physical and mental conditions of patients in these critical care units dictated which, if any, components of the TEC device SS patients were able to use. In the clinical trial phase, when researchers had control of TEC device use, nurses generally agreed that many, if not most, patients in their critical care units were unable to effectively utilize the system as it now exists. During the freely available phase when unit nurses controlled use of the device, at least 49 critical care, SS patients were able to successfully use the TEC device to communicate with their nurse.

Nurses in both sets of focus groups agreed that patients who had cognitive deficits, who were just coming out of sedation, who were on medications that caused confusion, or who were otherwise not mentally clear had difficulty effectively using the technology. The TEC device was, likewise, unsuited to patients who were blind or who had physical disabilities/weakness that inhibited them from lifting their hand the 12 or so inches it took to reach the screen. As one nurse in the clinical trial phase said, "*They are (temporarily) paralyzed and, when they start moving around, they don't have the strength to hold the iPad or push any specific buttons*." Many patients in these critical care units were elderly, weak, on multiple medications, and just generally what nurses referred to as "*deconditioned*." They did not have the strength to lift their arms and touch icons on a screen, let alone type or use a stylus to write. In those instances, nurses were forced to resort to other methods of determining patients' needs, such as "*running the list: Okay, are you in pain? Do you need to go to the bathroom? Are you uncomfortable? You know, there's really no way, there's no way to, to know*," explained one nurse. "*And that's when you need them to be able to use (the technology), when they're sick like that*," said another nurse.

Whether secondary to having the technology readily available on their critical care units or because of some other factor, nurses in the freely available phase focus groups seemed to find many more opportunities to use the TEC device once their critical care patients had progressed a little further in their recovery trajectory. Once they had patients who had successfully used it, they were anxious to introduce it to other SS patients. They believed that it was an improvement upon traditional communication tools and that it ameliorated frustration for many of their patients who had been struggling to communicate their needs.

3.3. Noticing effects of using the TEC device on patient frustration levels

The second theme we found was nurses noticing the effects of using the TEC device on their patients' levels of frustration. Nurses clearly appreciated having the opportunity to interact with patients using the TEC device, in part because of the decreased frustration of many of their patients while using the device. Most nurses noted that patients using this technology seemed less frustrated or angry at their inability to communicate when they had access to the system. "*I think it would provide them optimism toward their recovery*" and "*It gives them hope*" were comments made regarding use of the system. One nurse explained, "*They don't get so frustrated and they don't, like, shut down when they are able to communicate in some form or fashion, whether it's pictures, typing, writing. Some form of communication is better than nothing*." Another said, "*Part of the frustration (for the SS patient) is the fact that you don't have any control over any situation that's goin' on right now*." Some nurses believed that using the technology could be "empowering" for patients. One patient was described as having been given a voice. "*It was like*

a breath of fresh air for her." When patient frustrations were reported, they seemed to relate to a lack of fit between the technology and a particular patient's capacity to engage it. Patients who were not used to technology, who were "*acutely ill*," or "*immediately out of surgery*" were deemed to be less suitable candidates for using the TEC device and more likely to be frustrated by it. For example, one nurse reported how a patient got "*so frustrated*" because his lack of dexterity. Several nurses also noted that their older patients were more likely to become frustrated with the technology, even when it was explained to them. One nurse said that he had seen patients older than 40 get "*extremely frustrated fairly quickly*."

The configuration of the multi-icon screen may also have contributed to some frustration on the part of other patients. Of particular concern to some of the nurses was that the TEC device not be introduced "*too soon*" in a SS patient's recovery trajectory: when they were still under effects of anesthesia or were weak and debilitated. For such patients, precipitous introduction of the technology could actually be counterproductive, as one nurse explained, "*I think if you try and introduce it too soon as their form of communication and they get frustrated, that's kind of gonna put the kibosh on it for future use. If they get frustrated in the beginning, they're just gonna remain frustrated and may not give it a second chance*."

In order to minimize patient frustration, it was also necessary that nurses be familiar with the range of each individual SS patient's capabilities at any given time. Did they have the dexterity to write on a screen or even to push the icon buttons? Could they see the screen? Were they literate? Were they able to communicate in English or Spanish? Were they familiar with a QWERTY keyboard? Knowing which, if any, screen would be within a patient's capability was critical to the patient's success at using the device.

