

Sociotechnical factors influencing a digital early warning system: A qualitative interview study

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SUMMARY

This qualitative semi-structured interview study examines how clinicians and other healthcare staff perceive and integrate a digital Early Warning System embedded within an electronic patient record. Findings reveal varied expectations and concerns across professional groups, highlighting benefits such as clearer escalation cues alongside challenges like alert fatigue, temporal misalignments, and usability issues. These insights underscore the importance of designing digital tools that align with clinical workflows, support professional judgement, and consider the human factors critical for successful adoption.

KEYWORDS

Early Warning System, Electronic Patient Record, Sociotechnical systems analysis

Introduction

Digital Early Warning Systems (EWS) integrated within Electronic Patient Records (EPRs) are increasingly deployed to support the early identification and management of patient deterioration. While in theory these systems hold the potential to improve care efficiency and provide more accurate risk stratification, their real-world effectiveness depends heavily on how clinicians interpret, trust, and integrate them in everyday practice (Wong et al., 2024). This study therefore aims to explore attitudes, expectations, perceived risks and benefits, and the broader sociotechnical conditions that may facilitate or hinder effective adoption of digital EWS by healthcare staff in acute care settings. This qualitative study uses semi-structured interviews with four groups: physicians, nurses, quality and safety professionals, and information management and systems (IMS) staff. By engaging diverse stakeholder perspectives, the research seeks to generate a comprehensive, cross-disciplinary understanding of the processes shaping digital EWS sense-making, uptake, and workflows.

Methods

Part of a wider PhD research programme, the study is based in a large urban teaching hospital. Semi-structured interviews were chosen to facilitate both flexibility and richness of qualitative insights. The interview topic guides were piloted with representatives from each stakeholder group to ensure clarity, relevance, and contextual validity. Topics draw loosely on the Systems Engineering Initiative for Patient Safety (SEIPS) 2.0 model, a guiding framework which examines how work system elements (e.g., people, tasks, tools, organisation, environment) collectively shape system performance and user experience (Holden et al., 2013). Interviews explore views on sociotechnical domains such as usability, trust, workflows, training adequacy, and communication processes. Questions evoke both EWS-specific insights as well as broader perspectives on EPR performance, extending to considerations of future digital EWS developments, including those augmented by machine learning. Participants are purposively sampled from the four stakeholder

groups and data collection is ongoing; interviews are audio-recorded, transcribed, and analysed using thematic analysis (Braun & Clarke, 2013; Pope & Mays, 2020) to identify patterns across and within professional groups.

Results

Analyses reveal a significant "translation gap" between technical system design and frontline clinical reality, with notable variation in how different professional groups conceptualise the role and value of the digital EWS. Initial themes indicate that while automated score calculation and auditability are viewed as high-value features, they are frequently undermined by interface usability issues and documentation-related delays. Notably, there is a divergence in perception between IMS and safety staff and frontline clinicians regarding system workarounds; where technical and quality teams see a lack of compliance, clinicians describe a necessary adaptation to maintain workflow efficiency. Nurses specifically emphasise the tension between monitoring and documentation demands, while physicians highlight the challenge of balancing system-generated scores with their own mental models of patient status. Across all groups, participants identify that positive outcomes – such as clearer escalation cues – are often offset by system-design barriers such as alert fatigue. These results suggest that human factors were likely secondary to technical functionality during the initial implementation phase.

Conclusion

This study is beginning to illuminate the complex sociotechnical conditions that shape the adoption of digital EWS in acute care. Findings highlight the importance of aligning digital tools with clinical workflow, supporting professional judgement, and attending to the differing needs and priorities of multiple stakeholder groups. A deeper understanding of these human factors and organisational dynamics will be essential for informing the design, implementation, and optimisation of digital EWS solutions, for the support of safe and meaningful clinical decision making. This study more broadly highlights the value of qualitative perspectives in healthcare human factors, particularly in healthcare technology design and implementation.

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