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Communication vulnerable patients in the pediatric ICU: Enhancing care through augmentative and alternative communication

John M. Costello[a,*], Lance Patak[b] and Jennifer Pritchard[a]
[a]*Department of Otolaryngology and Center for Communication Enhancement, Augmentative Communication Program, Children's Hospital Boston, Boston, MA, USA*
[b]*Department of Anesthesiology, University of Michigan Health Systems, USA*

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Abstract. Children in pediatric intensive care units (PICUs) may experience a broad range of motor, sensory, cognitive, and linguistic difficulties that make it difficult for them to communicate effectively. Being unable to communicate is emotionally frightening for children and can lead to an increase in sentinel events, medical errors and extended lengths of stay. Implementation of augmentative and alternative communication (AAC) tools and strategies can address the communication needs of children in the PICU by enabling them to communicate their wants, needs and feelings to healthcare providers and family members and participate in their own care more productively.
Hospitals around the world are increasingly recognizing and addressing patients' needs for communication access and have begun to implement communication screenings and assessments and interventions at admission and throughout the hospital stay. New standards for all American hospitals, in fact, mandate efforts to improve patient communication. When patient-provider communication improves, treatment success goes up, hospital-caused errors decrease and patient and family satisfaction improve. This article describes three phases of intervention for communication vulnerable children in the PICU and provides examples of treatment approaches that ensure communication access as their medical condition changes.

Keywords: Children, augmentative and alternative communication, AAC, communication, assistive technology, pediatric intensive care unit, pediatric, hospital, communication vulnerable, sentinel events

1. Introduction

The broad criteria upon which critically ill children are admitted to the Pediatric Intensive Care Unit (PICU) suggest that many of these young patients will experience communication difficulties at some point during their stay. According to the American Academy of Pediatrics and the Society of Critical Care Medicine [17], general guidelines of PICU admission include children with: (a) severe or potentially life-threatening pulmonary or airway disease, (b) severe, life threatening or unstable cardiovascular conditions, (c) neurological conditions or disease, seizures, spinal cord compressions, head trauma and progressive neuromuscular dysfunction, (d) hematology/oncology disease and (e) endocrine/metabolic disease. Many of these conditions are associated with 'communication vulnerability' because they involve airway patency and management of blood gases, impaired muscle function, strength and coordination and/or neuro-cognitive/neuro-linguistic impairment [7,34].

We define communication vulnerability as the diminished capacity in a patient's expressive and/or receptive

*Corresponding author: John M. Costello, M.A., CCC-SLP, Department of Otolaryngology and Center for Communication Enhancement, Augmentative Communication Program, Children's Hospital Boston, 300 Longwood Avenue, Boston, MA 02115, USA. Tel.: +1 781 216 2220; Fax: +1 781 216 2252; E-mail: John.costello@childrens.harvard.edu.

communication abilities. In the PICU such vulnerabilities can relate to the reason for admission (e.g., craniofacial surgery, pulmonary disease, Meningococcemia, etc.) or be secondary to medical interventions, such as intubation, sedation, compounded medications, physical restraints, isolation or a tracheotomy, In addition, some children admitted to the PICU have pre-existing congenital disabilities, such as visual, hearing, motor, speech and/or cognitive impairments, that result in a limited understanding of spoken language and/or difficulty producing intelligible speech. Children with degenerative diseases, such as muscular dystrophy, juvenile Huntington's disease or panthanokenate neurodegenerative disease, may also have difficulty with communication. Additionally, some children and/or their families may not understand or speak the language of the ICU environment, thus compounding the communication issues [7,34].

In 1998, Dr. David Ebert developed simple criteria to identify serious communication impairments in hospitalized patients, suggesting causes that include: (a) inability to produce speech understandable to the medical team, (b) altered mental status, (c) vision so poor that patients are unable to read, even with corrective lenses, and/or (d) inability to understand loud speech even with hearing aids [10]. Children in the PICU with one or more of these impairments may be unable to communicate with family and care providers and thus be more likely to experience a wide variety of adverse outcomes. There is mounting evidence that communication vulnerability places patients at higher risk for medical recovery and psychological wellness [2,11, 33].

This article discusses the critical need for children in Pediatric ICUs to communicate effectively with medical staff and family members and illustrates how augmentative and alternative communication (AAC) tools and strategies (communication boards and books, switches, adapted call buttons, eye gaze, typing, white boards, etc.) can help these children overcome communication vulnerabilities at various stages of their recovery.

