A Human Factors Evaluation of the use of Patient Alerts within an Electronic Medical Records program

Camilla Rowland[1], Dr Laura Pickup[1], Fiona Spence[1] & Dr Kyle J Harrington[2]

[1]University Hospitals Bristol & Weston NHS Foundation Trust, [2]University of Nottingham

SUMMARY

A human factors evaluation of the usability, reliability including staff perception of the Accessible Information Standards (AIS) patient alerts within an acute NHS Trust electronic medical records program (EPMR). Aim of the investigation was to improve patient safety with the creation of a set of patient alert system principles to support future design of patient alerts systems within EPMRs.

KEYWORDS

Alerts, healthcare, interface design

Introduction

The Accessible Information Standards (AIS) were created in 2016 by NHS England and require health and adult social care organizations within the NHS to apply five requirements, see Table 1, to meet information and communication needs of patients with a disability, impairment or sensory loss (NHS England, 2017).

Table 1: The five requirements that NHS care and publicly funded adult social care must implement.

Requirement 1	Ask people if they have any information or communication needs and find out how to meet their needs.
Requirement 2	Record their needs clearly and in a set way.
Requirement 3	Highlight or flag the person`s file or notes so it's clear that they have information or communication needs and how to meet those needs.
Requirement 4	Share information about people`s communication and information needs with other providers of NHS and adult social care, when they have consent or permission to do so.
Requirement 5	Take steps to ensure that people receive information which they can access and understand and receive communication support if they need it.

At University Hospitals Bristol &Weston NHS Foundation Trust (UHBW) patient alerts within the electronic patient medical records (EPMR) system are used to record and flag these patient needs. It was recognized by the Experience of Care and Inclusion Team that the digital system created

challenges for staff that were not recording or making reasonable adjustment to support patient needs and this was impacting on patient safety. The aim of the research study was to use human factors methods to evaluate the current design of the patient alerts system and the objective was to produce a set of principles to inform future design of patient alerts.

Methods

Two human factors methods were chosen**.** Focus groups were held, staff were recruited from Outpatient areas across the Trust and separate groups held for clinical and non-clinical staff to gain their perception of the current design of the patient alert system. Participants were shown seven of the AIS patient alerts and asked the same set of questions, see Table 2. Focus group data was transcribed into Nvivo and a thematic analysis was completed.

Table 2: Focus Group questions.

1	**What do you understand by the meaning of this alert?** Is it meaningful? What might be the implications for the patient / what are the patient's needs?
2	**Do you feel this alert is safety critical?** How quickly does this alert need to be actioned?
3	**How well does this alert fit into your workflow?** When would be the most appropriate time to receive this alert (in relation to your task)?
4	**To what extent does this alert give you the information you need to act?** Is any information missing?

A heuristic evaluation was completed of the EPMR system by human factors experts from the Human Factors Professional in Healthcare network group. As recommended by Quiones et al (2018) a domain specific set of heuristics were created to reflect three core requirements of the EPMR, usability, safety critical and efficiency. Screen shots of the EPMR were taken and the human factors experts were asked to complete five tasks, searching for a patient, reviewing the patient's alerts, adding a patient alert, removing a patient alert and adding an interpreter requirement. Their comments were recorded along with the number of prompts they required to navigate within the interface. After each session the human factors expert was sent a link to a Microsoft Form and asked to rate each heuristic and provide additional comments.

Results

A total of twelve staff attended the focus groups. Five core themes were determined from the focus group data, with the theme of *Design* eliciting the most participant exerts (Table 3). Participants perceived the current design of patients' alert lacked clarity or information to enable a successful interaction with a patient who has information or communication needs.

Table 3: Thematic Analysis codes, sub codes and data extracts

	Code Theme	**Sub-code (s)**	**Number of Data Extracts**
1	Design	• Interface mis-design • Lack of Clarity	99

		• Prompt	
2	Patient Requirements	• Patient Communication • Patient Need • Patient Preference	48
3	Clarity of Process	• Clear communication • Lack of Knowledge of the process	44
4	Safety Considerations	• Safety • Work Demand • Time critical	75
5	Task Dependent	• Task dependent	31

Three human factor experts participated in the heuristic evaluation. *Recognition and recall* were the heuristic which participants scored as most severe for usability; *Helpfulness* was the second most severe. Participants felt that new users would struggle to locate information and doubt their choices when moving through steps for each task.

Discussion

We believe that this research study is the first of its kind to evaluate information and communication patient alerts. Previous human factors research was sourced relating to medication patient alerts within a clinical decision support system. Some similar results were found to be applicable to the use of patient alerts within an EPMR. This research concluded with the creation of a set of six principles for the creation of a patient alerts system, see Table 4.

Table 4: Principles for the creation of a patient alert system.

1	**Write a list of system requirements, involving all users** to promote recognition and acceptance of patient alerts. Consider use of appropriate cues for all users, including temporary staff.
2	**Place patient alert information next to other relevant information,** to reduce steps required to complete the task, ensuring information is visible on all devices used.
3	**Provide help sections at all decision-making actions**, help content to reflect staff job role level of knowledge and experience
4	**Create transparent alert descriptions**, including information on the hazard, consequence and instructions to avoid the hazard.
5	**Create a clear process (system of work) for patient alerts,** including responsibilities for adding and removing alerts.
6	**Ensure patient alerts are present at the most relevant time for each job role within their workflow,** for example before a decision is made.

These principles are proposed to inform NHS health and adult social care organizations when procuring future EPMR systems. Application of these principles within an EMPR system will enable successful implementation of the Accessible Information Standards. Successful

implementation of these Standards will increase patient safety, staff reliability and provide efficient use of clinical services reducing missed appointments.

References

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