Patient Communication Following Head and Neck Cancer Surgery: A Pilot Study Using Electronic Speech-Generating Devices

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Purpose/Objectives: To describe the communication of patients who received electronic speech-generating devices (SGDs) following surgical procedures for head or neck cancer.

Design: Exploratory, complementary mixed methods.

Setting: Otolaryngology surgical inpatient unit of an urban teaching hospital.

Sample: 10 purposively selected patients with a mean age of 57.1 years (SD = 12.8 years) and moderately severe illness (Acute Physiology and Chronic Health Evaluation III score $\bar{X}$ = 27.1 ± 13.2) who had SGDs in their hospital rooms for 9.1 ± 6.2 days.

Methods: Observation, interviews, questionnaires, and clinical record review.

Main Research Variables: Communication methods, communication content, SGD use, communication quality (i.e., ease and user satisfaction), barriers to SGD use, and patient clinical characteristics.

Findings: SGDs were used in message construction in 8 (17%) out of 48 total observed communication events. Writing (31%) and nonverbal communication (46%) were the most frequently observed primary methods of communication used by patients with head and neck cancer postoperatively. Five patients demonstrated occasional SGD use with or without cuing, and one used the SGD as the dominant communication method. Ease of Communication Scale scores showed only slightly less difficulty with communication when compared to a historic control group. Patients initiated communications more often when SGDs were used in message construction. Poor device positioning, staff unfamiliarity with SGDs, and patient preference and ability for writing were barriers to SGD use.

Conclusions: Although writing and making gestures were the most common communication methods, SGDs were used successfully by selected patients and may be particularly beneficial for constructing complex messages during conversation.

Implications for Nursing: SGDs may be an appropriate assistive communication strategy for postoperative patients with head and neck cancer. Nurses can facilitate effective patient communication with SGDs by cuing patients on device options and positioning SGDs within easy reach.

Key Points . . .

- ➤ Writing was the most common communication method used and preferred by nonspeaking patients with head and neck cancer following surgical procedures.
- ➤ Electronic speech-generating devices (SGDs) may be most effective when used by patients for complex communications.
- ➤ Staff education on cuing patients and proper positioning and repositioning of SGDs within easy reach is critical in facilitating SGD use for patient communication.

Patients with head and neck cancer often experience frustrating and socially isolating communication problems during the period in which they are unable to speak following surgery. However, patient communication during the immediate postoperative period has received little attention in research or clinical practice literature (Happ, Roesch, & Kagan, 2004). This article describes the communication methods and communication content of 10 intubated patients who received electronic speech-generating devices (SGDs) following surgical procedures for head or neck cancer, with a particular focus on SGD use, communication quality (i.e., ease and user satisfaction), barriers to SGD use, and clinical characteristics (e.g., age, illness severity, cancer diagnosis or surgical procedure, sedation or narcotic medications) of SGD users.

Literature Review

Studies of communication between nurses and nonspeaking, intubated patients in intensive care units (ICUs) have demonstrated that most interactions involve brief, task- or procedure-oriented information, commands, or reassurances (Ashworth, 1980; Hall, 1996; Leathart, 1994; Salyer & Stuart,

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1985). Communication interactions typically are initiated and controlled by the nurse and are influenced by the patient's degree of responsiveness and severity of illness (Ashworth; Baker & Melby, 1996; Hall; Leathart; Salyer & Stuart). A recent metasynthesis of research on the communication experiences of nonspeaking, mechanically ventilated patients revealed that patients often are misunderstood, resulting in loss of control and negative emotions, such as frustration, fear, anger, and anxiety (Carroll, 2004).

Most speech and communication assessments of patients with head and neck cancer target the posthospital rehabilitation period (Happ, Roesch, & Kagan, 2004), yet the in-hospital postoperative recovery period is a critical time for symptom management, stress adaptation, patient education, and resocialization (de Maddalena, 2002; Dropkin, 2001). Early speech rehabilitation with voice prostheses following laryngectomy has been associated with more positive emotional states than when patients have not received such rehabilitation (de Maddalena); however, patients who received early speech rehabilitation reported greater psychological stress than those who did not receive rehabilitation during the postoperative period despite better voice quality outcomes (de Maddalena). The results suggest a need for psychosocial support and counseling about speech rehabilitation, expected voice changes, and stigmatization when patients receive voice prostheses following laryngectomy (de Maddalena). Fox and Rau (2001), a psychiatric nurse specialist and speech-language pathologist team, applied individualized augmentative and assistive communication techniques, such as writing, communication boards, and electronic devices, in a progressive manner as patients' needs, motivation, and abilities changed following radical head and neck surgery.