In addition to knowing their patients, it was important for nurses to know the capabilities of the technology itself. One nurse, for example, noted that the only time she saw a patient frustrated with the TEC device was when that patient could not find the screen he was looking for. She stated that when "*another staff member didn't know how to do it*" the patient got frustrated "*because they knew that they had the ability to communicate. But they could not get to the screen. So that would be frustrating sometimes*." Another nurse indicated: "*Maybe we need to be more aware of, like, what needs to be set up so when we have a patient that's getting it, whoever is bringing it goes through that setting set up process with the patient. Because if they get frustrated from that initial part then they—yeah, then they may not—they just get frustrated—like, "I don't want to use this at all*."

Because nurses in this study had somewhat limited exposure to this new technology, and were really just learning its capabilities themselves, they were only beginning to realize how important a thorough introduction was in ensuring optimum success in patient-nurse communications.

3.4. Noticing effects of using the TEC device on nurse frustration

Our third theme was nurses noticing the effects of using the TEC technology on their own frustration. Opinions were mixed in the clinical trial focus groups as to whether the TEC device eased nurses' stress and frustration in caring for SS patients. Pressing an icon caused the TEC device to "speak" the phrase indicated on it, and several nurses commented that hearing "I need help. I need help," "Emergency, Emergency," or "I love you" could get wearing if patients pressed those icons frequently. As one nurse said, "*Honestly, it might increase frustrations if they're using it all the time.... Yeah, it can get old*." But other nurses believed that the increased ease of communication afforded by the TEC device decreased their stress in caring for SS patients; and decreased stress and frustration could lead to better patient care. For example, several nurses in these focus groups noted their reluctance to go into the rooms of some SS patients and deal with time-consuming and difficult communication challenges. One nurse described his dread of going into the rooms of SS patients and trying to figure out what they wanted. "*Dread, fear, whatever you wanna call it, because it gets to a point, it's like, Okay, this is my 15th time into the room in an hour*." A nurse in another group said, "*It's so frustrating that you eventually just avoid them because*

you're like, I can't help them." It's driving me crazy cuz our goal as nurses is to fix our patients." She liked working with the TEC device because "*It specifically lays out what they need*." So, as one nurse said, using the TEC device "*kinda puts less stress on us as nurses, cuz (normally) it's like, Oh my God, I gotta go in that room, you know? I mean, I think it's a good, I think it's a great idea*." Another nurse simply said, "*You make it easier for the patient, you inherently make it easier for me because then the patient can get less frustrated … and it'll just be a lot easier on everybody*."

Participants in the freely available phase focused more of their comments on patient frustration than on their own, in part due to the contexts in which the topic came up. Two of the focus groups were asked specifically what led them to use the TEC device with their SS patients, and most nurses indicated that their main motivation arose out of the "*frustration of not being able to communicate*." As one nurse who had been "*doin" this 24 years*" said, "*You get really good at reading lips and all that, but it's very frustrating when they're drooling and swollen. You have a hard time understanding*." Even while mentioning their own frustration with traditional attempts at communicating with their SS patients, nurses in the freely available phase of this study seemed to quickly turn back to commenting on the frustration felt by their patients.

3.5. Noticing whether using the TEC device saved time

The fourth theme was noticing whether using the TEC device saved the nurses' time. In the clinical trial phase focus groups, opinions were mixed as to whether the TEC device saved nurses time when attempting to communicate with SS patients. One nurse, for example, when asked, exclaimed, "*Oh my God, yes!*" Another immediately echoed, "*Yes, or you'll be sitting there for 20 minutes, like, getting the first letter. Yes, definitely*." But another nurse replied in a more equivocal tone, "*I mean, it's helpful…. You know, patients want to talk and verbalize a lot of stuff. So you're still having to be there and kinda come up with, you know, whatever they're trying to say*."