2. The ICU experience through the eyes of a child

When making decisions about ways to support communication and the kinds of tools and strategies to recommend, hospital staff need to consider "how" and "what" a child understands. Developmentally young children often experience illness and pain through 'magical thinking' – a belief that their illness happens because it was wished upon them or is punishment for bad behavior [11,12,25]. Dr. Benjamin Spock provides an example of the magical thinking in a child who believed 'my brother was sick and went to the hospital because I was mad at him' [27]. It is crucial that young children have a way to communicate their fears and anxieties and to solicit comfort from parents and loved ones.

Somewhat older children may have learned that illnesses are caused by germs and that staff will respond based upon how well they express their pain [3]. This makes it vital for these children to be able to communicate their needs and feelings about comfort and pain. Preteens and adolescents typically realize that hospital staff are trying to help them, even when the procedures they administer cause discomfort or are painful [23]. These children need to be able to ask questions and interact with staff in ways that facilitate an understanding of their medical interventions, so that they can participate actively in their own care.

The PICU is a unique, unfamiliar and frightening environment, and children often have limited information and a high degree of uncertainty about what they are experiencing (15). In addition, they may have difficulty processing information because of their condition, medical interventions and/or medications. Children who are communication vulnerable are at high risk for misunderstanding or misinterpreting their conditions. Also, if they are unable to speak, their attempts to communicate may be misinterpreted as inappropriate behavior, such as when a child who is intubated tries to communicate thirst by pointing to her mouth, but the nurse interprets this as an attempt at self-extubation and restrains the child's hand. Rather than manage these behaviors medically (e.g., by increasing sedation and/or adding restraints), medical staff today can introduce communication tools, strategies and technologies that enable communication vulnerable children to ask questions, connect with familiar and trusted adults, and express their distress in ways that establish a greater sense of control.

In 1990, the Association for the Care of Children's Health (ACCH) published a clinical practice manual, *Psychosocial Care of Children in Hospitals*, which details what hospital staff can do to reduce stress during hospital admissions [15]. The manual suggests ways to provide hospitalized children with information that supports their sense of control and enables them to participate actively in their care in developmentally appropriate ways. This may include providing tools that

enable them to call for attention, communicate medical and physical needs more explicitly, solicit comfort, convey emotional states, ask questions, and express psychosocial needs, as well as accept or reject procedures.

3. Sentinel events as a result of poor communication in the Pediatric ICU

A sentinel event is an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof. A nine-year (1995–2004) study of sentinel events by the Joint Commission (TJC) named communication breakdowns as the most frequent cause of sentinel events [28,29]. Diminished communication abilities on the part of patients can therefore lead to an increase in sentinel events [1,2,20,29]. Thus effective communication must be considered a key cornerstone of patient safety. Ensuring that all patients have access to effective communication in the hospital is part of a growing effort in many countries to improve the quality and safety of healthcare [14,18,22,24]. In the United States, the Joint Commission, which accredits healthcare organizations and programs [30], has developed standards of care that require hospitals to identify and meet the communication needs of patients who are communication vulnerable. An implementation guide, *Advancing Effective Communication, Cultural Competence, and Patient- and Family-Centered Care: A Roadmap for Hospitals*, is now available to assist hospital administrators and staff to recognize and address breakdowns in patient-provider communication. The new standards, which will begin being implemented in January, 2011 [31], require that hospitals conduct an assessment of patient communication needs at admission and throughout the hospital stay.

Many hospital staff will need to be engaged in this process. Admission personnel can flag patients with pre-existing communication difficulties and identify children and families where language and cultural issues require consideration. Physicians and nurses often can identify unmet communication needs as they assess the alertness and orientation of their patients. Hospital staff can refer to communication specialists (e.g., speech-language pathologists, audiologists, interpreters, translators) for a more thorough assessment and, if necessary, treatment. For example, according to their Scope of Practice, speech-language pathologists can offer AAC supports to children with temporary and/or persistent communication difficulties across the continuum of healthcare. [Appendix A details components of a comprehensive communication assessment aimed at supporting children who are unable to speak in the PICU.]

