

# Human Factors Analysis of Patient Safety Concerns Associated with Electronic Prescribing (E-prescribing) in Community Pharmacy

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## Background

- Healthcare settings are increasingly adopting health information technology (HIT) such as e-prescribing to improve the safety of the medication use process.
- Human Factors Engineering (HFE) researchers have examined patient safety issues that arise with HIT in hospital settings and have found that the use of HIT can introduce new kinds of medication errors.
- A primary reason for adopting e-prescribing was to reduce medication errors associated with illegible handwritten prescriptions. However, a 2011 study found that 11% of electronic prescriptions have errors, one third of which are potentially harmful

## Objective

- To use the sociotechnical systems approach to identify patient safety hazards that arise from using e-prescribing employing HFE techniques.

## Conceptual Framework

- To understand the patient safety issues that arise from using e-prescribing technology, the sociotechnical system (STS) approach was used as the guiding framework. This approach was developed by human factors engineers to characterize, evaluate, and improve human-technology interactions.
- A sociotechnical approach, assumes a systems perspective which takes into consideration the social, technical, and environmental work elements of a user's interaction with technology. This HFE analysis focused on the social subsystem of the STS framework

## Methods

### Participants

- 14 Pharmacists and 16 technicians were recruited from seven community pharmacies (three chains and four independents) in Wisconsin. Pharmacies using PDX, QS/1 and PharmaServ pharmacy dispensing systems who process a minimum of 10 e-prescriptions daily

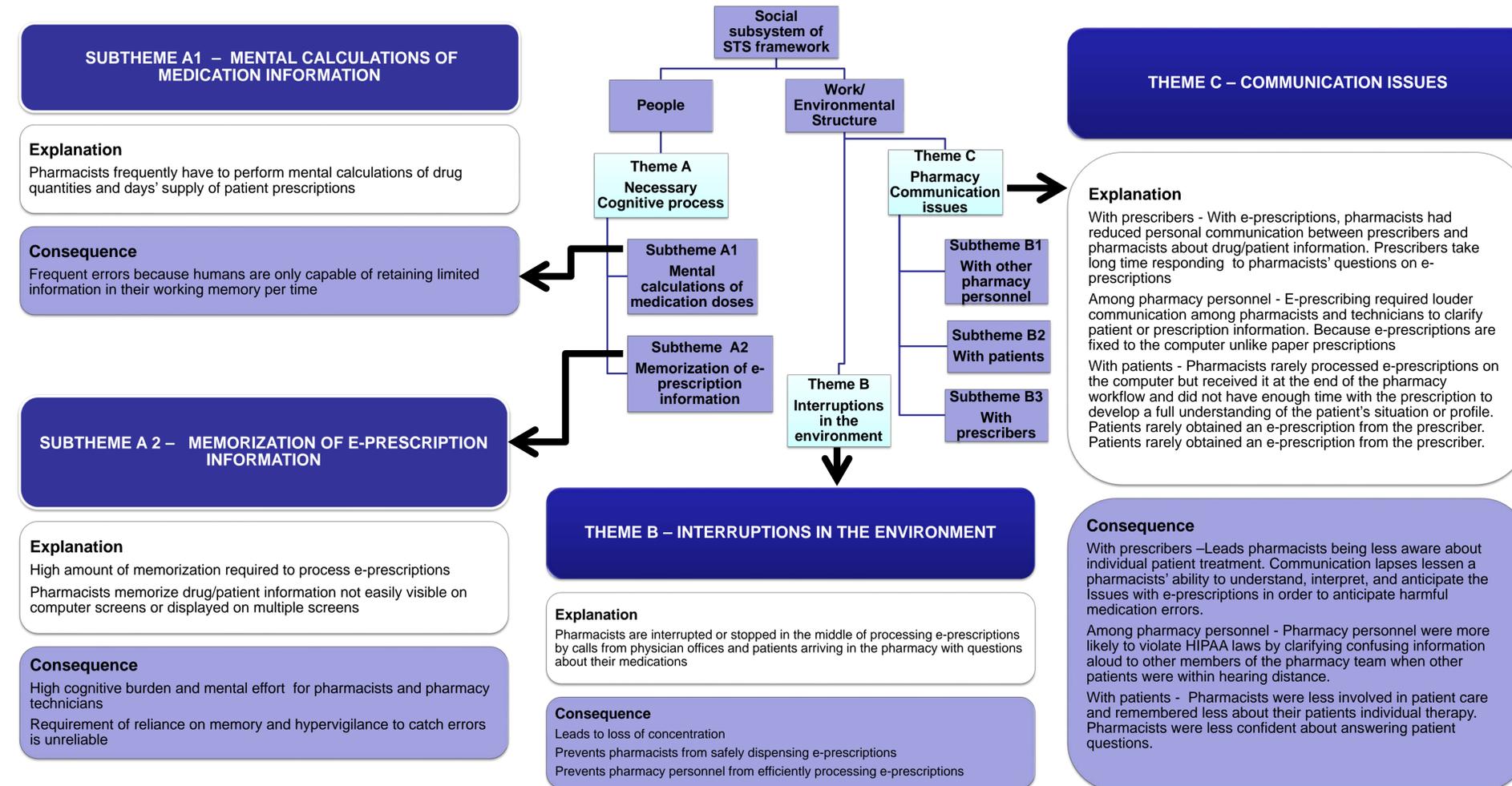
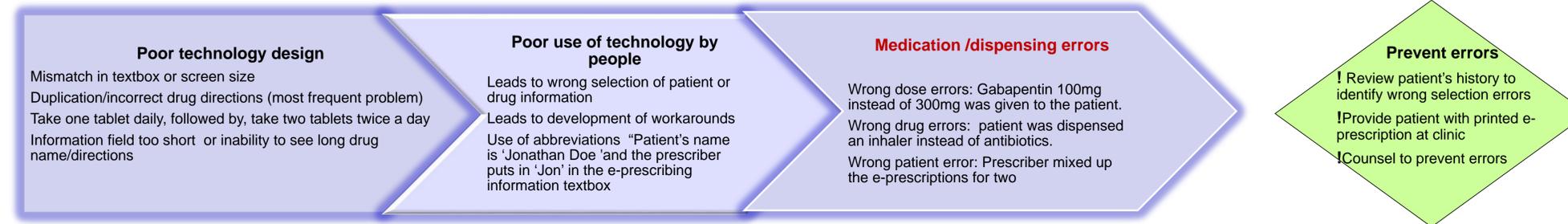
### Data Collection

