

PRINCIPLES OF AUGMENTATIVE AND ALTERNATIVE COMMUNICATION SYSTEM DESIGN IN THE ICU SETTING

Miriam A. Goldberg¹, Leigh R. Hochberg², Dawn Carpenter³, Johnny Isenberger³, Stephen O. Heard⁴, J. Matthias Walz⁴

¹Graduate School of Biomedical Sciences, University of Massachusetts Medical School; ²Department of Neurology, Massachusetts General Hospital, Boston, MA and Department of Engineering, Brown University; ³UMass Graduate School of Nursing; ⁴Department of Anesthesiology & Perioperative Medicine, University of Massachusetts Medical School

Introduction: The ICU as a technology design setting requires specific and thoughtful awareness of patient-, caregiver-, and environment-related constraints. Designing an ICU-specific communication system involves an even deeper understanding of patient needs and desires, building on existing work exploring available technologies for use in this setting^{1,2}. We report our initial experience from a pilot study with a novel communication device engineered specifically to allow mechanically ventilated ICU patients to communicate with caregivers³.

Methods: We used a validated survey for nurses about communication purposes to explore relevant beliefs, attitudes, and desires of nurses⁴. Existing technologies available for communication assistance in the ICU – e.g., letter boards, writing on paper, and mouthing words – were analyzed. Suggestions about the content for an eventual communication system were collected. ICU-specific design requirements were noted, including adherence to infection control standards, accessibility to restrained patients, and availability to patients with motor weakness, contractures, edema, tremor, and/or neuropathy. In addition, the system must include a minimal learning curve,

Results: Initial testing in the ICU has revealed additional considerations for technology design. For instance, many patients have visual impairments, so displays should be large and high-contrast. Furthermore, patients benefit from a very short teaching/demo process due to their short attention span. Additionally, leveraging interfaces with significant similarities to everyday systems appears to reduce confusion. Nurses also mentioned that the system should be accessible to at least some non-English-speaking patients. Finally, physical deficits that ICU patients experience require that manually operated devices be as flexible as possible in terms of type of manipulation required.

Conclusions: ICU patients are in significant need of communication systems that meet their unique needs. Building such a system requires awareness of many different constraints, including both general heterogeneity of patient needs and capabilities and the constraints of the ICU setting itself.

References:

1. Costello JM, Patak L, Pritchard J. Communication vulnerable patients in the pediatric ICU: Enhancing care through augmentative and alternative communication. *J Pediatr Rehabil Med*. 2010;3(4):289-301. PMID: 21791863.
2. Broyles LM, Tate JA, Happ MB. Use of augmentative and alternative communication strategies by family members in the intensive care unit. *Am J Crit Care*. 2012 Mar;21(2):e21-32. PMID: PMC3607206.
3. Poster presented at the 2016 Annual Meeting of the International Anesthesia Research Society, San Francisco, CA, May 21-24, 2016. *Anesth Analg*, May 2016, Vol 122(5S_Suppl): S-470.
4. Poster presented at the 2016 Annual Meeting of the International Anesthesia Research Society, San Francisco, CA, May 21-24, 2016. *Anesth Analg*, May 2016, Vol 122(5S_Suppl): S-424.

Contact:

Miriam Madsen
University of Massachusetts Medical School
miriam.madsen@umassmed.edu