Communication assessment in the PICU is an ongoing, dynamic and collaborative process. Decisions are often made (and remade) secondary to changes in a child's medical status, medications and fatigue, as well as to motoric, cognitive, behavioral, emotional and sensory factors [6]. Both medical staff and family members play an active role in the assessment process and help carry out treatment protocols. Speech-language pathologists often collaborate with hospital staff and the family at the bedside, recommending, implementing and adapting strategies based on input from the team.

4. AAC supports for pediatric patients in the ICU

As noted, the communication needs of children often change rapidly in the PICU, and different approaches are effective during different phases of the process. As early as 1980, Franklin Silverman discussed the use of augmentative communication (AAC) in medical settings, describing the role of nurses in helping patients communicate and identifying vocabulary that patients may need during nurse-patient interactions [26]. Other practitioners and researchers have continued to explore the role of AAC tools and strategies in the ICU, developing a range of solutions and AAC-related technologies to help communication vulnerable patients [4,6, 8–10,13,14,18,19,21].

Skilled communication partners are an essential component of successful treatment in the PICU. Staff and family members must be cautious and analytical when asking questions and presenting information, as well as when interpreting communication initiations and responses of the young patient. For example, 'how' a communication partner presents information will depend upon the child's developmental stage, wakefulness, and the child's ability to process information and to respond.

Being a good partner also means being a good observer. This means not over-interpreting non-purposeful movements, while, at the same time, not disregarding the possibility that a movement is purposeful and an effort to communicate. In addition, communication partners need to wait patiently, as it often takes children in the PICU more time to respond.

Fig. 1. Microlite switch with toe.

Fig. 2. Jelly bean switch with wrist/hand.

At the Children's Hospital Boston, several departments work collaboratively to support communication vulnerable patients throughout their hospitalization. After years of experience, the staff has identified three phases for providing communication access in the PICU. Each phase reflects the medical status and ability of a child to interact in meaningful ways with medical staff and family members. The framework also delineates different types of communication supports, strategies and technologies that are useful at each phase.

Phase I describes children who are just becoming aware of their environment, while Phases II and III offer guidelines for children who are more able and interested in communicating and participating in their care, as described below. During all phases, communication partners play a key role by supporting a child's communication efforts and helping to identify strategies and tools that support the child's ability to communicate effectively and efficiently.

Phase 1: Emerging from sedation: Getting attention and responding to yes/no questions

When a child first awakens in the PICU, bedside providers need most immediately to determine whether the child is oriented and alert, can use the nurse-call button and has a way to communicate 'yes' and 'no'.

Getting attention

All patients need a way to call the nurse to solicit assistance for medical and physical comfort needs. While each PICU bed space has a nurse-call button and nurses are typically close by, children who cannot physically access a standard nurse call will require a *modified nurse call system*. Staff need to (1) identify the most consistent and reliable physical movement the child can make, (2) place specialized switches that are easy to use nearby so that the child can activate the call system and (3) teach the child to use the switch to call a nurse. For children with complex physical needs, an occupational therapist or physical therapist will often conduct a physical movement and/or physical access assessment. Figures 1, 2 and 3 show examples of switches positioned so they can easily be activated. Figure 1 depicts a child activating a Micro Light switch (Ablenet, Inc.) with a toe; Fig. 2 illustrates a child activating a Jelly Bean switch (Ablenet, Inc.) with the rotation of her wrist/hand; and Fig. 3 shows an ultimate switch (Enabling Devices, Inc.) that a child can activate with a slight turn of the head.

Children who are unable to speak in the ICU also need ways to get their parents' attention. Staff may introduce a single message speech generating device (SGD), as described in the following scenario.

> *At the age of 7 years 5 months, Melinda was admitted to the PICU secondary to a high fever, sepsis and possible seizure activity related to an untreated urinary tract infection. M. has CHARGE syndrome with a moderate to severe cognitive disability. The family reported that she uses symbol-based communication boards at home and in school with vocabulary that is highly motivating, familiar and contextually salient. In the PICU, M. was visibly comforted when her mother was near, and she would vocalize to gain her attention. However, due to poor oxygen saturation levels, M. needed to be intubated and was then unable to vocalize. Whenever*

Fig. 3. Ultimate switch with head.

her mother stepped away from the bedside, M. began to exhibit significant discomfort, agitation and overall anxiety, and her oxygen saturation would drop. Staff provided her with a LITTLEmack™ *speech generating device* (Ablenet, Inc.) *with the recording, "Mom, I need you". M. activated the device with her left hand. When her mother appeared, she would stop thrashing about and her oxygen saturation level would return to baseline.*

Having a reliable yes/no response

Medical care providers need children to answer simple "yes" or "no" questions so they can assess their alertness, basic needs and cognitive, physical and emotional status. A yes/no response, while important, is not a sufficient communication system for any child, because it requires either complete agreement or disagreement and limits communication topics to those introduced by caregivers. At the very least, staff should offer a third message, 'I don't know' or 'I am not sure'. This affords the child an opportunity to ask for clarification and may encourage partners to ask additional questions.

