Human-Centered Design of a Scorecard tool for Adverse Drug Events

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Abstract. Based on innovative screening methods of hospital databases, the ADE-scorecards deliver clinicians monthly statistics on a specific category of ADE. We describe the 3-stages user-centred design of this application: (i) analysis of the work system; (ii) users’ involvement in the design of the Human Computer Interaction; (iii) iterative usability evaluations from in lab inspections to onsite usability tests. Feedbacks from pilot implementation confirm the good usability and usefulness of the tool.

Keywords. Patient safety, Adverse Drug Events, user-centred design, usability, team awareness

1. Introduction

Adverse Drug Events (ADEs) are a major public health issue endangering patient safety and instigating significant extra hospital costs. The European project "Patient Safety through Intelligent Procedures in medication" (PSIP) aims at reducing preventable ADEs. PSIP focuses on the identification and prevention of a specific category of ADEs that are due mostly to inappropriate monitoring of the patient’s treatment based on lab tests, e.g. administration of potassium monitored through surveillance of kaliemia. A new prevention tool, the ADE-scorecards, has been developed [1]. An automatic screening of the medical records of past hospitalizations allows delivering healthcare professionals information on ADEs (type, causes, and statistics) susceptible to have occurred in their hospital department. We describe here the 3-stages user-centred approach to the design of this application: (i) analysis and modelling of the current work procedures and cognitive processes supporting the lab values based monitoring of the drugs; (ii) involvement of the users in the design of the application’s Human Computer Interface (HCI); (iii) iterative usability evaluations of the prototype, starting with in lab evaluations and ending with actual usage feedbacks during clinical studies.

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2. Methods

The study site is a 416-bed hospital equipped with a Patient Care Information system. Methods for stage 1 included ethnographic observations and semi-structured interviews. Data collected were described under the SHEL (Software, Hardware, Environment & Liveware) formalism and then modelled using Unified Modelling Language (UML). For stage 2, a representative sample of end-users (5 physicians, 2 pharmacists, 9 nurses, and 1 quality manager) participated in the design of the HCI. For stage 3, in lab usability inspections were completed with on site usability tests. We took the opportunity of a clinical study to retrieve usage feedbacks from the users along with use satisfaction assessed with the System Usability Scale (SUS).

3. Results

The analysis of the work system (stage 1) demonstrated that physicians and nurses are not aware of the ADEs uncovered by the PSIP system. It also shows that the monitoring of the patient’s treatment is a collective process distributed among clinicians. It is therefore important that the scorecards be usable by all those actors, including nurses. Results of stage 2 show that clinicians need clear identification of the rules detecting the ADE along with an access to an overview of the corresponding patient’s medical information. This information must highlight the relationship between the suspected ADE (e.g. abnormal lab values) and the incriminated drugs. The design of the scorecards complied with these functional requirements. In stage 3 iterative usability inspections allowed eliminating most of the usability flaws of the prototype. Once considered usable enough, the scorecards were installed for clinical study. The results of the usability tests and of the SUS confirm the good usability of the application and most importantly its usefulness in raising team awareness about the targeted ADEs.

4. Conclusion

Integrating Human factors considerations in the design and implementation of Health IT systems aiming at preventing ADEs helps delivering usable and useful tools. Moreover, the usage analysis helps understand why such application has (or has not) an impact on the actual ADE rate as measured through clinical studies and trials.

Acknowledgments: The research leading to these results has received funding from the European Community’s Seventh Framework Program (FP7/2007-2013) under Grant Agreement n°216130 – the PSIP project.

References