INTERACTIVE COGNITIVE AIDS FOR CRITICAL EVENTS IN ANESTHESIA

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Introduction: Paper cognitive aids (such as checklists) improve outcomes in both emergency and routine patient care. During a medical crisis, multi-tasking and the challenges of team coordination make it more difficult to successfully incorporate cognitive aids into practice. We present an interactive cognitive aid that supports aid visibility and teamwork, implemented using large-screen and tablet displays.

Method: The interactive cognitive aids were developed by a team of human-computer interaction experts collaborating with anesthesiologists in the School of Medicine. This involved an iterative design process, involving many cycles of collaborative design and critiques from practitioners. Over the course of 18 months more than 50 prototypes and variations were generated and critiqued. Following this design, functional interactive aids were built using a WebSockets-based server-architecture that enables aids to be shown and used simultaneously across tablets and large screens. We piloted this system with anesthesiologist residents (n=4) in simulated crisis resource management training scenarios.

Results: During our iterative design process and pilot we learned three things. First, anesthesiologist residents were able to successfully use interactive cognitive aids during simulated crisis. They were particularly excited about timers to automatically keep track of drug dosages, and information about the patient and the people in the room. Second, using WebSockets to synchronize a tablet and large screen allowed a nurse/trained technician to operate display remotely so that the team leader could keep their hands free for other tasks. Verbal communication with the technician was an effective method of interaction with the system. Third, visual design made a major impact on how easy it was to get information from the aids. Designs with minimal color, large fonts, and clear visual structure were received well. Early designs that tried to exactly replicate the visual designs used successfully in the paper aids resulted in poorly received designs because the screen must be read from much further away than the original paper. Later designs took advantage of the dynamics of the digital presentation method by presenting less information at a time in a much larger format then updating that information as the situation evolved.

Conclusion: Interactive cognitive aids using large screens and tablets have been shown to be feasible in simulated crisis environments by anesthesiologists. Visual and interaction design of the cognitive aids proved key to their success. In the future, computer based aids would additionally allow tools that would support rapid and high-quality aid creation and distribution.

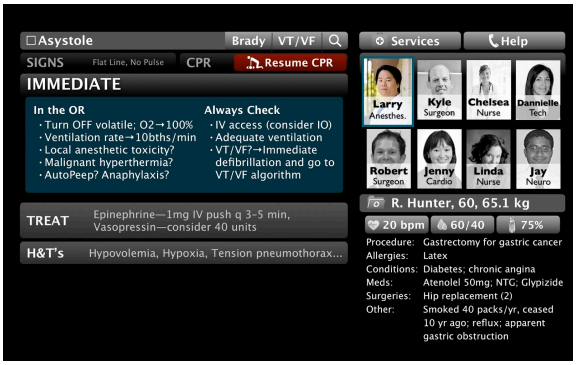

Figure 1 - Interactive Aid for Asystole

Figure 2 - Large-screen display mounted on wall