For children who can't easily indicate "yes/no/not sure", staff can provide other options. These may include (1) pointing with a finger/hand to text or graphics depicting "yes/no/not sure" on a communication board, (2) looking at words or graphics on a board, (3) using a gesture (thumbs up/eyes up) and/or (4) using partner assisted scanning, (i.e., selecting "yes/no/not sure" when a communication partner provides options from which the child selects).

Phase 2: Increased wakefulness: Communicating basic information with staff and family

As children in the PICU become more aware of their surroundings, they need ways to solicit attention, respond, ask questions, express concerns and emotions, make comments, and solicit support, reassurance and encouragement. This requires access to a broader range of appropriate vocabulary. These children may have limited physical access to supportive technologies due to physical disabilities or movement restrictions caused by traction, surgical incision sites, central line placement, or protection of intravenous (IV), arterial or CVP lines. AAC options offer a broad range of tools and access strategies to support communication while accommodating for reduced motor skills.

Picture communication boards

Figure 4 shows two Picture Boards with vocabulary appropriate for use in the PICU. Staff at Children's Hospital Boston developed these generic displays for use while custom communication boards are being developed. Figure 5 shows another board that is now available commercially [http://www.vidatak.com/]. Once staff and family members select and learn how to use the board, they can teach the child to communicate with it. Symbols always need to be taught to a child. Also, because some medications used for pain management cause short-term memory difficulties, children often need to be regularly re-oriented to their communication boards.

Alphabet boards

For children with literacy skills, access to the alphabet can enable them to say anything they want. One study of literate adults in ICUs who had experienced temporary non-speaking conditions, for example, revealed they preferred alphabet boards to boards with pre-stored words and phrases [13].

Before organizing an alphabet board, an assessment will determine if the letters should be arranged in a QWERTY or ABC configuration. For children who are unable to point to letters, staff will arrange the alphabet for partner-assisted scanning. Fig. 6 is an example of a board 'chunked' by vowel group to facilitate efficient partner-assisted scanning.

