

## Appendix: Summary of Best Papers Selected for the 2019 Edition of the IMIA Yearbook, Section HFOI

Couture B, Lilley E, Chang F, DeBord Smith A, Cleveland J, Ergai A, Katsulis Z, Benneyan J, Gershanik E, Bates DW, Collins SA

**Applying user-centered design methods to the development of an mHealth application for use in the hospital setting by patients and care partners**

*Appl Clin Inform* 2018 Apr;9(2):302-12

M-Health applications are increasingly being used in the hospital setting, yet there is a need for more research around patient/care partner usability needs in the hospital setting. The learning opportunities that e-Health tools for inpatient use open up for researchers and health care systems are numerous and can help provide a new source of information on patients and their care partners. In developing e-Health tools, it is important to remember that hospitalized patients have different characteristics than the general population, and within a given population of hospitalized patients there can be wide variation of socioeconomic status, baseline use of technology, and literacy and e-Health literacy levels. Care partners of hospitalized patients may experience emotional stress and increased learning needs related to their loved one's hospitalization. These emotional and situational factors add to the importance of conducting participatory design when developing an m-Health app for hospitalized patients and their families. Participatory design with end users may lead moreover to better engagement, and it is reported that more engaged patients have better outcomes, shorter length of stay, and decreased costs as compared with less engaged patients.

This article describes the usability testing conducted with hospitalized patients and care partners for the iterative design and refinement of the patient and care partner facing the components of a web-based and mobile-enabled safety reporting application that facilitates real-time

communication of concerns and worrisome events from hospitalized patients and care partners to clinical staff.

Miller A, Koola JD, Matheny ME, Ducom JH, Slagle JM, Groessl EJ, Minter FF, Garvin JH, Weinger MB, Ho SB

**Application of contextual design methods to inform targeted clinical decision support interventions in sub-specialty care environments**

*Int J Med Inform* 2018 Sep;117:55-65

Recent studies suggest that gaps and discontinuities from omitted or inappropriate patient care are common, and can result in increased costs due to higher readmission rates, and increased disease-related morbidities. Computerized clinical decision support (CCDS) interventions that are integrated into electronic health records (EHRs) may reduce discontinuities by presenting evidence-based guidelines at the point-of care. However, CCDS systems have not fully demonstrated their value in terms of improved care quality or safety. A commonly reported failing is CCDS' 'poor fit' to clinicians' work and decision needs. The purposes of this study were to better understand physicians' inpatient and outpatient work and decision needs, and to translate them into user interface (UI) design guidelines.

Using HF design approaches, the authors focused on where and how CCDS might be integrated within this environment. Their findings elucidate some characteristics of clinical work that have received little attention in CCDS literature. The most significant of these is the finding that clinical decision making is distributed across roles and over time. In addition, decision-making is iterative, with each role filtering, prioritizing, and aggregating information to enhance clarity and direction. Based on these findings, guidelines for CCDS UI design are proposed to efficiently support collective and iterative decision-making.

Tamblyn R, Winslade N, Lee TC, Motulsky A, Meguerditchian A, Bustillo M, Elsayed S, Buckeridge DL, Couture I, Qian CJ, Moraga T, Huang A

**Improving patient safety and efficiency of medication reconciliation through the development and adoption of a computer-assisted tool with automated electronic integration of population-based community drug data: the RightRx project**

*J Am Med Inform Assoc* 2018 May 1;25(5):482-95

Many countries recommend or require hospitals to implement medication reconciliation at admission, transfer, and discharge for accreditation as a means of reducing medication errors and avoidable morbidity and improving patient safety. One of the most challenging and time-consuming aspects of medication reconciliation is accurately and reliably documenting the community drug list. The authors developed a web-based software application to semi-automate the medication reconciliation process by prepopulating the community and hospital medication lists using a regional clinical data repository and the local hospital pharmacy system. System development followed user-centered design and an agile development process. They performed a cluster randomized trial to evaluate whether the use of the given system increased medication reconciliation completion rates and reported on the technical, professional, and medicolegal issues encountered in its deployment and use. The authors used a clinical adoption framework to classify challenges encountered in implementation, thus considering the sociotechnical aspects of health care organizations at the macro, meso, and micro levels.

Tscholl DW, Handschin L, Neubauer P, Weiss M, Seifert B, Spahn DR, Noethiger CB

**Using an animated patient avatar to improve perception of vital sign information by anaesthesia professionals**

*Br J Anaesth* 2018 Sep;121(3):662-71

Situation awareness enables healthcare providers to correctly diagnose patient condition and make informed clinical decisions. This might help care providers avoid errors and improve patient safety. The authors developed a novel technology designed to improve perception of vital sign informa-

tion. To optimize the information gained from checking a monitor, they developed an animated patient avatar to create an interface that transmits the current status of vital signs to care providers as quickly as possible and with minimal cognitive effort, which has been described as the goal for successful situation awareness design.

The study completed a comprehensive iterative development process of the avatar and afterwards compared the final version with conventional monitoring. The study provides some first empirical evidence that when anesthesia providers scan patient monitors in real-life patient care, the avatar

technology almost doubled the number of perceived vital signs, improved care provider confidence, and reduced perceived workload. Participants achieved these results after only watching an educational video explaining the avatar, which suggests quick learnability and potential for real-life usability.