Attention and usability issues in mobile health information systems at point-of-care

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Abstract. In point-of-care situations, use of mobile devices may demand much of the physician’s attention and may disturb the communication with the patient. By using minimal attention user interface design and context awareness, attention theft from mobile devices at point-of-care can be reduced.

Keywords: Usability, Health Information Systems, Human-Computer Interaction, User-computer interface.

1. Introduction

1.1. Problem description

While the use of mobile devices is becoming reality in many clinical settings, little is known about the effect of their introduction on the physician-patient communication in point-of-care situations. A mobile device may act as a support to the clinician when he communicates with the patient, but may also draw the attention of the physician away from the patient – a situation that hereafter will be described as ‘attention theft’.

Occurrences of attention theft have been reported from observations of computing device usage in clinical environments, both for laboratory [1] and real-life settings [2].

Relevant contributions for attention-easy mobile user interfaces emerge from different areas within the field of human computer interaction. Minimal attention user interfaces [3], Context aware applications [4] and Attentive User Interfaces [5] might provide a relevant reduction in cognitive workload.

1.2. Research questions

Our main goal is to develop usability guidelines for attention-easy and non-disruptive mobile information systems at point-of-care. Towards that goal we compare demands for a mobile device and a medical paper chart used in point-of-care situations.

2. Methodology

Lab experiments (N=14) in a full-scale model of a section of a hospital ward were used in the study. During a simulated patient visit physicians made changes in the prescribed medication by using four different information devices; one paper based medical chart and three versions of a PDA-based medication system. Three different input methods were used for the PDA (stylus, finger and buttons).
3. Results

3.1 Preliminary results

As a first step towards creating a framework for measuring attention theft, we analyzed gaze direction times from video data from a previously conducted usability evaluation [3]. In this test physicians and patients playing out a clinical scenario with and without using a PDA for selecting x-ray images for display on a bed-side mounted screen. The results showed that PDA usage increased the number of focus shifts by 87% and increased the number of slowed-speech events by 108%.

The posttest debrief after the lab study indicate that a majority of physicians are positive towards mobile systems at point-of-care, but worried about attention theft and the ICT system’s effect on the communication with the patient.

3.2 Current status

Laboratory experiments are performed and video data is currently being analyzed.

4. Discussion

4.1. Discussion of the results

Because focus shifts incur cognitive costs [6] and slowed speech indicates resource depletion caused by increased cognitive demands [7], our results indicate that physicians experience attention theft from mobile point-of-care system. Careful design of the user interface might minimize the attention required for these systems.

4.2 Plan for future work

We will develop a framework for measuring attention theft, analyze observational data, and develop guidelines for attention-easy user interfaces in point-of-care situations.

5. Contribution to the field of Biomedical informatics

With the rapidly increasing computer support for care-critical functions in hospitals, mobile devices with well-tuned user interfaces are needed to avoid unnecessary attention theft. From a general point of view the ability to design attention-easy interfaces for mobile work will contribute to a better user experience.

References