In the freely available phase focus groups, however, nurses categorically stated that using the TEC device saved them time in caring for their SS patients. When one focus group was asked this question the immediate responses from three of the participants were: "*Sure." "Yes. Yes." "Absolutely."* Most obviously, using the TEC device saved time in deciphering what the patient was trying to communicate. As one nurse said, it eliminated much of the guesswork "*because you don't spend five minutes trying to figure out what they're trying to say. They just communicate it. So it definitely saves time*." Another nurse elaborated, *"I'd get to the point where it's like it, it was taking my whole shift just to get a couple things out. So I'd go over to the doggone thing (TEC device) and bring it in, cuz it would save me the time. Cuz it felt like you were just killing your whole night trying to get simple things out…. I'd bring 'em a cup of water to swab their mouth, 'No, no, no.' Like 'What do you want? Here, push this button*."

Another nurse enthusiastically agreed, "*Same thing. Like just trying to go in the room, and every time you go in they, you know, have something additional to say. It's not like you can just go in and do something and then leave. They, you know, wanna communicate. They wanna tell you what they need, and so every time they're trying to mouth something, if they didn't have access (to the TEC device). And then, trying to get them to write. It cuts down the time by at least half, if not even more so. So definitely, a huge improvement*."

Using the TEC device helped these nurses more quickly discern a SS patient's need so they could "*immediately start working on the solution to it*." Pressing an icon to indicate a bathroom need could prevent *"a whole bed change, which definitely takes more time*," for example. Because pressing an icon caused the computer to "speak" out a word, nurses could know what a patient in isolation needed before donning protective garb to go in and find out. As one nurse said, "*You can bring the supplies or the medications with you and you've saved yourself a trip, which overall saves a lot of time*." As a result, nurses identified specific situations where use of the device had the potential to enhance their ability to discern SS patients' needs, and consequently, improve time management.

3.6. Using the TEC device for assessment

Our final theme centered around nurses' perceptions about using the TEC device as an assessment tool. When asked how the TEC device could be improved, nurses in both sets of focus groups did not believe that much could be done to make it useful for their very weak, sedated, or otherwise cognitively impaired SS patients. As one nurse in the freely available phase explained, "*I don't know if we could actually improve on that cuz they're out of it*." Nurses in the clinical trial focus groups, however, suggested that the technology could be useful to them if it facilitated assessing these patients' cognitive status. "*We try to orient. You try to do their orientation and you really can't*," stated one participant, who then added, "*Are they just smilin' at you and lookin' at you or are they really in there?*" Noting again that the technology had the ability to "speak" when various icons were touched, nurses in one focus group suggested that it could be programmed to orient patients to their surroundings as they came out of anesthesia or otherwise were becoming more mentally cognizant.

Because nurses in clinical trial focus groups had suggested that the TEC device might be enhanced to also serve as an assessment tool, nurses in the freely available phase were queried as to whether they had actually ever tried using it in this way. Patients suffering stroke, significant trauma, or those coming out of surgery were routinely assessed for orientation to time and place, and nurses working with SS patients found ways to do those assessments in spite of patients' inabilities to speak. "*I'll ask them yes or no questions, so they can nod yes or no. That's all, you know. Is it 2014? Right now? I'll say, Is it 2015? And then they nod yes. And then I know, Okay they're oriented to that*," explained a nurse in one focus group. None of the other nurses in her group thought that the TEC device might be useful in assessing orientation or mental status. "*I've not utilized it in that way…. I didn't think about it,"* said one. *Another agreed saying, "I haven't used it that way either. I mean honestly for orientation stuff it's easier and quicker to just say nod yes or no*," added a third. The general consensus in that group and in most of the others was that, if a patient could use the TEC device, they were obviously oriented.

A few participants in different groups, however, had explored the possibility of using the TEC device for assessment. One nurse thought that, if a SS patient was able to point to an icon to express a need that in itself demonstrated at least some degree of orientation. Another nurse asked her patient to write the year on the writing screen and asked, "*Do you know where you are?"* and encouraged the patient to write on the writing screen. A couple of the other nurses believed that the TEC device was quite useful in assessing a patient's level of pain when they could not readily speak. By pressing on the "Pain" icon and bringing up a rating scale, SS patients could indicate pain levels, as well as locations. One nurse mentioned how she believed that this approach "*let 'em get more interactive with their care*."