Electronic SGDs, also known as voice-output communication aids, are a subset of augmentative and assistive communication devices that produce prerecorded, digitized voice messages or synthesized speech when specific locations on a dynamic display screen or keyboard are selected by the communicator. Most electronic SGDs can be preprogrammed with situationally relevant messages, such as "I'm having pain," that are accessed at one location on the device display. Preprogrammed messages on additional levels provide patients with access to a larger repertoire of messages for specificity or elaboration. For example, a numeric pain scale can be activated after a message such as "I'm having pain" is communicated. Some devices allow users to spell new messages using alphabet keystrokes.

Clinical studies have described different contexts and outcomes with the use of SGDs. Costello (2000) reported general satisfaction with electronic SGDs among 43 patients, 2.8–44 years of age, and their families who were assisted in planning for temporary voicelessness following surgery to the face, mouth, or neck. Prior to surgery, patients or family members selected vocabulary items that were recorded and categorized under topic cues, such as words or icons, using the SGD of their choice (Costello). Etchels et al. (2003) reported on the development and testing of an electronic SGD specifically designed for use by ICU patients. Feedback from users (patients) and communication partners (nurses and family members) was mixed; therefore, the initial prototype was redesigned to better meet the needs of hospitalized patients and caregivers (Etchels et al.).

Standardized measures of communication ease, frequency, quality, or success were not used in early research endeavors. A recent pilot study explored the feasibility of SGD use with 11 nonspeaking adults in a medical ICU (MICU) (Happ, Roesch, & Garrett, 2004). In general, patients reported less difficulty with communication after SGD use ($t > 2.62$, $p = 0.047$). Five participants demonstrated some independent use of the SGD (Happ, Roesch, & Garrett). Electronic SGDs may be useful adjuncts for patients with head and neck cancer to facilitate communication with family members and clinicians in the immediate postoperative period. However, to date, no studies of electronic SGD use with hospitalized patients with head and neck cancer have been published.

The specific aims of this study were to describe the clinical characteristics, communication methods, communication content, SGD use, communication quality (ease of communication, user satisfaction), and barriers to the use of SGDs among intubated, nonspeaking patients who received SGDs following surgery for head or neck cancer in a hospital setting. The following research questions were addressed.

- What are the clinical characteristics (age, severity of illness, medical diagnosis, cognition, use of hearing and visual aids, upper-extremity function, education level, prior computer use, days intubated, sedation or analgesia use) of postsurgical patients with head and neck cancer who received SGDs?
- What are the communication methods and communication content of postsurgical patients with head and neck cancer who received SGDs?
  - What is the frequency of SGD use and assistance required by postsurgical patients with head and neck cancer?
- What is the quality (ease of communication, user satisfaction) of patient communication with SGDs following head and neck cancer surgery?
- What are the barriers to use of SGDs by postsurgical patients with head and neck cancer?

Methods

In this study, a qualitatively driven, mixed-methods design (Morgan, 1998; Morse, 2003) was used. This approach is appropriate to answer the descriptive, exploratory research questions posed in the study. Participant observation, semi-structured interviews, questionnaires, and clinical record review were used to obtain data on patient communication with 10 adults following head and neck cancer surgery.

Setting

The study was conducted in an inpatient otolaryngology surgical unit of a university-affiliated, tertiary care hospital following review and approval by the University of Pittsburgh Institution Review Board. Prior to this project, augmentative and assistive communication technology for nonspeaking patients was limited to writing materials supplied by family members or nurses. A one-way tracheostomy speaking valve or tracheoesophageal puncture was used, when appropriate, usually after at least one week of postoperative recovery. Electrolarynx devices rarely were used in the hospital at the time this study was conducted.

Sample

Eleven adult patients initially were selected using the following criteria: (a) intubated, (b) responsive to verbal stimuli, (c) able to follow simple commands, (d) able to understand

English, and (e) able to complete six of the eight items from the Initial Cognitive-Linguistic Screening Tasks developed by Dowden, Honsinger, and Beukelman (1986). Patients eligible for the study were identified by charge nurses during unit rounds and were selected purposefully by the investigators for variation in diagnosis, surgical procedure, age, gender, education, and prior computer use. Patients were invited to participate, and informed consent was obtained prior to surgery or following recovery of decisional ability after surgery. One patient refused an invitation to participate, and another returned the device early but permitted use of collected data. Therefore, the final study sample was 10 patients. Family members and clinicians (nurses, physicians) who were the patients' communication partners were considered to be secondary participants.

