Use of a Speech-Generating Device for Hospitalized Postoperative Patients With Head and Neck Cancer Experiencing Speechlessness

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Purpose/Objectives: To test the feasibility of using a programmable speech-generating device (PSGD) in hospitalized adults with head and neck cancer experiencing speechlessness.

Design: Time-series design.

Setting: Tertiary care institution, inpatient setting.

Sample: 9 female and 12 male postoperative patients ($\bar{X}$ age = 62 years) experiencing speechlessness as a result of a surgical intervention to treat head and neck cancer.

Methods: Patients participated in a communication intervention that incorporated use of a PSGD during their hospital stay. Data about PSGD use and functionality- and technology-related issues were collected. Satisfaction and usability of the PSGD were rated with the Satisfaction and Usability Instrument.

Main Research Variables: Use of, satisfaction with, and usability of the PSGD.

Findings: Participants demonstrated significant improvement in ability to use the PSGD over a four-day period for all communication functions assessed. Results indicated that participants were "quite satisfied" with using the device and considered the technology to be "quite important" during the postoperative period. PSGD messages generated by participants via the hospital call system were understood by clerks. However, participants admitted to intensive care units experienced issues associated with accessibility of the device.

Conclusions: Participants demonstrated proficient and independent use of the PSGD to communicate programmed messages; however, other strategies were necessary to meet their communication needs as the postoperative period progressed. Additional research on technologic communication options and strategies to tailor technology to meet the needs of speechless patients is warranted.

Implications for Nursing: PSGDs may offer a more reliable option to facilitate communication between patients and nurses during the postoperative period. Technology should be tailored to meet speechless patients' unique needs as they progress through the rehabilitation process.

Hospitalized patients recovering from surgery for head and neck cancer may find themselves suddenly speechless and without a mechanism to reliably communicate their needs. Sudden speechlessness may occur when structures essential to speech are removed (laryngectomy) or disabled (tracheal intubation) as a result of surgery. Patients are unable to verbalize normal comfort and care needs (e.g., pain relief, need for repositioning, toileting) and are powerless to communicate even critical needs (e.g., difficulty breathing, immediate need for suctioning or blocked airway, inadvertent disconnection of ventilators or oxygen, bleeding from disconnected IV lines) (Happ, 2000; Rodriguez, 2003).

In an effort to communicate, speechless patients and nursing staff draw on their own ingenuity to identify alternate face-to-face communication strategies. However, the strategies typically are slow, energy-draining methods such as mouthing words; nodding to a series of *yes* or *no* questions; and use of writing pads, alphabet boards, hand signals, and facial gestures. In addition, speechless patients are limited to using electronic intercom systems to verbalize their needs when staff members are not present (Rodriguez, 2003). Clearly, current practice does not adequately address this population's need for communication with nurses to prevent and rapidly treat dangerous situations and lessen frustration, anxiety, fatigue, and dissatisfaction with provided care (Ashworth, 1984; Happ, 2000; Patak, Gawlinski, Fung, Doering, & Berg, 2004; Rodriguez, 2003; Stovsky, Rudy, & Dragonette, 1988).

Communication issues may be solved effectively with programmable speech-generating devices (PSGDs). Commonly used to facilitate communication for people experiencing chronic speechlessness, some devices allow for use of recorded messages that can be matched with a symbol graphically representing each message. The speechless patient then is able to play a message on command by selecting or activating the associated symbol. Although PSGDs are a standard approach to facilitate the communication process for individuals with a chronic impairment, limited research studies have focused on use of PSGDs for hospitalized postoperative patients with head and neck cancer experiencing sudden speechlessness.

Background

Research exploring PSGDs for speechless postoperative patients with head and neck cancer after surgery focuses on the appropriateness of such devices for this population (Costello, 2000; Happ, Roesch, & Garrett, 2004; Happ, Roesch, & Kagan, 2005). In a case study with patients after surgery for craniofacial anomalies, tumors of the face, or placement of a tracheostomy, Costello (2000) described use of PSGDs to facilitate patient communication about medical needs, personal comfort (e.g., toileting, positioning), and psychosocial (e.g., emotional) needs. Selected discharge interview findings indicated that participants were satisfied with the ability to use technology to communicate. The importance of considering preoperative teaching, the need to include messages beyond those prerecorded, and maintaining device accessibility were points stressed by several participants during discharge interviews. However, all but postoperative teaching are difficult to meet in acute care hospital settings.