- Human factors engineering (HFE) approaches were employed to collect data. HFE is a science that deals with the understanding of the human abilities and system properties to improve the design of technology. HFE data collection techniques included: direct observations, think aloud verbal protocols (TVP), and in-depth group interviews. Group interviews involved four pharmacy team members from each participating pharmacy
- TVP used to provide detailed procedural information on pharmacy staff day-to-day interact with e-prescribing technology. TVP involved participants verbalizing their thoughts and tasks out loud, as they processed at least five e-prescriptions. Responses were digitally recorded and transcribed for analysis

### Data Analysis

- Transcripts were analyzed using thematic analysis. Major and minor themes were identified based on the key components of the sociotechnical system theory

## Results



## Conclusions

- Poor design of e-prescribing technology has led to poor utilization by pharmacists and prescribers.
- A possible reason for poor design of e-prescribing technology is developer's lack of understanding how actual pharmacy workflow and day-to-day practice.
- Bad fit between pharmacy workflow and design of the e-prescribing technology can lead to medication errors.
- The impact of interruptions, miscommunication between users in different healthcare settings, and cognitive burden on safety when using e-prescribing needs to be addressed by researchers, pharmacy organizations and individual users of e-prescribing technology
- In this study pharmacists highlighted that the above issues are a safety risk when using e-prescribing technology that can easily lead to patient harm or injury.
- It is important to evaluate how design of current e-prescribing systems impact patient safety to ensure that patients do not receive incorrect medication regimens in community pharmacies.

## Future Research

- Future studies should confirm hazards and identify ways to utilize technology to effectively extend the work conducted in community pharmacies.
- Future research is also needed to quantify medication errors and identify workaround stemming from e-prescribing use in pharmacies
- Additional research is also needed to develop and test interventions to reduce incompatibilities between pharmacy and prescriber systems

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