

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

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**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<sup>1,2</sup>. 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 caregivers<sup>3</sup>.

**Methods:** We used a validated survey for nurses about communication purposes to explore relevant beliefs, attitudes, and desires of nurses<sup>4</sup>. 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:

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