Happ et al. (2004, 2005) reported results from two small studies that provided early support for use of PSGDs by intubated patients in a hospital intensive care unit, particularly in postoperative patients with head and neck cancer. PSGDs were used to facilitate patient-nurse communication about symptoms associated with the postoperative period and comfort, care, and psychosocial needs. Despite availability of a PSGD, most nurses providing care to study participants were dependent on other communication strategies (e.g., *yes* or *no* questions, head nods, lip reading). Participants used more than one method to communicate (e.g., writing, PSGD) and described barriers including poor device positioning or malfunction, complexity of message screens, staff time constraints, staff unfamiliarity with devices, and deterioration in patient's condition. Although findings indicated that a limited number of suddenly speechless patients were able to use PSGDs to communicate during the acute postoperative period, identification and elimination of barriers to effective PSGD use in this population is needed.

The current study aimed to test the feasibility of using a PSGD with adults in acute care who had undergone surgery for head and neck cancer that rendered them speechless. In consultation with an expert in augmentative and alternative communication, the SpringBoard™ (Prentke Romich Company, Wooster, OH) was selected based on its recording capability with gender-specific voice, 7.5 inch color touch-screen display (large enough to facilitate visibility of graphic symbols by bedridden patients), accessibility of recorded messages via direct selection, built-in stand (may be placed on the overbed table), and compact and lightweight design (3 lbs). Research questions included the following.

- Can speechless patients with head and neck cancer use a PSGD to communicate throughout the acute postoperative period?
- How much time is needed for speechless patients to become proficient in using the PSGD after surgery?
- Can the PSGD be used to attract or summon help when patients must use an intercom system?
- How do patients rate the performance of the device in terms of importance and satisfaction with its functions?

Methods

A time-series design was used to assess PSGD use for four consecutive days in speechless patients recovering from head and neck surgery. The study was conducted at a tertiary care institution in the southeastern United States after approval from the appropriate institutional review board.

Participants

Informed consent was obtained from potential participants during the preoperative visit. The study inclusion criteria were being aged 50 years or older, able to verbally communicate at time of consent, able to read and write in English, Mini-Mental State Examination score of 24 or higher, no previous history of speechlessness, and able to use upper extremities. After surgery (postoperative day 1), assent to continue participation was obtained if the patient had speechlessness caused by surgery or intubation without postoperative complications limiting participation, such as severe respiratory, cardiac, or neurologic impairments.

Thirty-six patients met criteria and consented. Surgical interventions for five consenting participants were cancelled because of advanced disease. Ten participants were excluded during the postoperative period because they were able to communicate verbally after surgery (n = 4), developed complications that hindered participation (e.g., delirium tremens, confusion) (n = 3), or requested to discontinue participation (n = 3). Therefore, 21 participants completed the study.

Intervention Procedure

Equipment: The SpringBoard PSGD was programmed to incorporate messages that addressed patient communication needs consistent with those reflected in the literature (Costello, 2000; Happ, 2004, 2005) and with a study that explored communication needs of suddenly speechless postoperative patients with head and neck cancer (Rodriguez & Blischak, in press). The device was preprogrammed to display all contained messages when turned on. The messages were associated with topics of pain, breathing issues, suction needs, elimination needs, resting and sleeping, need for a nurse, questions or sentences to aid in communication with the healthcare provider (e.g., "How am I doing?" "I am feeling okay."), and three alternatives to summon help as needed (e.g.,

"Help," "I need a nurse now," sound of an alarm). Symbols prestored in the SpringBoard were identified for each communication need included, and a gender-specific voice was used to record each message.

Initial plans to set up the PSGD on an over-bed table were not possible for patients admitted to the intensive care unit because of consistent use of over-bed tables by RNs for documentation purposes. The adaptation of a mounting device (Manfrotto arm) allowed for attachment of the SpringBoard on an IV pole or side rail, thus facilitating accessibility for the remainder of the study.