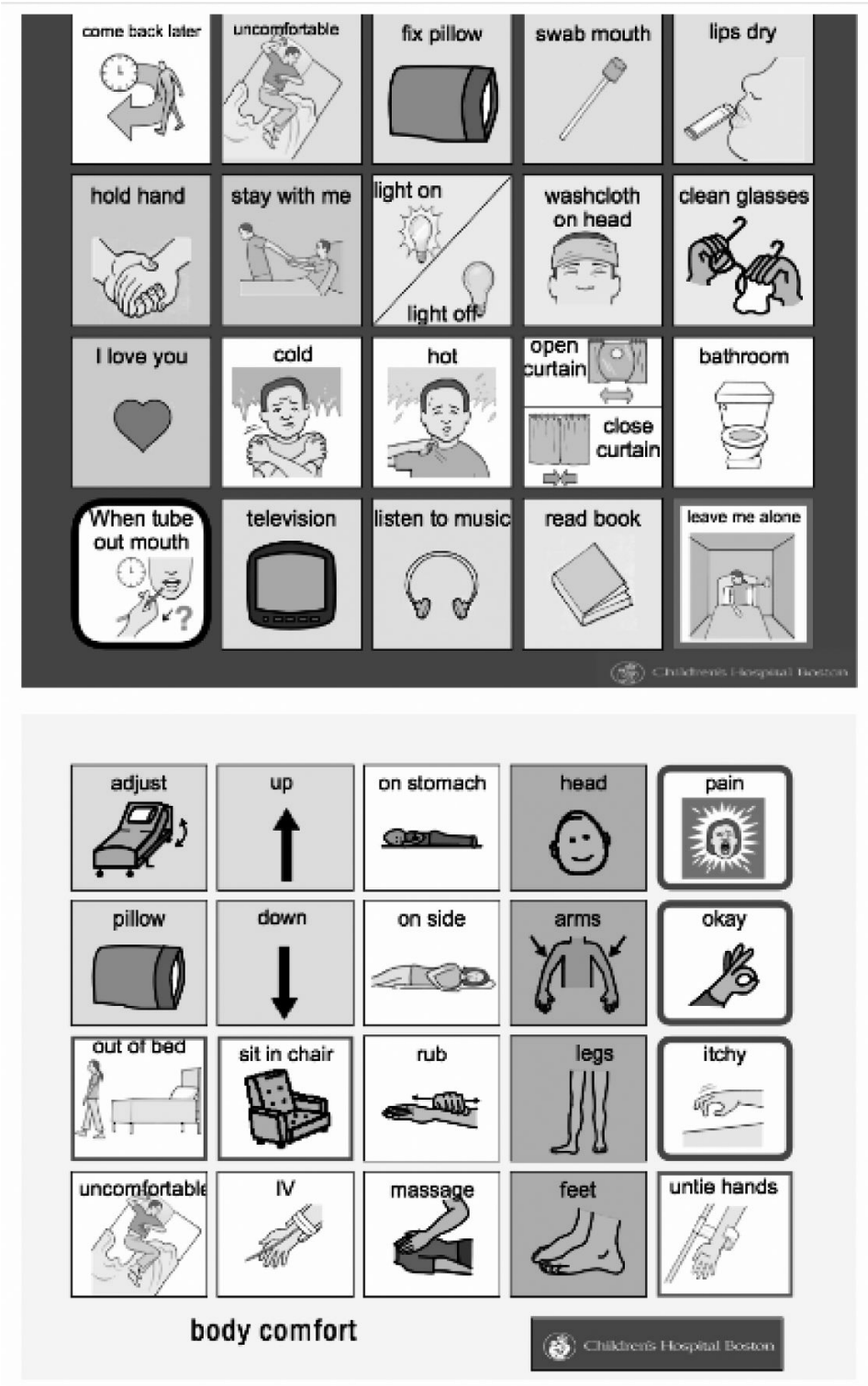

Fig. 4. Hospital boards.