Procedure

Study participants were followed until they were able to vocalize or were discharged from the hospital, whichever occurred first. Investigators carried pagers, rotating on call to solve problems or answer questions about the device.

Equipment and device setup: Participants were offered a choice of two different SGDs in this study. The DynaMyte™ 3100 model (DynaVox Technologies, Pittsburgh, PA) device with VitalVoice™ (DynaVox Technologies) software was used by five study participants (see Figure 1). The MessageMate™ (WordsPlus, Inc., Lancaster, CA) was chosen for use by five study participants (see Figure 2). No study participants accepted an opportunity to use the alternate device when offered after a three-day trial period with their initially selected device. Table 1 contrasts device features of DynaMyte and MessageMate. Message displays and message selections on each SGD were individualized based on patient input. Patients were shown standard messages derived from the literature (Ashworth, 1980; Connolly & Shekleton, 1991; Costello, 2000; Hall, 1996; Leathart, 1994; Salyer & Stuart, 1985) and asked about possible additions or deletions, such as requests for eyeglasses or music. Messages common on all SGDs used in this study included pain, shortness of breath, request for suctioning, help, hot or cold, home, family, anxiety, and worry.

a. MessageMate

b. Specific message overlay for intensive care unit

Figure 2. MessageMate™ Communication Device

Note. Photos courtesy of Simulation Plus, Inc. Reprinted with permission.

Figure 1. DynaMyte™ Speech-Generating Device

Note. Photo courtesy of DynaVox Technologies. Reprinted with permission.

Training: Initial patient instruction consisted of a review of menu items and device features that lasted approximately 20 minutes. Instruction was discontinued if the patient appeared fatigued, in pain, unable to comprehend, or asked to stop. Additional instruction was conducted as needed throughout the study period. As a result of staffing and workload constraints, few nurses were able to attend the prescheduled 15-minute training sessions about the study purpose and operation of the SGDs. Therefore, laminated instructions were attached to the devices for quick reference and nurses were introduced to device purpose and main features by the investigators at the bedside whenever possible (Happ, Roesch, & Garrett, 2004).

Data Collection and Instruments

Data collection and analysis procedures replicate those reported previously in a study of SGD use with MICU patients (Happ, Roesch, & Garrett, 2004).

Clinical characteristics: Demographic (i.e., age, gender, marital status, and educational level) and clinical data (i.e., sedation use, primary diagnosis, and surgical procedure) were obtained by chart review and patient or family report. The **Acute Physiology and Chronic Health Evaluation III** (APACHE III), a well-accepted and widely utilized instrument (Knaus et al., 1991; Wagner, Knaus, Harrell, Zimmerman, & Watts, 1994), was used to measure illness severity on the day of study enrollment. The **Therapeutic Index of Severity Score (TISS)** (Cullen, Civetta, Briggs, & Ferrara, 1974; Keene & Cullen, 1983), a quantification of 76 therapeutic interventions, was used to measure technologic intensity at

Table 1. Speech-Generating Device Set-Ups for This Study

Features Used	MessageMate™	DynaMyte™
Display	1 x 1 inch squares on rectangular keypad	Dynamic display (touch) screen
Message capacity	Small	Large
Speech output	Digitized	Synthesized
Number of icons/messages on display	36	6–12/page
Spell new message (keyboard)	NO	YES
Number of words in output message	1–7	1–10
Direct select (point/touch)	YES	YES
Auditory or visual scan/switch	NO	NO
Battery power	YES	NO*
Dimensions (inches)	11.75 x 4 x 1.25	8 x 7 x 2
Weight (lb)	1.66	3.20

*Although equipped with a 6–7 hour rechargeable battery, the device was connected to a battery charger and power source continuously for this study.

Note. From "Electronic Voice-Output Communication Aids for Temporarily Nonspeaking Patients in a Medical Intensive Care Unit: A Feasibility Study," by M.B. Happ, T.K. Roesch, and K. Garrett, 2004, *Heart and Lung: Journal of Acute and Critical Care, 33,* p. 94. Copyright 2004 by Mosby. Reprinted with permission.

the time of entry into the study. The **Glasgow Coma Scale (GCS)** was used as a gross measure of cognition on entry into the study and at the time of each observed communication event, with appropriate modifications to the verbal score for intubated patients (Teasdale & Jennett, 1974). Interrater reliability for the APACHE III, TISS, and GCS was maintained at more than 0.90 throughout the study.