Data Collection Procedures

Participants were admitted to the intensive care unit, where they received the PSGD on postoperative day 1. The PSGD remained with them as they were transferred to an intermediate care or medical surgical unit. Also on day 1, the researcher visited participants and collected demographic information and data related to PSGD use. Data about PSGD use were collected each day afterward, and device functionality and technology-related issues were monitored and managed. On the final day of data collection (day 4), participants who remained hospitalized kept the PSGD and the researcher continued to monitor device functionality and technology-related issues until participants were discharged or recovered speech. Prior to discharge, participants completed the Satisfaction and Usability Instrument, which was adapted from the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST) instrument and modified by the first author to measure degree of satisfaction with and importance of using the SpringBoard as an assistive communication device.

During the preoperative visit, a 30-minute training session was offered to consenting potential participants. The session consisted of a PSGD demonstration and opportunities to review available messages and consider adding other messages based on individual needs. In addition, an overview of using the PSGD was provided to participants who were unable to activate a message on command on postoperative day 1. RNs assigned to participants also were provided with an overview of how to turn the device on and off, an explanation regarding the relationship of graphical symbols to prerecorded messages, instructions on how to set up the device to make it accessible, and the investigator's contact information if any issues occurred with the device.

Measures

Device usage: Data specific to PSGD use were collected on four consecutive days. A researcher-developed tool was used to collect data on use of the PSGD on selected tasks, whether participants could access the device easily, and whether messages generated by the PSGD and communicated via the call system were understood by the clerk. The researcher assessed participants' ability to use the PSGD to communicate a need for emergency care, pain management, suctioning, breathing difficulty, and summoning a nurse. The researcher scored participants' attempts to use the device and collected field notes about difficulties encountered during the performance of the tasks. Each assessment was graded as 1 (independent use), 2 (minimal assistance from researcher [2 cues or less]), 3 (considerable assistance from researcher [more than 2 cues]), or 4 (unable to perform).

Difficulties encountered with PSGD use were recorded as inability to find or push the pictorial hot button, inability to follow instructions, or other difficulties encountered. The ward clerk's ability to understand PSGD messages was categorized as understood or not understood. Location of the PSGD also was recorded to determine whether it was accessible by patient or inaccessible when the data collector entered a participant's room.

Satisfaction and usability of instrument: After stabilization of their clinical condition and prior to discharge, participants were surveyed about usability of the PSGD, satisfaction with its use, and ways in which it could be enhanced for future use. QUEST, a questionnaire designed to measure satisfaction and importance associated with use of assistive technology, was adapted for this purpose. Test-retest reliability (0.82–0.91) (Demers, Monette, Lapierre, Arnold, & Wolfson, 2002) and internal consistency alpha (0.76–0.82) (Demers, Wessels, Weiss-Lambrow, Ska, & Witte, 1999) have been reported.

Table 1. Clinical and Demographic Characteristics

Characteristic	n	%
Gender		
Male	12	57
Female	9	43
Race		
Caucasian	15	71
African American	3	14
Hispanic	3	14
Level of education		
Grades 1–8	1	5
Grades 9–12	13	62
1–2 years of college	1	5
More than 2 years of college	6	29
Cancer site		
Larynx	10	48
Oral cavity	9	43
Other head and neck cancer	2	10
Medical or surgical procedure		
Total laryngectomy	10	48
Tracheostomy	11	52
Communication impairment		
Permanent	10	48
Temporary	11	52

N = 21

Note. Because of rounding, not all percentages total 100.

The first author adapted items that were congruent with the study's technology. Criteria were incorporated to measure importance of and satisfaction with each PSGD function, ability to report symptoms and communicate with healthcare staff, useful characteristics of the PSGD, accessible location of the PSGD, and amount of technical support needed or received during the hospital stay. Items were rated on a scale from 1 (not important or not satisfied at all) to 5 (very important or very satisfied). Adaptations made to the questionnaire were reviewed by an expert in measurement and a senior researcher with expertise in the development and evaluation of technology to monitor individuals with dementia. Based on participants' stages of recovery prior to discharge, completion of the 16-item questionnaire was anticipated to occur independently or with assistance from the researcher as requested.

Standards of Care

Prior to implementation of the current study, standards of care associated with speechless postoperative hospitalized patients with head and neck cancer did not include use of PSGDs at the study site. The provision of writing tablets by nurses or family members and use of alphabet boards on some units were the customary practices.

Data Analysis

Descriptive statistics were used to describe demographic and clinical variables and scores for all satisfaction and importance items. A repeated measures report was generated for variables studied over the four-day period (communication functions included in PSGD, location and accessibility of PSGD, and ward clerk's ability to understand messages). Friedman's test was used to test relationships of repeated measures data.

