The effectiveness of computer system tools on potentially inappropriate medications ordered at discharge for adults older than 65 years of age: a systematic review

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CRD summary
The authors concluded that prescriptions for potentially inappropriate medications were reduced with the clinical decision-making computer support tools, such as drug-specific alerts. This conclusion reflects the evidence presented. The limited number of studies, particularly for the meta-analysis, should be considered when interpreting the reliability and generalisability of the review findings.

Authors' objectives
To evaluate the effects of computer systems to assist clinical decision making to reduce inappropriate orders for medication at hospital discharge, unplanned emergency department visits, and hospital re-admissions, for older adults.

Searching
Eleven data sources, including PubMed, CINAHL, EMBASE, and DARE were searched for studies, available in English, from January 2003 to July 2011. Search terms were reported. Reference lists were searched for further studies. Unpublished material was sought in various ways, including from conference proceedings and handsearching selected journals.

Study selection
Eligible for inclusion were randomised controlled trials or quasi-experimental studies that focused on electronic or computer-based clinical decision making aids or support to avoid the prescription of inappropriate medication. The population had to be adults living in the community and aged 65 years or older. Studies of adults in nursing homes or assisted living were excluded. Eligible comparators were no electronic or computer-based support, or no intervention. The outcomes had to be the frequency of ordering potentially inappropriate medications for patients at discharge, or the rates of unexpected hospital readmissions or emergency room visits for patients who were discharged with inappropriate medications.

The included studies were published between 2006 and 2009. The interventions were computer-based alerts, including drug- and age-specific alerts, and education. They lasted from 12 months to 39 months. None of the studies specifically measured unplanned emergency room visits or unexpected hospital admissions.

The authors did not state how many reviewers were involved in study selection.

Assessment of study quality
Study quality was assessed by two independent reviewers using criteria compiled by the Joanna Briggs Institute (JBI). Disagreements were resolved by discussion, or with a third reviewer.

Data extraction
JBI methods were used to extract the data to calculate relative risks and 95% confidence intervals. The authors did not state how many reviewers extracted the data.

Methods of synthesis
The results were pooled in a random-effects (DerSimonian and Laird) meta-analysis, where possible, using JBI methods. Where this was not possible, a narrative synthesis was presented. Statistical heterogeneity was assessed using $X^2$.

Results of the review
Five studies were included; four were randomised controlled trials (RCTs) and one was a quasi-experimental study. Group size ranged from 103 to 29,840. Two RCTs were included in the meta-analysis. Study quality was considered to be high (full results were reported for the RCTs).
All studies showed that computer alerts successfully reduced the prescription and receipt of potentially inappropriate medications for community-dwelling older adults. Three RCTs showed statistically significant effects in favour of the intervention.

The meta-analysis showed a statistically significant difference, in favour of computer alerts to reduce the frequency of inappropriate medication prescriptions (RR 0.82, 95% CI 0.76 to 0.88; two RCTs; no significant heterogeneity).

**Authors’ conclusions**
Prescriptions for potentially inappropriate medications were reduced with the clinical decision-making computer support tools, such as drug-specific alerts.

**CRD commentary**
The review question and inclusion criteria were clearly reported. A number of relevant data sources were searched, and unpublished material was considered. Language restrictions mean that relevant studies could have been missed. The review process was not fully reported, with a lack of clarity in the processes of study selection and data extraction. The methods used to assess study quality and the synthesis of the results seem to have been appropriate. There appear to be errors in Appendix V for the group sample size (529,840).

The quality of the included studies was good and the authors’ conclusion reflects the evidence presented. The limited number of studies, particularly for the meta-analysis, should be considered when interpreting the reliability and generalisability of the findings.

**Implications of the review for practice and research**
**Practice:** The authors stated that computer systems decision making tools could reduce potentially inappropriate medications prescriptions for community-based adults aged 65 years or older. Drug- and age-specific alerts were specifically recommended.

**Research:** The authors stated that the effects of computerised clinical decision making tools on prescription writing for the elderly should continue to be explored, including variables that might facilitate their successful implementation. Documentation of unplanned emergency room visits and re-admissions should be correlated with the prescription of inappropriate medications.

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