The use and effectiveness of electronic clinical decision support tools in the ambulatory/primary care setting: a systematic review of the literature

Bryan C, Boren SA

CRD summary
The authors concluded that clinical decision support systems had the potential to produce statistically significant improvement in outcomes, but there was much variability among types and methods of implementation and resulting effectiveness. Poor reporting of the review methods, risk of language bias and uncertain quality of the included studies suggest that the reliability of this conclusion is uncertain.

Authors' objectives
To assess the effectiveness of electronic clinical decision support systems (CDSS) in the primary care setting.

Searching
MEDLINE, CINAHL, Cochrane Database of Systematic Reviews, ACP Journal Club, DARE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched from 2000 to 2006 for English-language studies; search terms were reported.

Study selection
Randomised controlled trials (RCTs) or non-randomised observational trials with at least one comparable control group that assessed CDSS as a single intervention in an outpatient clinic or primary care setting with quantifiable outcome measures were eligible for inclusion.

In the included studies, where stated, CDSS was used for disease or medical management, drug dosing/prescribing patterns and prevention/screening. Two-thirds of studies used CDSS for chronic disease management. In most studies CDSSs were embedded in existing electronic records and provided automated prompts. Multiple primary outcomes were reported in most RCTs. Studies were undertaken in university affiliated clinics, community-based practices and Veteran's Affairs facilities. Half of the studies received governmental funding and a quarter had funding from a pharmaceutical company. Most studies were undertaken in USA (over two-thirds); other studies were in UK, Spain and Italy.

The authors stated neither how studies were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
Evaluation tools from the literature were used to assess the study quality of RCTs (100-point rating scale) and non-randomised or observational studies (10-point rating scale); studies that scored either 50 (for RCTs) or five (non-randomised or observational studies) met inclusion criteria for the review.

More than one reviewer assessed validity.

Data extraction
Data were extracted on provider and patient outcomes. These were categorised as: positive (all primary outcomes have positive findings); neutral (no statistically significant difference found in any primary outcomes); and variable (both positive and neutral findings were reported for primary outcomes)

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
A narrative synthesis was presented. Differences between studies were evident from tables and were discussed in the text according to type of study.

**Results of the review**

Seventeen studies were included (n=506,248 patients or encounters, range 200 to 450,000): 12 RCTs and five non-randomised observational studies.

Thirteen studies (76%) found either positive or variable outcomes related to CDSS intervention. Nine studies reported definitive positive outcomes. Four studies reported that there were improvements for some outcomes. Four studies (24%) showed no significant effect.

Of the RCTs, four studies reported positive primary outcomes, four had neutral findings and four had variable findings. Primary outcomes in studies that reported positive outcomes included ordering of procedures and prescribing medication therapy.

Of the observational non-randomised trials, statistically significant improvements in primary outcomes related to use of CDSS were reported for all five studies. Primary outcomes included: medication prescribing patterns (three studies); screening for latent tuberculosis infection (one study); and achievement of therapy treatment goals (one study).

**Authors’ conclusions**

Although there was validation that CDSS had the potential to produce statistically significant improvement in outcomes, there was much variability among types and methods of CDSS implementation and resulting effectiveness.

**CRD commentary**

This review addressed a clear question and had clear inclusion criteria for participants, intervention and study design. Inclusion criteria for outcomes were broad. The authors searched a reasonable range of sources, but the limitation to studies published in English implied a risk of language bias and some studies may have been missed. Study quality was assessed according to criteria used in the literature; details and composite scores were not reported, but scores of 50% were required for inclusion into the review. Review methods were not reported, so risks of reviewer errors and/or bias affecting study selection, data extraction and study quality was unclear. Relevant details of included studies were presented. Use of a narrative synthesis was appropriate.

The authors’ cautious conclusions reflected the evidence presented, but the poor reporting of review methods, potential for language bias and uncertain quality of the included studies suggest that the reliability of the conclusions is uncertain.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that future research should assess effectiveness of CDSS on patient outcomes in clinical settings and seek to identify implementation strategies that would be successful across a range of settings and patients populations.

**Funding**

Not stated.

**Bibliographic details**

Bryan C, Boren SA. The use and effectiveness of electronic clinical decision support tools in the ambulatory/primary care setting: a systematic review of the literature. Informatics in Primary Care 2008; 16(2): 79-91

**PubMedID**

18713524
Original Paper URL
http://www.ingentaconnect.com/content/bcs/ ipc/2008/00000016/00000001/art002

Indexing Status
Subject indexing assigned by NLM

MeSH
Ambulatory Care /organization & administration; Decision Support Systems, Clinical; Disease Management; Humans; Outcome and Process Assessment (Health Care) /organization & administration; Practice Guidelines as Topic; Primary Health Care /organization & administration; Quality of Health Care /organization & administration; Reminder Systems

AccessionNumber
12008107882

Date bibliographic record published
06/05/2009

Date abstract record published
10/11/2010

Record Status
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.