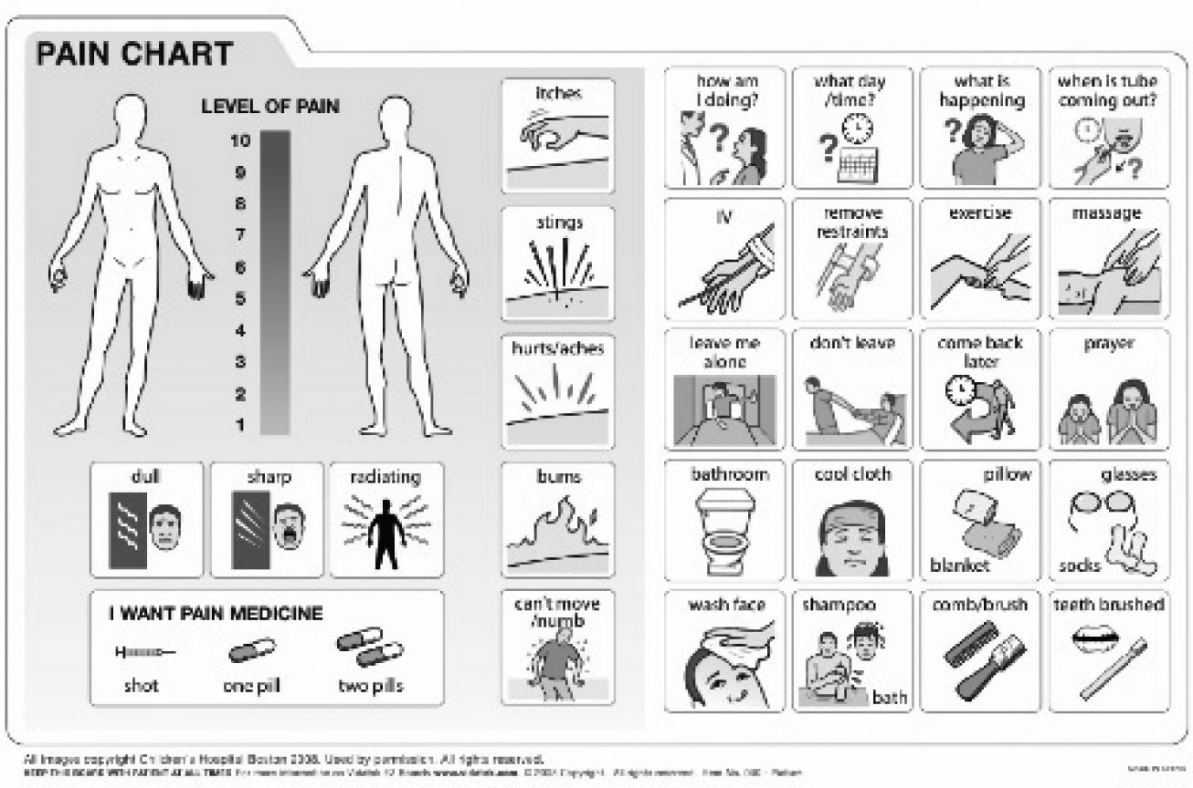

Fig. 5. Vidatak board.

Alternative methods of access

For children who cannot point directly to a display, staff will consider alternative access strategies, both non-electronic and electronic. A scanning approach is discussed below.

> *Twelve-year-old Gracie has a diagnosis of spinal muscular atrophy type II and severe kyphotic spinal deformity. She was admitted for spinal fusion surgery. Postoperatively, she was intubated and receiving pain medication. Her pre-existing physical disability prevented her from touching buttons on a speech generating device or pictures on a communication board. Although she tried to mouth words around the endotracheal tube, she had minimal success. Her medical team asked for speech-language pathology (SLP) consultation. The SLP discovered that G was able to slightly shake her head yes/no and could use a two-sided picture communication board as shown in Fig. 5. The board featured vocabulary related to her body (pain/comfort), emotions, positioning, personal needs and environmental concerns. Initially, the SLP oriented her to the board, while nursing staff observed. When G indicated she wanted to communicate, the SLP pointed to each section on the board, labeling it (e.g., Is it in the emotions section? the personal needs section? the body section?). G nodded 'yes' to body section. The SLP then went through each part of the body on the 'body' template until G nodded 'yes' to 'legs'. The SLP then asked Itchy? Stings? Hurts? Numb? Burns? and G nodded 'yes' for 'hurts'. When the nurse then asked her, "Do you want me to put another pillow under your legs?", G opened her eyes widely, smiled and nodded 'yes'. The nurse put a pillow under her legs and gently massaged them. G closed her eyes and staff noted that her heart rate lowered to an acceptable range.*

Speech Generating Devices (SGDs)

During phase II, children often begin to use SGDs to communicate a broader range of messages. Some devices offer digital recordings of pre-stored messages in the child's own voice. Others allow children to generate novel messages using synthesized speech. Pre-stored message in these devices may include medical issues (e.g., *I am in pain, My throat hurts, I feel dizzy*), psychosocial needs (e.g., *Please stay with me, Mommy*

read me a story, Turn on the TV, Hold my hand) and personal comfort (e.g., *I need a pillow, I have to go to the bathroom, turn off the lights*). Children who can spell often prefer keyboard-based systems. For children who are pre-literate, staff can use graphic symbols or pictures to represent their messages.

Voice and message banking [6] can offer some patients and families the option to record messages in advance of a hospital admission (e.g., before surgery). The child and family work collaboratively with an SLP to set up and record messages digitally into a SGD for use postoperatively. For example, at Children's Hospital Boston, staff use the Message Mate (Words + Inc.) and GoTalk (Attainment Company) because these devices store up to 40 digitally recorded messages. Another option currently under evaluation at Children's Hospital Boston is the iTouch or iPad with an attached speaker and the iTunes storage library. Increasingly, mainstream technologies are able to support children with good motor and sensory skills.

When children are in the PICU, it is important to minimize new learning and take into account their changing communication needs and abilities as illustrated below.

> *Abby, age 6 year 8 months, was admitted to the ICU following the removal of her mandible due to an invasive Ewing Sarcoma. At a preoperative appointment with her SLP, she selected an SGD (Message Mate 40) and digitally banked her own messages. Staff anticipated she would have facial swelling for at least 24 hours postoperatively that could affect her vision so she was taught to use single switch auditory scanning to access her messages after surgery. Even when the swelling subsided and she could see, she continued to use single switch scanning because her arms were weak and restraints were in place to prohibit her from pulling at her ventilator tube. Within 48 hours, however, she began pointing to messages to "talk".*

Staff can also use digitally recorded messages to support non-English speakers in the PICU. Messages can be recorded in English and in the child's native tongue using a certified hospital interpreter, thus providing family members and hospital staff with messages both can understand.