Characteristics of communication: To assess the changes in patient perception of communication difficulty, participants completed the revised **Ease of Communication Scale (ECS)** (Menzel, 1997) after the SGD had been used. These scores were compared to a convenience sample of 10 postoperative head and neck surgical patients obtained prior to the introduction of SGDs on the unit. ECS measures for both groups were conducted on postoperative day 3 or day 3 of device use if SGD use was delayed postoperatively. The revised ECS consists of 10 Likert-type statements about perceived communication difficulty (0 = not hard at all, 1 = a little hard, 2 = somewhat hard, 3 = quite hard, 4 = extremely hard), with possible scores ranging from 0–40. Menzel's original six-item ECS showed good internal validity (alpha = 0.88). Internal consistency for the revised ECS was established in this study at alpha equals 0.93.

Study participants were observed by trained data collectors for at least 20 minutes each day for communication interactions. Data collectors used the investigator-developed **Observation of Communication Event Record** to document attributes of communication exchanges between study patients and communication partners (nurses, family members, other clinicians); event records included initiation of communication, communication partners, message content and frequency of communication exchanges, communication methods, barriers to SGD communication, and type of assistance required by the patient during communication interactions. This tool was pilot-tested and refined in a previous study of SGD use in an MICU (Happ, Roesch, & Garrett, 2004). In addition, data collectors wrote descriptive field notes about the interaction and any researcher interaction with patients regarding the SGDs. Clinical records also were reviewed, and documentation of nonvocal communication methods, content, and SGD use was abstracted.

Patients, clinicians, and family members were interviewed informally about their experience with the SGD after observations. These comments were recorded verbatim as much as possible in the data collectors' field notes. Finally, user satisfaction, barriers to device use, and common messages were assessed from the perspective of the study participants in interviews with eight patients prior to discharge. One interview was conducted with the patient and a family member. Information was confirmed further in a formal interview with one RN participant. The SGDs were used during each interview to question participants about message screens and message options. Interviews were audiotaped whenever possible, transcribed verbatim, reviewed for accuracy, and corrected by the interviewer.

Data Analysis

Characteristics of communication interactions (i.e., communication methods, number of communication partners, initiator of message, message validation, assistance required, sedation or analgesia, physical restraint use) were coded from the Observation of Communication Event Record, entered into an electronic spreadsheet program, and tabulated. Distinctly different communication interactions with different partners (e.g., family visitor and nurse) during a single 20-minute observation period were counted as separate communication events. Numerical data were analyzed using descriptive statistics (i.e., mean, SD, frequency) and pattern identification via data matrices (Miles & Huberman, 1994).

Qualitative field note data and interviews were analyzed by simple coding and categorization of (a) communication method, (b) barriers to use of the SGD or other nonverbal communication technique, (c) facilitators of use of the device or nonverbal communication technique, and (d) content of patient communication (Happ, Roesch, & Garrett, 2004; Miles & Huberman, 1994; Strauss & Corbin, 1998). Data were coded independently by two reviewers with final codes designated by the principal investigator. The following categories of SGD usage were developed from the documentation in the clinical record, observation data, and patient, family, nurse report: 1 = little to no use, 2 = occasional use with cuing, 3 = some independent use, and 4 = dominant form of communication. Using these categories, two independent raters classified SGD usage for each study participant according to their best use. Discrepancies were resolved by consensus agreement (Happ, Roesch, & Garrett). Categories of SGD usage, communication barriers, and content were added to the spreadsheet for tabulation and analysis.

Results

Patient Characteristics

Ten patients, ranging in age from 45–82 years ($\bar{X}$ = 57.1 ± 12.8 years) were recruited to participate in the study. All patients had tracheostomies following surgical procedures for laryngectomy (n = 8) or placement of radiation implant catheters for brachytherapy (n = 2). Demographic and clinical characteristics for the study participants are described in Table 2. All participants could write legibly, could complete basic motor screening tasks at study enrollment (Dowden, Honsinger, et al., 1986), and had high GCS scores (all scored 15, the highest possible score) on enrollment and during communication observations. Most study patients (n = 7) had some prior experience using a computer; at minimum, they had used an automatic teller machine.

An analgesic, anxiolytic, or sedation had been administered within six hours prior to study observation periods in 73% of total observations (48 out of 64) and in 71% of observations in which communication actually was observed (34 out of 48).

Communication Methods

Sixty-four observations were conducted and recorded (ranging from three to nine observations per patient, with a mode of seven observations per patient). Actual patient communication events were documented in 75% (n = 48) of the observation periods; patients were sleeping or not communicating in 25% of the observations. Figure 3 shows primary communication methods used by patients with head and neck cancer to construct observed messages. Writing and nonverbal methods (i.e., gestures, head nods, and facial expressions) were most common. Patients with head and neck cancer used a variety of writing systems (e.g., legal pads, notebooks, dry-erase boards) that were supplied primarily by families. More than one method of communication was employed during 94% of the observed communication interactions (45 out of 48).