Results

Mean age of participants was 62 years (SD = 8.72, range 51–83), and mean length of hospital stay was 13 days (SD = 8.67, range 7–47 days). One patient spent 47 days in the hospital because of the development of multiple complications. Clinical and demographic characteristics are described in Table 1.

Importance Level

Participants used a scale ranging from 1 (not important) to 5 (very important) to rate 16 items in the Satisfaction and Usability Instrument. Eighteen participants completed the instrument. The mean score for all importance categories was 4.5 (SD = 0.71), indicating that participants considered the PSGD to be quite important as a communication alternative during the postoperative period. All importance categories received a mean score higher than four (see Table 2). Highest levels of importance ($\bar{X}$ = 4.5 or higher) were assigned to activating the PSGD for emergency needs, receiving preoperative instructions about the PSGD, receiving technical support, using the device to communicate with relatives and the nurse, using the device to report symptoms and cope with communication issues, and having an opportunity to individualize the device for communication needs. Items that received lower levels of importance ($\bar{X}$ = 4.1–4.4) were location and accessibility of the device, having the device available one day after surgery, pictures and symbols incorporated in the device, ease of use, use of device

Table 2. Patient Satisfaction and Importance Associated With Use of Programmable Speech-Generating Device

	Satisfaction			Importance		
Criterion	n	$\bar{X}$	SD	n	$\bar{X}$	SD
Activating device for emergency needs	15	4.07	1.28	15	4.93	0.26
Receiving preoperative instructions about how to use device	15	4.73	0.59	14	4.93	0.27
Voice used in device	18	4.89	0.32	18	4.83	0.38
Receiving technical support	18	4.56	1.04	18	4.83	0.51
Using device to communicate with relatives	11	4.55	0.69	12	4.83	0.39
Using device to report symptoms	14	4.36	0.93	15	4.73	0.59
Individualizing device for patient's needs	16	4.5	0.89	17	4.65	0.79
Using device to communicate with nurse	17	3.88	1.22	18	4.61	0.98
Using device to improve coping with communication issue	17	4.24	1.35	17	4.53	1.18
Place where device was kept in room for use	18	4.22	1.06	16	4.44	0.96
Having device available one day after surgery	16	4.25	1.24	16	4.38	1.2
Pictures used in device	18	4.39	0.98	17	4.35	1.32
Ease of use	18	4.06	1.43	17	4.35	1.46
Using device to communicate	18	3.78	1.44	17	4.35	1.22
Using device to communicate with doctor	11	4.27	1.27	11	4.18	1.4
Receiving timely response from nurse when device is used	17	3.06	1.2	16	4.13	1.41

N = 21

to effectively communicate with physicians and RNs, and receiving timely responses from RNs when device was activated.

Satisfaction Level

Participants could rate their satisfaction level on 16 items in the Satisfaction and Usability Instrument with a scale ranging from 1 (not satisfied at all) to 5 (very satisfied). In addition, participants could provide additional feedback by responding to the question, "Why are you dissatisfied?"

The mean score for all satisfaction items was 4.18 (n = 18, SD = 0.76), indicating that participants were quite satisfied with PSGD use during the postoperative period. Eighty-one percent of items received a mean score higher than 4. Lowest mean satisfaction scores (3–3.88) were related to use of the PSGD to communicate with the nurse and receiving a timely response when the device was activated. Participants who assigned a rating of 3 or lower to these items and provided feedback related to their dissatisfaction (n = 5) identified the following issues: "multiple efforts needed at intervals," "RNs took long time to come" (after message was activated), and "at intervals, RNs took 15–20 minutes to respond" (multiple efforts needed to contact the nurse). Although the device functioned appropriately, participants were dissatisfied with response from the nursing staff, expecting a faster response when assistance was requested.

Participants who reported ratings of 5 for individual items of the instrument and included feedback recommended that the device be adjusted to facilitate writing (n = 6) or the use of a keyboard (n = 1). These participants reported the need to handwrite to communicate in addition to using the PSGD. One participant identified the need to communicate beyond the messages included in the PSGD: "I always need to say something that is not there." In addition, one individual believed that the Manfrotto arm was bulky, and another reported having to call the clerk three times or more to obtain assistance.

