The types and causes of prescribing errors generated from electronic prescribing systems: a systematic review

‘EP’ & CDS
Medication errors are responsible for patient harm

Majority of errors occur at the prescribing stage
  • Complex process, susceptible to many different types of error

‘Computerized provider order entry’ (CPOE) with clinical decision support (CDS) systems can help prevent medication errors, improve patient care and reduce healthcare costs.
The problem?

• These systems have also been associated with new types of error (Ash et al.)

“Without reflection, we go blindly on our way, creating more unintended consequences, and failing to achieve anything useful”
- Margaret J. Wheatley
Aim:

“To understand the different types and causes of prescribing errors associated with CPOE systems, and to make recommendations about how these systems could be improved”
Methods: Systematic Literature Review

Inclusion criteria

• Primary research studies that focused on prescribing errors associated with CPOE containing qualitative data about the types and causes of errors.

Information sources and search

• Searched databases: the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Embase (OVID) and Medline (OVID).

Study selection

• Titles → Abstracts → Full Texts

Data collection and analysis

• Data extraction
• Narrative synthesis
Search Results

Identification
- Records identified in the search (n = 1,185)
  - Medline n=134, Embase n=549, CINAHL n=502

Screening
- Number of titles screened (n = 1,185)
- Number of abstracts screened (n = 468)

Eligibility
- Duplicate articles and Records excluded: (n = 717)
- Records excluded: (n=319)
- Full-text articles assessed for eligibility (n = 149)

Included
- Full-text articles excluded, with reasons: (n = 115)
- Studies included in qualitative synthesis (n = 34)
Results

- 31 full text articles and 3 conference abstracts.
- Eight key themes
1. Computer Screen Display

Incomplete list of a patient’s medications on the computer screen.

Multiple screens, which require users to click through various parts of the CPOE system.

Similarly designed screens or features that have important functional differences.

Simple to move between different patients on an electronic system.
2. Drop-down menus and Auto-population

**Selection errors** associated with different drop down lists (e.g., patient names, medication names, drug dosages, etc.)

**Delays in system response time** resulted in prescribers using ‘multiple clicks’ to select a drug item.

**Inadvertent ‘mouse wheeling’**

**Auto-population functionality**, whereby on entering the first few letters (or numbers) of a drug name (or dose), the system ‘suggests’ information that could be easily selected in error.
3. Wording

Confusing wording, ‘User-Design Mismatch’

Difficulty finding items or knowing the specific wording

4. Default Settings

Failure to change a default time presented by the system

Lack of knowledge about the default stop dates and times of medications

Drugs included in an order set
5. Non-Intuitive Ordering or Information Transmission

Inflexible ordering processes

Entry of unfamiliar abbreviations in free-text boxes, are open to misinterpretation

Compatibility issues

6. Repeat Prescriptions and Automated Processes

Failure to update the original prescription

Reduced visibility of computerised errors.
7. Users’ Work Processes

- Inappropriate work processes, ‘batch entry’
- Inconvenient log-in process

8. CDS Alerting

- Alert fatigue
- Underutilisation of CDS functionality
- Provided erroneous information
Discussion & Conclusion

All eight themes relate closely to human factors and user-centred design.
Recommendations

Researchers:

• Pre and post-evaluation of CPOE and CDS
• Further research into the types and causes of these systems in U.K.
• Inform system design and development
• Improved interoperability
Thank you for Listening
Any Questions?