Amplification

Children with pulmonary insufficiency, airway disease and/or progressive neurological function may demonstrate minimal strength or respiratory support for speech volume, making it difficult for others to hear them. A variety of voice amplifiers are available commercially for patients whose voice cannot be easily heard.

Amplification can also be used when a patient has difficulty hearing. Patients who wear hearing aids may not be able to wear them when in bed. An audiology consult can help patients obtain specific technologies, such as an F.M. amplification system, making it easier for them to hear.

Phase 3: Need for broad and diverse communication access: Communicating about and beyond the hospital environment

Sometimes the complexity of a child's medical needs requires a PICU level of care even after the child is awake and alert for extended periods of time. These children may wish to re-engage with their friends and renew their interests outside the ICU or hospital setting, as well as communicate with providers and family members regarding their medical, personal care and social needs. Some may even attempt to "catch up" on academic assignments, play games, participate in on-line shopping, explore summer camp options, and so on.

Computers and Speech Generating Devices (SGDs)

Computers and some SGDs offer integrated platforms with sophisticated, memory-based language strategies, access to large vocabularies, generative spelling, word and grammar prediction, music and video files, email, Internet access, environmental control and even telephone access For many children, an overall sense of well being is enhanced by 're-engaging' with the world so it becomes important to offer these children these kinds of multiple options.

> *Peter, a 16 year old boy who sustained a C4/C5 fracture while playing high school football, was admitted to the PICU with paralysis of all four extremities. He had a tracheotomy and was ventilator dependent. After a complicated medical course, P's condition stabilized and he began participating in a regimen to wean him from the ventilator, which required continuous monitoring of vital signs. As P. was awake for longer periods, he became interested in understanding his own care, socializing with visitors, planning for rehabilitation upon discharge from the PICU and connecting with his friends and teammates through the Internet.*
>
> *P. had expressed a desire to access multimedia technologies for personal entertainment. Because his voluntary movements were restricted to mini-*

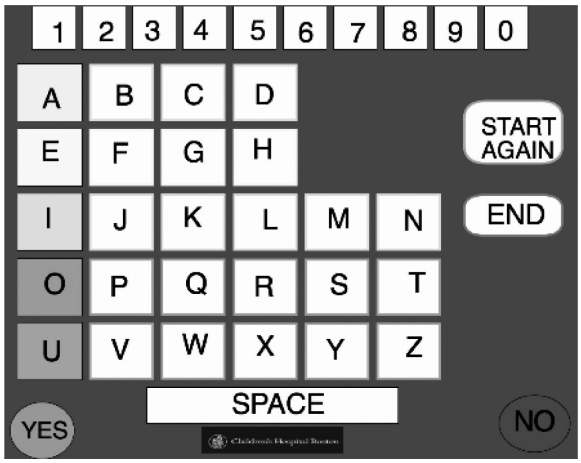

Fig. 6. Alphabet board chunked by vowel group for partner assisted scanning.

mal mouth and head movements, staff introduced him to the Dynavox Eyemax^{TM} SGD, a computer-based communication system with Internet access and email. Figure 7 shows P. calibrating the device for eye pointing and using the on-screen keyboard with word prediction.

Assistive and mainstream technologies

Assistive and mainstream technologies offer a multitude of options for young people who experience communication difficulties in the PICU. For example, patients who are deaf can access the Internet using Internet video relay services or by using two-way typing to communicate face-to-face with a hearing care provider on a dual platform system, as shown in Fig. 8. Newly released mainstream technologies (such as the iPad) offer sleek, mainstream platforms with multimedia access and applications for communication that allow a user to type or select symbols [16]. Also, environmental control options for television, fans or lights are now being used in some PICUs [19].

As technology options become more sophisticated and integrate more features on a single platform, PICU staff must exercise caution to insure that communication technologies are compatible with the ICU environment. In addition to mounting considerations, staff must ensure that AAC and other technologies do not interfere with rapid or emergency bedside patient access. They also need to consider how these devices interface with medical technologies. For example, critical care equipment is vulnerable to EMI (electromagnetic interference) which has been shown to change the rate of pumps, ventilators, dialysis machines, defibrillators and continuous renal replacement therapy machines. Thus there needs to be a hospital policy, e.g., to keep wireless devices one meter from the intensive care unit bedside [15,28] that establishes guidelines for the PICU.

