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Emergency department patient-tracking system evaluation

Priyadarshini R. Pennathur [a,*], Dapeng Cao [a], Ann M. Bisantz [a], Li Lin [a], Rollin J. Fairbanks [a,b], Robert L. Wears [c], Shawna J. Perry [d], Theresa K. Guarrera [a], Jennifer L. Brown [e], Zheng Sui [f]

[a] Industrial and Systems Engineering, 438 Bell Hall, University at Buffalo, Buffalo, NY 14260, USA
[b] National Center for Human Factors Engineering in Healthcare, MedStar Institute for Innovation, USA
[c] Department of Emergency Medicine, University of Florida-Jacksonville, USA
[d] Department of Emergency Medicine, Virginia Commonwealth University, USA
[e] St Joseph Hospital, Buffalo, USA
[f] Terra Technology, USA

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ABSTRACT

Information technology is rapidly being developed and implemented for health care environments, often as a replacement for paper based or other manual tools. One example of this transition is the replacement of large dry-erase boards, used in emergency departments (ED) for tracking patient locations and clinical care, with computerized patient-tracking systems. The design of such systems has important implications for aspects of ED work, including changes to workload and situation awareness of ED staff. In this study, we used a newly developed electronic patient-tracking system simulator which combined a realistic model of ED and patient events with a configurable patient-tracking system display. Situation awareness regarding patient data, workload, responses to system failures, and performance on secondary tasks was measured for two groups of experienced ED staff (nurses, and clerks) across two display conditions and two patient volume conditions. We found that nurses had higher situation awareness than clerks, and that increased patient volume increased some aspects of workload. Additionally there were some indications that color coding information made it easier for participants to remember information in the event of system failures and that the choice of display size may depend on users' primary tasks. As demonstrated by these important findings, the simulator was considered to be viable in adequately representing emergency department processes in a controlled lab setting for helping assess situation awareness and workload.

Relevance to industry: Healthcare technology design industry and healthcare systems planning to implement new information technologies would significantly benefit from the methodology and findings.

1. Introduction

Information technology is rapidly being implemented in health care environments because of perceived benefits in efficiency, safety, and quality (Aspden et al., 2004; Committee on Quality of Health Care in America, 2001; Kohn et al., 1999). For instance, electronic health records and other types of health information systems can provide distributed access to data; reduce the need for duplicate information entry, and provide caregivers with a more complete assessment of patients' medical history (France et al., 2005; Jensen, 2004; Kohli et al., 2004; Laxmisan et al., 2007; Poon et al., 2006; Vest et al., 2006).

The transition from manual to electronic patient-tracking systems in hospital emergency departments is one example of the changes to health information systems. Status boards contain both demographic information such as name, age and gender; and clinical information about the patient (symptoms/diagnosis, plans for care, test results). Manual status boards, typically large dry-erase boards, have evolved at individual hospitals from a simple listing of patients and room numbers to a complex display that supports situation awareness about individual patients and the overall status of the ED, communication across staff and time; and coordination of tasks (Nemeth et al., 2004a; Wears and Perry, 2007; Xiao et al., 2007; Wears et al., 2007). Caregivers use status boards to track their workflow status for each patient and coordinate with other ED staff.

The electronic tracking systems being implemented are typically linked to other hospital information systems and have the ability to log information inputs. Procurement is often led by organizational IT staff rather than clinicians, and is driven by overall

* Corresponding author. Currently at Quality and Safety Research Group, Johns Hopkins University School of Medicine, Anesthesiology and Critical Care Medicine, USA. Tel.: +1 (716) 645 2357; fax: +1 (716) 645 3302.
E-mail addresses: prp5@buffalo.edu, ppennat1@jhmi.edu (P.R. Pennathur).

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