SGDs were used by patients to construct messages in 17% (n = 8) of the observed communication events. In constructing messages with SGDs, patients also used gestures (n = 4), mouthing words (n = 2), head nods (n = 6), and writing (n = 2). Patients, family members, and nurses reported SGD use beyond that observed in most (9 out of 10) cases. One participant used the SGD as the dominant method of communication, and another attempted to independently use the SGD for phone conversation.

Assistance required: Most SGD-constructed messages (6 out of 8) were completed by patients without assistance (e.g., device repositioning, cuing) or message validation (e.g., repeating message, asking questions) from communication partners. Patients initiated communication in 63% of observed communication events involving SGDs (5 out of 8) and in 30% of communication events when SGDs were not used (12 out of 40). See Figure 4 for data about observed communication events.

Communication content: The content of all observed communications by postoperative patients was categorized into topical categories that are consistent with the literature on ICU patient communication (Costello, 2000; Fowler, 1997; Happ, Tuite, Dobbin, DiVirgilio-Thomas, & Kitutu, 2004; Robillard, 1994). A total of 55 content codes were applied to the 48 communication events. Figure 5 shows the communication content of all observed communication interactions. The messages during the observed communication events most commonly were about physical care and comfort needs, such as requests for suction or mouth care, summoning help, or complaints of thirst. SGD-constructed messages ranged from simple commands (e.g., "Help!") to typed questions and responses (e.g., "I look better than I feel." "I need to have a pacemaker inserted."). A patient who used the SGD extensively often prefaced his communication with a standard message announcement: "Please wait while I type." In addition to the communication the researchers observed, participants reported that the SGD was used to construct messages about pain and comfort, positioning, temperature, and elimination.

Barriers to Use of Speech-Generating Devices

Poor device position or malfunction: Devices were positioned beyond patient reach (n = 15) or did not function

Table 2. Patient Demographic and Clinical Characteristics

Sample[a]	Age (Years)	Days With Device	APACHE III Score at Enrollment	ECS Score[b]	Device Type	SGD Usage Category[c]	Intermittent Analgesia or Anxiolytic	Postoperative Days Prior to Device
Case								
1[d]	82	15	53	36	MM	2	Yes	1
2	49	8	20	26	MM	1	Yes	1
3	63	3	40	NA	D	3	Yes	1
4	66	7	25	27	MM	1	Yes	1
5	45	10	29	10	D	4	Yes	2
6	49	8	21	6	D	1	Yes	1
7	48	6	5	NA	MM	1	Yes	1
8	50	24	33	19	D	2	Yes	6
9	72	4	28	20	MM	2	No	2
10	47	6	17	15	D	3	Yes	3
$\bar{X}$	57.1	9.10	27.10	19.88	–	2.00	–	1.90
SD	12.8	6.21	13.16	9.73	–	1.05	–	1.60

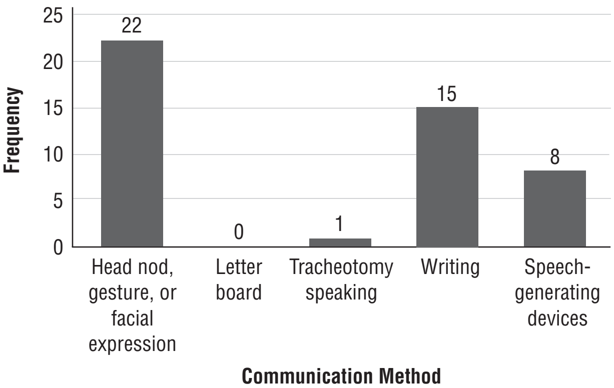
[a] All patients underwent laryngectomy except for cases 7 and 8 who underwent tracheostomy with brachytherapy.

[b] Possible score ranges from 0–40, with 40 denoting the highest difficulty with communication.

[c] Categories were 1 (little or no independent use), 2 (occasional use with cuing), 3 (some consistent independent use), and 4 (assistive communication device as dominant form of communication).

[d] Patient exhibited hearing deficits and used hearing aids.