Participants who reported satisfaction ratings lower than 4 for individual items (n = 3) identified more barriers that hindered their ability to use the PSGD, including characteristics of the device (e.g., too heavy, availability of too many items to select, position of the device not appropriate), accessibility of the device (e.g., staff kept moving the device, not always handy), specific needs not met by the PSGD (e.g., need for messages not included in the device resulting in the need to handwrite messages, blurry vision, too groggy to use the device), and feedback from others once the device was activated (e.g., doctor in a hurry during use, RNs took too long to respond).

One participant recommended that the device be adjusted to facilitate communication of messages such as on or off, up or down, wet or dry, and areas of the body. Two participants suggested improvements for the location of the device, such as making it come down from the ceiling, placing it directly in front of the patient, and adapting a longer attachment to provide more flexibility for moving it around.

Device Usage

In addition to communication functions incorporated in the PSGD, participants had the opportunity to add messages based on their individual needs. The messages were added after being identified during data collection periods. Topics included symptom-related physiological needs, including "I am having nausea," "I am hungry," "Could you raise the head of the bed?" "Please wet my lips," "Please help me to move up in bed," and "Do not tuck blankets or covers under my feet." Other messages facilitated communication with relatives or significant others, such as "Happy birthday," "I love you," and "How are my grandkids?" Requests also included the addition of a message to indicate inability to verbally communicate (i.e., "I cannot speak.") as well as a message to convey privacy needs while in the hospital (i.e., "Please close the door."). The most common message requested by participants was "Please wet my lips."

Participants demonstrated significant improvement in their ability to use the PSGD over a four-day period for all communication functions assessed. On postoperative day 1, about 43% (n = 9) were able to activate at least three of five functions independently as requested by the researcher (see Table 3). Participants who required assistance to activate a function upon request (day 1) experienced difficulty physically pushing the button (n = 2) and were unable to find the graphic symbol associated with the requested function (n = 10). Inability to activate any functions (n = 1) was associated with the participant's sedation level. By day 3, most participants demonstrated the ability to independently and correctly activate all five functions as requested by the researcher. One participant did not have eyeglasses available, resulting in inability to activate requested functions. Another participant required more than two prompts to activate functions. Participants requiring minimal assistance had difficulty activating one (n = 3) to three functions (n = 1).

Effectiveness outside intensive care unit setting: On each data collection day, the investigator instructed participants admitted to units with the hospital call system (all except surgical intensive care unit) to communicate a need via this system by activating a communication function on the PSGD. Participants activated the call system and, on response from the clerk, proceeded to activate a message from the PSGD. Once the message was activated and received by the ward clerk, the investigator asked the clerk if the message was understood and the type of message that was communicated. All

Table 3. Patient Use of Programmable Speech-Generating Device

Variable	Independent Use n	Independent Use %	Minimal Assistance[a] n	Minimal Assistance[a] %	Considerable Assistance[b] n	Considerable Assistance[b] %	Unable to Perform n	Unable to Perform %	Statistics
Pain management									$\chi^2 = 21.82$
Day 1	7	33	10	48	3	14	1	5	df = 3**
Day 3	16	76	3	14	1	5	1	5	
Summon nurse									$\chi^2 = 23.51$
Day 1	9	43	8	38	3	14	1	5	df = 3**
Day 3	19	90	–	–	1	5	1	5	
Breathing difficulty									$\chi^2 = 22.42$
Day 1	7	33	10	48	3	14	1	5	df = 3**
Day 3	18	86	1	5	1	5	1	5	
Suctioning									$\chi^2 = 15.27$
Day 1	9	43	8	38	3	14	1	5	df = 3*
Day 3	18	86	1	5	1	5	1	5	
Emergency care									$\chi^2 = 23.53$
Day 1	9	43	7	33	4	19	1	5	df = 3**
Day 3	18	86	1	5	1	5	1	5	

N = 21
*p = 0.002; **p < 0.001
[a] Participants required two prompts or fewer to perform the task.
[b] Participants required more than two prompts to perform the task.
df—degrees of freedom

messages generated by participants via the hospital call system (n = 56) were understood by the clerks.