4. Discussion

The analysis and interpretation of focus group data revealed five overarching themes that emerged in association with nurses' perceptions about the effectiveness of the TEC device in facilitating communication with critically ill SS patients. Nurses shared innovative ideas about how to integrate the TEC device as a strategy to enhance the assessment of patients.

The availability of TEC at the bedside represents a potential solution to address communication problems of SS patients), and has been associated with improvement of clinical functions that complement nursing care (e.g. communication, education) in real-world practice. (Bolton, Gassert, & Cipriano, 2008; Etchels, Macaulay, Judson, & Ashraf, 2000; Happ, Roesch, & Garrett, 2004; Happ, Roesch, & Kagan, 2005); Miglietta, Bochicchio, & Scalea, 2004). In this study, nurse participants using the TEC reported that the intervention was of assistance in enhancing their communication process while caring for SS patients. The availability of the bedside TEC intervention was associated with saving time deciphering patients' communication attempts by eliminating the guesswork, decreasing the amount of time spent discerning the patients' needs, and the opportunity to start working on what was necessary right away. Specifically, the nurses reported that advantages of the TEC device included: (1) ease of use; (2) appropriate communication strategies to meet the

needs of SS patients; and (3) ready availability of the bedside device to both patient and nurse. Nurses also reported that use of the TEC improved their ability to discern SS patient's needs, and as a result, saved them time when caring for SS patients

Studies that have described methods used to facilitate communication during sudden speechlessness events, indicate that non-TEC strategies used to augment communication with SS patients had limitations in meeting their communication needs (Happ et al., 2005; Rodriguez & Blischak, 2010; Rodriguez et al., 2014). These limitations have consequences for nurses caring for these patients and, consequently, for the care that their patients receive. When nurses are unable to effectively communicate with SS patients, they may feel time-challenged and frustrated, a situation which sometimes leads to avoiding these patients and not providing consistently high quality care (Rodriguez et al., 2014). Overall, in this study, nurses seemed clear about their fundamental responsibility to ameliorate patients' communication challenges and provide consistent care to patients despite the absence of ability to verbalize needs. Like nurses without access to the TEC device, however, they also spoke of sometimes avoiding contact with SS patients when such communication strategies were not available. When using the TEC device, however, we noted a change in the way nurses talked about frustration.

In the clinical phase, when nurses worked with patients who had been pre-selected to use the device, focus group participants still spoke about their own frustrations. They were divided in their assessments of whether the TEC device ameliorated or contributed to frustration. Some nurses perceived that the availability and use of the TEC intervention increased ease of communication and consequently decreased the stress and frustration perceived in caring for their SS patients. Others noted that they experienced frustration when patients repeatedly activated the same messages; an unanticipated consequence from enhancement in communication ability.

Nurses in the freely available phase, however, focused far more comments on their perceptions of patients' frustration than on their own. It is possible that nurses using the TEC device with their patients simply felt less time-challenged and less frustrated. Compared with the clinical phase participants, participants in the freely available phase of focus groups did, indeed, more robustly report their belief that using the TEC device with SS patients saved time. Decreased nurse frustration may also have resulted from an increased sense of autonomy. During the freely available phase, when nurses had control of assigning the intervention, an increase in the number of times nurses assigned the intervention was noted. It is also possible that having the TEC accessible for use without delay, increasing familiarity with use of the intervention, and witnessing how patients who were ready to use the intervention succeeded in communicating resulted in a more effective approach to allocate the intervention thereby reducing nurses' frustration.

Because, during the freely available phase, we were centered on exploring nurses' perceptions of caring for SS patients while using the intervention, we did not collect any patient data. We did not consider this necessary, as we had already identified that patients reported lower frustration levels associated with the communication process while using the TEC intervention, in comparison with the usual care group (Joint Commission, 2010). However, we did explore the nurses' perceptions of patients' frustration while using the TEC intervention, and identified that the nurses perceived less frustration in patients using the TEC. These perceptions were centered on the belief that, when using the device, their SS patients felt empowered, their self-report capability was enhanced, and control was regained as they were able to more effectively communicate. Nurses' feedback during the freely available phase was also critical to validating the importance of considering the patients' physical and cognitive status when implementing TEC interventions in the critical care setting.