Eye tracking: calibration and use in the PICU

Patient able to use keyboard, stored medical phrases and word prediction menu

Lateral view to observe distance of system from patient's eyes (approximately 20 inches) with under bed mounting system

Fig. 7. Eye tracking: calibration and use in the PICU.

5. Palliative care

AAC strategies, technologies and supports not only can play a critical role in supporting a patient through the recovery process, they may also offer powerful supports to children at the end of life. Simple low and no-tech solutions can help a child gain attention, as well

Fig. 8. Ubi Duo.

as solicit comfort or communicate messages of comfort and hope to loved ones. Indeed, having reliable communication access during a life threatening illness may even prove an important part of providing a 'good death' [5,24].

6. Conclusion

This article discusses the paramount importance of well-informed communication interventions to support children's needs and to promote significantly better patient outcomes in the PICU. Thoughtful collaboration among healthcare workers, speech-language pathologists, audiologists, interpreters and family members in both anticipating children's communication support needs and then responding to additional needs as they arise during a hospital stay can make an important difference in the experience of young patients and can often lead to better outcomes. The authors suggest three phases of communication interventions, with concrete and practical examples of the kinds of AAC tools, strategies and approaches that can provide helpful communication support during each phase.

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Conflict of interest

The authors report no conflicts of interest

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Appendix A.

Assessment domain	Assessment considerations	System selection/Feature matching considerations
Cognition *Alertness/awareness *Orientation *Premorbid status	– Nursing staff report – Ability to remain awake – Ability to follow commands	– Consider frequency, timing, complexity of assessment, instruction and strategies introduced – Consider providing a memory book and orientation strategies.
Sensory	– Pre-morbid vision status – Current vision status – Availability of visual aids – Pre-morbid hearing status – Current hearing status – Ability to use hearing aids if needed	– Consider how to represent language (pictures, symbols, text) – Consider ability to use an SGD – Consider FM system – Consider using partner assisted auditory scanning – Determine availability of hearing aids – Use of patient to partner typing system
Language comprehension and literacy screening	– Comprehension	– Determine approximate level of comprehension, vocabulary needs and how to represent vocabulary – Consider use of single message system for attention/assistance
	– Ability to answer yes/no questions	– Yes/no/maybe system or strategy
	– Non-English speaking:	– Native language based communication board (bilingual format) – Picture board – Digital voice recording for language translation of basic messages
	– Literacy screening	– Written words – Alphabet for novel messages – Picture based system – Sophisticated speech generating device that supports spelling
Motor access assessment in different positions	– Gestures/pantomime	– Natural gestures – Gestural codes – Yes/no signals
	– Control/access – Direct selection including hand/eyes/other	– Signal of yes/no – Standard or adapted nurse call system – Size and layout of word/picture board – Keyboard – Dynamic display – Keyguard – Non-electronic eye gaze strategy – Electronic eye tracking technology
	– Indirect selection	– Technology based scanning – Partner assisted scanning
	– Ability to write/draw	– Alphabet/word communication board – Pen/paper – White board and marker
Speech production	– Reduced volume	– Electrolarynx – Amplification
	– Moderately compromised intelligibility	– Letter cueing/topic cueing – Writing/typing – Word or symbol based communication board – Speech generating device – Voice and message banking
	– Severely compromised speech production	– Alphabet board – Word/symbol communication board – Speech generating device

Appendix A, continued

Assessment domain	Assessment considerations	System selection/Feature matching considerations
Vocabulary selection	– Patient needs – Patient personality – Patient interests – Address medical, personal and psychosocial needs	– Pre-made commercial boards – Custom boards – Spelling with alphabet board – Speech generating device (simple to complex)
Environmental assessment	– Lighting – Noise – Mounting	– Impacts features of system(s) – Impacts availability of system(s)
Communication partners	– Native language – Hearing status – Literacy level – Skill with using augmentative strategies to support communication	– May need to consider system to support communication success with non-literate, deaf or hard of hearing or non-English speaking family members. – May need to provide ongoing support and modeling for partners who are inexperienced with using augmentative communication tools and strategies.
Documentation/Staff training	– Team member responsibilities and availability – Environment	– Diversity of team and limited available time. Require easy-to-learn, maintain equipment.