APACHE III—Acute Physiology and Chronic Health Evaluation III; D—DynaMyte™; ECS—Ease of Communication Scale; MM—MessageMate™; NA—not available; SGD—speech-generating device

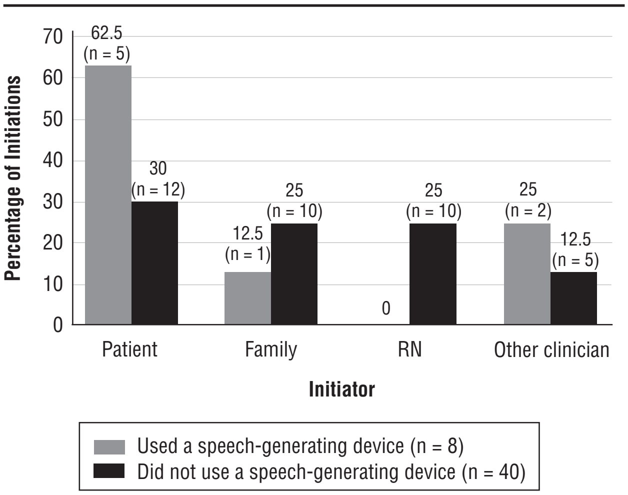


Note. Two methods were unknown.

Figure 3. Primary Communication Methods for Observed Communication Events (n = 48)

properly (n = 9) in 38% of the total observations. After moving the device to perform care, clinicians often failed to replace or reposition the SGD so that the screen was easily accessible to the patient. In fact, the researchers intervened to restore SGD function for several minor technical problems, such as slippage of swivel arm screws, power source disconnection (DynaMyte), lost keyboard template (MessageMate), failed Velcro attachment to the swivel arm (MessageMate), and inadvertent setting changes. Researcher intervention was required to return the electronic device (DynaMyte) to the "on" position for an Orthodox Jewish patient after his Sabbath observance ended.

Staff time constraints and unfamiliarity with speech-generating devices: Most nurses continued to rely on yes or no questions, head nods, and lipreading to communicate with nonspeaking patients. A nurse said, "Usually . . . I try to just ask them [yes or no] questions . . . and then some [patients] eventually start to write." As a result of low staff attendance



Note. Data on initiation of communication were unavailable (missing) in three observations (8%) of patients who did not use a speech-generating device.

Figure 4. Initiation of Observed Communication Events (n = 48)

at the information sessions, several nurses told the researchers that they did not know what the device was or how to use it. A nurse summed up the problems and potential of SGD use in this patient population.

> I don't know if it was explained to us really. . . . So, I think if we were more aware of it and would make an initiative, I think it would be a good thing and I think people would definitely use it more. . . . If we . . . would be more encouraging with the devices, I think they'd actually use them. It seemed like . . . [the SGD] just gets pushed to the side. I think these [devices] are much less overwhelming than trying to write something completely out.

Two young physicians were interviewed after they conducted a cardiology evaluation with a patient who was using the DynaMyte almost exclusively to communicate.

> Interviewer: What was it like using the device to communicate with the patient?
>
> Physician 1: Aggravating!
>
> Interviewer: Why?
>
> Physician 1: We had to wait for him to type everything out when we know what he was going to say.
>
> Physician 2: It would have been easier, faster, if it were a conventional keyboard.
>
> Interviewer: How would you have preferred that he communicate with you?
>
> Physicians 1 and 2: Writing. It's faster.

The patient, who had a different view of this interaction, said "[It was] good for me. [The physicians] kept wanting to guess what I was trying to say before I was done." The patient found this "guessing" to be somewhat frustrating.

Preference for writing: The theme of writing as the preferred method of nonvocal communication was extracted from interviews, observations, and communication method frequency. Similar to the writing preference, the patient who used the device almost exclusively to communicate preferred using the keyboard option to generate novel messages rather than the icon buttons for preprogrammed, standard messages.

Communication Quality

Ease of communication: ECS scores were compared to a nonintervention historic control group of 10 patients from the same unit who had similar ages ($\bar{X}$ = 58.8 ± 11.8 years) and surgical procedures (four laryngectomies, five oral cavity or maxillary surgeries, and one unreported). This convenience sample was obtained prior to the initiation of SGDs on the unit. Postintervention ECS scores ($\bar{X}$ = 19.8 ± 9.7) among the study group were only slightly lower than ECS scores among the nonintervention, historic control group ($\bar{X}$ = 22.5 ± 11.3). Higher scores indicated greater communication difficulty.