Feedback from participants provided insight about the role technology solutions may have in providing assistance with early identification of changes in patients' physical or mental

status, a goal of significance in the development of technology to facilitate efficient and safer nursing care (Rodriguez et al., 2014). The potential role for the intervention to enhance nursing assessments, especially to facilitate the identification of cognitive fluctuations, emerged during the focus groups. For some nurses, the patients' demonstration of ability to use the TEC intervention was in itself proof of the patients' cognitive ability. However, in other situations, the nurses identified the possibility of using the TEC in their assessments to facilitate the identification of fluctuations in the patients' level of orientation. Enhancement of the TEC, incorporating options to facilitate nursing assessments of SS patients, suggests a more autonomous nursing role with the potential to enhance the communication process and consequently decrease frustration and increase satisfaction for both SS patients and critical care nurses. In addition, the level of enthusiasm exhibited by these nurses attests to their eagerness to be part of the process of enhancing the possibilities for their SS patients.

4.1. Implications for Practice

In this study, we were able to further document nurses' perceptions about the deficit in current care experienced by critically ill patients that are unable to communicate their needs (Happ et al., 2005; Institute of Medicine, 2013; Joint Commission, 2010; Joint Commission, 2011; Miglietta et al., 2004; Patak et al., 2009). We also noted that, at least for nurses in our series of focus groups, increased autonomy to incorporate enhanced TEC options was associated with an increased perception of time saved when caring for SS patients, and a decreased focus on nurse frustration when reporting on experiences of caring for these patients. Moreover, nurses in both phases of our study were very clear in reporting which types of SS patients were and were not suitable for using the device. Further development of the intervention and its impact on safe and quality care are needed before full integration into the critical care setting. We anticipate refinement of the TEC device and further test its safety and suitability in the population of SS patients. We recommend, as new technology is increasingly being introduced into the health care setting, a greater role for nurses and other stakeholders in assessing the usefulness of such technology for themselves and their patients. Although limited in scope, findings from this study lead us to believe that, as nurses have increasing autonomy in selecting which new interventions are appropriate for their SS patients, they may experience less frustration and be better equipped to provide the quality of care that is their ideal.

4.2. Implications for Future Research

Focus groups were an effective methodology to capture critical care nurses' perspectives after using a TEC device to facilitate communication for SS patients. However, the process of assembling the groups was time consuming for research staff and required ongoing adaptation in the schedule of critical care nurses interested in participating. Although findings are of essence in guiding the continuing development of the TEC device, there is a limitation in the extent to which results can be generalized. In addition, for reasons unknown, some of our freely available phase participants were not asked Question #2 on the interview schedule, which has the potential to compromise the robustness and validity of our findings. As a result, we anticipate exploring further how nurses make decisions about integrating TEC interventions and their experiences with using other tools to communicate with SS patients when the technology is freely available for use.

In addition to implementing some of the suggestions proffered in these focus groups as we make enhancements to the TEC technology, there are other steps that can be taken to further refine its usefulness. For example, interviewing patients who used the TEC device after becoming SS would provide an alternate and vital perspective. Because we found in our control phase study that nurses believed other types of caregivers had different experiences communicating with SS patients (Rodriguez et al., 2014) it would also be useful to convene focus groups of other types of caregivers, such as physical or occupational therapists, and solicit their feedback. Moreover, because many of the nurses in the clinical trial phase and freely available phase groups pointed

out that the technology is best suited to patients a little further along in their recovery, it would be useful to also introduce the TEC device to patients in step-down units of hospitals.

Topics of education and consent, important concerns raised by nurses in the control phase of our project (Rodriguez et al., 2014) were not fully explored in clinical trial and freely available phases. Nurses did note that patients were able to express more complex thoughts and questions while using the TEC device, leaving one to speculate that the technology might be useful in these regards. Future focus groups with both patients and caregivers could include specific inquiries to explore these concerns more explicitly.

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