Interruptions During the Use of a CPOE System for MICU Rounds

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Abstract

Clinical distractions may account for 43% of medication errors. "Silent errors" in Computer Provider Order Entry (CPOE) warrant a new perspective for interruption analysis. We developed a taxonomy of interruptions in the context of CPOE. In two hours of observed CPOE use by residents during Medical Intensive Care Unit (MICU) rounds, one distraction or interruption occurred approximately every 5 minutes and preceded 2 order entry errors. Future analysis of the proposed taxonomy in a variety of clinical settings may help to understand "silent errors" and identify possible informatics interventions to prevent such errors.

Background

Interruption rates consistently approach 30% of all clinical communication[1]. Furthermore, 43% of medication errors have been attributed to workplace distractions[2]. A reduction in medication errors up to 81% followed CPOE implementation[3], yet new "silent errors", i.e., latent errors resulting from unforeseen workflow mismatches, emerged[4]. Interruptions in the context of CPOE use have not been detailed to date, thus the purpose of this study was to examine interruptions during CPOE usage.

Methodology

MICU medical resident rounds were observed for the Infobuttons project at Columbia University; Morae[TM] software served as the portable usability lab to collect two hours of observational data.[5,6] As a sub-study of the Infobuttons project we extended existing taxonomies of interruptions to characterize CPOE interruptions (see Table 1). The taxonomy also includes a change in the patient's plan of care (CH) and two modifiers: 1) an *error*[7] and 2) *forgetting* essential information.

Table 1. Taxonomy of Interruptions during CPOE

Code	Definition
Interruption (I)	Cessation of productive activity before the current task was completed for an externally imposed reason[8]
Distraction (D)	Acknowledged stimulus from an external source that was not followed by cessation of activity.
Distraction with multitasking (DM)	Period when a distraction causes a subject to interact in two or more concurrent communication events[9].

Results

A distraction or interruption occurred every 5:10 (five minutes ten seconds) and preceded a total of two errors (see Figure 1). The average time to complete an original task after an interruption or change in plan of care was 5:31. The average time to complete a request that caused a distraction was 2:30. Frozen CPOE user interface screens, potentially caused by the data collection software, proved a source of interruption in addition to clinician communication interruptions.
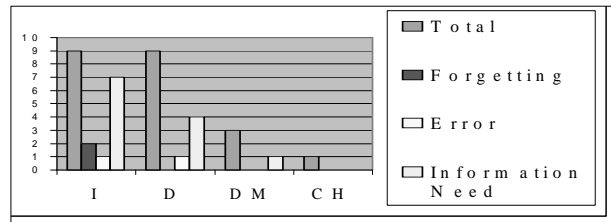

Figure 1. Number and Type of Interruptions

Limitations to the data analysis include difficulty determining the end of an intended task and a lack of standard order requirements. Additionally, the detected errors may have been corrected after the MICU recording.

Conclusion

This study extended a taxonomy of interruptions to characterize CPOE use in a MICU. We noted a small number of interruptions, some of which preceded potential errors. The resident's unsuccessful attempt to perform CPOE at the same pace as medical rounds precipitated interruptive events. This taxonomy proposes detailed CPOE specific interruptions, yet is also comprehensive enough to capture the dynamic clinical environment of the MICU. Further analysis of interruptions during the use of the CIS will validate the use of the taxonomy and will test its adaptability to other clinical settings. The benefits of CPOE implementation far outweigh the emergence of new "silent errors"[4]; however, understanding these errors is necessary to provide the high quality and safe patient care that the adoption of clinical information systems promise.

References

1. Alvarez G., Coiera E. Interruptive communication patterns in the intensive care unit ward round. International Journal of Medical Informatics 2005. Vol 74: 791-796.
2. MEDMARX Data Report 2002
3. Koppel R, Metlay JP, Cohen A, Abaluck B, Loclaio AR, Kimmel SE, Strom BL. Role of computerized physician order entry systems in facilitating medication errors. JAMA 2005. Vol 293(10): 1197-1203.
4. Ash JS, Berg M, Coeira E. Some unintended consequences of information technology in health care: the nature of patient care information system-related errors. JAMIA 2004. Vol 11:104-112.
5. Cimino JJ, Patel VL, Kushniruk AW. Studying the human-computer-terminology interface. JAMIA 2001. Vol 8(2): 163-173.
6. Currie LM, Graham M, Allen M, Bakken S, Patel V, Cimino JJ. Clinical information needs in context: an observational study of clinicians while using a clinical information system. Proceedings of the American Medical Informatics Association Symposium 2003;190-194.
7. Committee on Data Standards for Patient Safety, 2004; Dismukes & Nowinski, in press
8. Flynn EA, Barker KN, Gibson JT, Pearson RE, Berger BA, Smith LA. Impact of interruptions and distractions in dispensing errors in an ambulatory care pharmacy. *American Journal of Health-System Pharmacy* 1999
9. Coiera E, Jayasuria RA, Hardy J, Bannan A, Thorpe ME. Communication loads on clinical staff in the emergency department. MJA 2002. Vol 176(9): 415-418.