Satisfaction: Feedback from patients and families was mixed. Although patients and families expressed enthusiasm for the SGD concept (e.g., "It's a great idea." "Real helpful"), most of the postsurgical patients preferred writing. A woman who was unable to speak during high-dose intermittent brachytherapy wrote, "I am almost too dazed and sore to do much on [the SGD] now." Another patient stated that he liked

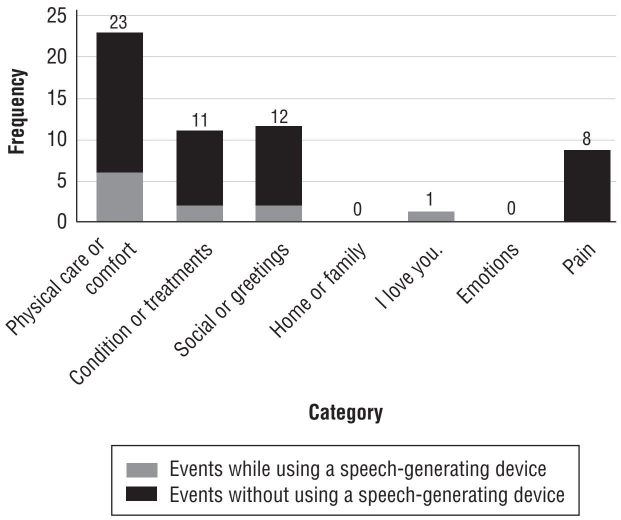


Figure 5. Content Codes (n = 55) for All Communication Events

to write messages in advance of an interaction. He remarked, "To me, this box in front of me is like my granddaughter's toys. I would like something a little more progressive so that I could type out [needs] from my bed." This patient refused the offer of a higher-level device with keyboard capability. Another patient stated that the voice and message selections were impersonal.

The participants suggested the following improvements in the design and application of SGDs: larger screens, more reliable touch sensitivity, easier keyboard access (DynaMyte), more secure mounting attachments, and backlighting (MessageMate). A family member noted that because of space limitations in the room and around the bed, "a small handheld unit would be ideal."

Discussion

Patient Characteristics

Postsurgical patients with head and neck cancer who used SGDs were similar in severity of illness (moderate APACHE III scores) and awareness level (high GCS score) to those in the MICU who used SGDs (Etchels et al., 2003; Happ, Roesch, & Garrett, 2004). In previous research, neuromotor disability and cognitive fluctuation posed the greatest challenges to SGD use in the MICU setting (Happ, Roesch, & Garrett). In contrast, the current study's patients with head and neck cancer had fewer fine and gross motor limitations, wrote legibly, and had writing tools available at the bedside that may at least partially explain their preference for writing.

Speech-Generating Device Usage Patterns and Communication Content

Previous research indicates that the success of an augmentative and assistive communication intervention is dependent on the availability of technology, patient capabilities, device complexity, and partner familiarity and training (Beukelman & Mirenda, 1998; Garrett & Kimelman, 2000; McNaughton & Light, 1989). Recent studies of SGDs used among nonspeaking ICU patients reported that the patients required frequent cuing when communicating with an SGD (Etchels et al., 2003; Happ, Roesch, & Garrett, 2004). This is supported in the current study by a nurse interviewee's opinion that if staff were more encouraging of SGD use, patients may have been more inclined to use the devices. In the current study, 60% of patients with head and neck cancer used SGDs with minimal assistance and instruction despite serious illness, poor positioning, sedating anxiolytic or narcotic analgesia, and no matching of patient abilities to SGD features.

The patients with head and neck cancer in this study typically used more than one technique to construct a message, which is not surprising. Most nonspeaking patients use more than one technique or strategy to communicate during an acute or critical illness (Dowden, Beukelman, & Lossing, 1986; Dowden, Honsinger, et al., 1986; Etchels et al., 2003; Fried-Oken, Howard, & Stewart, 1991). Etchels et al. reported that their ICU patients used multiple methods in addition to the investigational computerized augmentative and assistive communication system to construct messages. In an earlier study by Dowden, Beukelman, et al., writing, mouthing words, and making gestures had the best reported success rates of all types of augmentative and assistive communication methods recommended by speech-language pathologists for ICU patients. Writing and gestures appear to be the most comfortable and natural approaches for nonspeaking postoperative patients and were used alone and in combination with SGDs. Mouthing words was less common among patients in this study because of their extensive and painful oral or facial wounds and edema.

One of the most interesting findings in this study is that patients with head and neck cancer initiated 63% of the communication interactions involving SGDs—twice as many interactions as when SGDs were not involved in the communication. This represents a greater portion of patient-initiated communication with SGDs than in an MICU study where a third of the communication interactions involving SGDs were initiated by patients (Happ, Roesch, & Garrett, 2004). Taken together, these findings differ considerably from previous observational studies of nurse communication with nonspeaking patients in which nurses more often were the initiators and controllers of communication (Ashworth, 1980; Baker & Melby, 1996; Hall, 1996; Leathart, 1994; Salyer & Stuart, 1985) and suggest that the use of SGDs may provide nonspeaking hospitalized patients with more control or equity in communication interactions (Happ, Roesch, & Garrett).

