The clinical value of computerized information services: a review of 98 randomized clinical trials


Authors' objectives
To review all randomised clinical trials addressing the efficacy of clinical information systems, and to determine the clinical settings, types of interventions, and effects studies.

Searching
MEDLINE was searched using a combination of medical subject headings and textword terms. Additional material was obtained by searching proceedings, books and monographs in the area of medical informatics, by examining reference lists of retrieved articles, and by contacting experts and institutions.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials, with a computerised information intervention in the study group, and measurement of the process or outcome of care, were included.

Specific interventions included in the review
Computerised information services, targeted at providers or patients, included: provider prompt or reminder; computer-assisted treatment planner; provider feedback; computerised medical record and information access; prediction; computer-assisted diagnosis; computer-assisted interactive patient education, instruction, and therapy; patient prompt or reminder; patient-computer interactive information gathering.

Participants included in the review
Health care providers or patients in out-patient (82%) or in-patient care (18%) were included.

Outcomes assessed in the review
The process and/or outcome of care, e.g. change in laboratory test ordering and decrease in average blood-pressure. The outcome of a trial was considered positive when the null hypothesis of no difference in primary outcome, as defined in the trial, could be rejected.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
A quality evaluation tool was used which was specifically designed for health services research trials (see Other Publications of Related Interest). The minimum acceptable quality score for a trial is the mean total score minus 2 standard deviations. The authors do not state how the papers were assessed for quality, or how many of the authors performed the quality assessment.

Data extraction
Two reviewers independently extracted data from the individual studies on the site of the trials, the type of computerised intervention, and effect variables.

Methods of synthesis
How were the studies combined?
The vote-counting method was used to estimate the success rate and the ratio of positive trials. The number of unpublished negative trials required to reverse the conclusion reached was also calculated.

How were differences between studies investigated?
The studies were grouped according to the site and intervention.

**Results of the review**
One hundred trials were reported in 98 articles.

The majority (82%) of the information services were tested in out-patient care. The provider was targeted in 64% of the trials. Of the included trials, 76% primarily measured the process of care as the effect variable. The total positive rate is 85%. Provider prompt or reminder, computer-assisted treatment planner, interactive patient education or therapy, and patient prompt or reminder were significantly successful interventions (sign test, p<0.05). Tolerance calculation suggested that the significant sign test results were less likely to be affected by unpublished negative studies.

**Authors' conclusions**
Physician and patient reminder, treatment planner, and patient education are four generic information interventions that are active ingredients of computer systems and can make a significant difference in family medicine. To manage care and improve quality, primary care computer systems should incorporate these effective information services.

**CRD commentary**
It is unclear whether the review included non-English articles. Authors simply used vote-counting method to synthesis results from individual studies, i.e. studies were given equal weight without considering the sample size. In addition, as the authors mentioned in the review, the magnitude of the effect was not estimated. Details of individual studies were not presented in the review, so it is difficult to judge whether the authors' conclusions are appropriate.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.