Accessibility: PSGD accessibility was assessed by observing whether participants could reach the device while in bed. Sixty-four (77%) of 83 observations revealed that the device was located in an accessible site (e.g., overbed table, within reachable distance). The device was classified as inaccessible during 19 observations (23%) if found on the floor, placed at an unreachable distance (e.g., behind the bed; on night stand, sink counter, or chair; under the television set), or not found in the room (e.g., placed in storage area after patient was transferred). Participants experiencing the biggest issues with accessibility were those admitted to surgical intensive (n = 8) and intermediate (n = 7) care unit settings. Commonalities associated with these units included finding the device on the night stand or at an unreachable distance with the device attached to the Manfrotto arm.

RN feedback: An initial goal of the current study was to obtain feedback from at least one RN assigned to each participant per day on days 1–4. A 10-minute inservice about the study was provided to the RN assigned to each participant at each data collection point. Nurses were recruited and consented at that time. The small number of participating RNs (n = 23) limited the ability to make any inferences about their responses. The most common reasons for not participating included not having time to participate and limited time spent on the units (based on status as temporary nurses).

Discussion

Previous research findings demonstrated that speechless patients with head and neck cancer are able to use technology to communicate needs that emerge during the postoperative period (Costello, 2000; Happ et al., 2004, 2005). The current study's findings support the previous research and confirm that proficiency in using a PSGD independently may occur within a few days during the acute postoperative period. In addition, the possibility of adapting technology to communicate via the hospital call system presents a viable option for speechless patients as they begin to recover and are transferred from intensive care units.

Study findings associated with accessibility, technology characteristics, staff responses, and incorporation of other strategies to meet speechless patients' changing communication needs also are consistent with reports from previous studies (Costello, 2000; Happ et al., 2004, 2005) and highlight the importance of exploring effective, accessible alternatives that can be adapted readily to acute care settings. Based on participants' recommendations, integrating other communication functions besides those preprogrammed in the device and considering PSGDs with expanded platforms for accommodating more than one communication strategy (e.g., handwriting, typing) should be explored. Based on staff members' responses, considering a more formal approach in the provision of instructions to nursing staff (e.g., unit meetings, dedicated time to attend an inservice) may bolster the recruitment process and increase staff participation in future studies.

Limitations

The current study used a small convenience sample with limited representation of a diverse population. In addition, the sample was limited to postoperative suddenly speechless patients with head and neck cancer, although other patients may experience speechlessness while admitted to the acute care setting. In addition,

the researcher-developed tool that facilitated data collection specific to PSGD use has not been evaluated for reliability or validity. Plans for testing the tool in this respect are being considered as part of a larger study's design.

Conclusion

The immediate postoperative period after speech-related surgical interventions (e.g., laryngectomy, glossectomy) is associated with complications that result in significant instability. Level of patient disability related to sudden speechlessness and lack of a reliable approach to facilitate communication between patients and nurses can increase levels of patient discomfort as well as safety risks. Therefore, alternative communication methods should be considered to enhance patient-nurse communication at a time when critical safety needs are most likely to emerge.

The current study's findings support PSGD use in suddenly speechless postoperative patients with head and neck cancer. Study participants demonstrated proficient and independent use of the PSGD to communicate messages programmed in the device; however, other strategies were necessary to meet participants' communication needs as the postoperative period progressed. Future research should consider evaluating communication strategies tailored to the individual needs of speechless patients with head and neck cancer, particularly those that emerge as the postoperative period evolves. In addition, an exploration of how to best capture nurses' feedback in research studies will be useful for tailoring technology to meet the needs of this population as well as to influence practice changes and standards.

Relevance to Clinical Practice

Postoperative speechless patients often experience the need to communicate critical signs and symptoms. Therefore, healthcare providers should be proactive in facilitating effective communication interventions. The integration of technologic interventions, particularly PSGDs, may offer a more reliable strategy to communicate urgent and emergent postoperative needs compared to time-consuming nonverbal communication strategies. Obtaining feedback from nurses caring for speechless patients is essential for tailoring technology to meet patients' unique needs as they progress through the rehabilitation process. Nurses, often the first line of communication for speechless postoperative patients, can provide the detailed, evidence-based knowledge necessary for facilitating development of practice standards needed to maintain an optimal level of care and safety. This knowledge then can be incorporated as part of a focused inservice or in the general planning of educational strategies to orient and facilitate development of nurses and hospital staff about the communication needs of speechless patients.

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