The novel message construction exhibited by patients who used the SGD to consult with physicians or converse on the phone suggests that the devices may facilitate construction and delivery of more complex messages from patients with head and neck cancer to communication partners within and outside the hospital. These high-use patients also demonstrated the importance of considering individual preferences for SGD use.

Unlike previous observations in the MICU population (Happ, Roesch, & Garrett, 2004; Happ, Tuite, et al., 2004), this study recorded a low incidence of communication about home and family or in which love or other emotions were expressed. This may be a function of observational barriers or some self-editing by research participants in this setting. Moreover, the postoperative experience may be perceived as less life threatening and uncertain to patients with head and neck cancer and their families than the MICU experience. However, patients with head and neck cancer did reveal written messages (not observed in real time) to the researchers that involved home and family topics.

Communication Quality

Ease: The ECS scores for patients with head and neck cancer after SGD use did not show notable reductions in comparison with the historic control group. In contrast, previous research with MICU patients showed marked reductions in ECS scores following SGD use (Happ, Roesch, & Garrett, 2004). Patients with head and neck cancer may anticipate or expect a period of voicelessness after surgery and may not have as much perceived difficulty with communication as MICU patients who typically are intubated under emergency circumstances with little preparation. The higher level of motor function and lower incidence of cognitive fluctuation may provide postoperative patients with head and neck cancer with better adaptive and compensatory nonvocal communication skills. Of course, the use of historic group comparison limits the interpretation of this study finding.

Barriers to Speech-Generating Device Use

The observational data clearly show that poor positioning of SGDs, particularly moving devices out of patients' reach, is a primary barrier to use. In fact, positioning failure and device malfunction may have prevented an adequate test of SGD use in this sample. Specific technical and social factors, such as device positioning, device attachment, backlighting, reliable power sources, and staff time and preparation, emerged as potentially important components of successful augmentative and assistive communication interventions in acute and critical care settings (Happ, Roesch, & Garrett, 2004). Staff training and preoperative instruction are likely to improve acceptance and use of electronic SGDs among hospitalized nonspeaking patients with head and neck cancer (Costello, 2000).

Study Limitations

This study used a small, purposefully selected sample of patients. Selection criteria excluded the most seriously ill, agitated, or confused patients with head and neck cancer. Preoperative teaching and SGD planning as described by Costello (2000) would have strengthened this study but was not feasible given the structure of preoperative outpatient visits in this facility and study resource constraints.

The small number of observed patient communication events using the SGDs precluded comparisons among devices. Furthermore, a speech-language pathologist was not involved to match device features to patient abilities (Fox & Rau, 2001). The observational data are limited by the nature of the inpatient unit environment, such as high noise levels, private rooms, and multiple simultaneous interactions. Patient, family, and clinician reports indicated slightly greater use than the researchers were able to observe directly. Therefore, these data present a conservative depiction of patient communication in general and SGD use in particular.

Clinical Implications

This pilot study shows that the use of SGDs is possible with selected patients with head and neck cancer and has the potential to contribute to greater ease of communication in the immediate postoperative period, particularly for complex communications with clinicians and family members. Barriers to SGD use may be addressed by design improvements, staff education, individualized assessment, and combination augmentative and assistive communication strategies. Ideally, speech-language pathologists who are experts in SGD use should perform on-site and individualized staff training for device use. Device formats should be easily recognizable, and instructions should be reviewed frequently with staff and patients. Optimally, patient understanding and ability to use the device should be tested daily and necessary adjustments made to the plan of care. At minimum, patients with head and neck cancer should be instructed preoperatively to develop a lexicon of gestures and advised to bring to the hospital (or be provided with) adequate materials that are appropriate for writing in bed (Costello, 2000).

Conclusions

A more controlled investigation comparing the communication patterns of randomly selected patients with head and neck cancer who receive SGDs to those who do not receive SGDs to communicate is needed. Moreover, SGDs that may be better suited to the needs and abilities of postoperative patients, such as voice-output keyboard systems with message-save and retrieval features, should be tested. Finally, preoperative education, message planning, and selection of augmentative and assistive communication techniques with patients with head and neck cancer should be developed and subjected to clinical investigation. Additional measures of mood, motivation, and resocialization should be considered in future research regarding communication in this population. Exploring the influence of new techniques to improve communication in the immediate postoperative period, including a detailed description of resocialization behaviors and factors that may improve resumption of communicative interactions, also are needed (Dropkin, 2001). These descriptions then would expand opportunities to improve current practice, including the development of empirically based interventions.

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