The impact of computerised physician order entry systems on pathology services: a systematic review
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CRD summary
This review found that there are little data on the impact of computerised physician order entry systems on patient outcomes. Although the review suffered from a number of limitations, these conclusions are sufficiently cautious to be likely to be reliable.

Authors' objectives
To determine the impact of computerised physician order entry (CPOE) systems on hospital pathology services. This abstract focuses only on the effects of CPOEs on patient outcomes.

Searching
MEDLINE, CINAHL, EMBASE, Social Sciences Index and the Cochrane Database of Systematic Reviews were searched from 1990 to August 2004. Additional attempts to locate relevant studies included web-based searches using Google, hand screening of international health informatics journals, and screening the reference lists from relevant articles and articles by key authors. The search terms were described.

Study selection
Study designs of evaluations included in the review
Studies that used an experimental or quasi-experimental design, including before-and-after studies and time series, were eligible for inclusion.

Specific interventions included in the review
Studies of CPOE systems were eligible for inclusion. The studies compared CPOE with and without computerised decision support systems to no CPOE, paper-based requisition and support systems, and telephone reporting systems, or compared outcomes before and after the introduction of CPOE systems. Some studies compared CPOE combined with computerised decision support systems to CPOE alone.

Participants included in the review
Inclusion criteria were not defined in terms of the participants. Most of the studies were conducted in secondary care among all or specific patient groups, or for all or selected medical staff. One study was conducted among general practitioners and one in a tertiary teaching hospital.

Outcomes assessed in the review
Inclusion criteria were not defined in terms of the outcomes. The outcomes considered in the review were: the test ordering process (including decisions to order tests); test processing within the pathology department; and the application of pathology test results (including the delivery of results and impact on patient outcomes). Only data relating to the application of pathology test results are included in this abstract, as the other sections of the review fall outside the remit of DARE.

The specific outcomes assessed were impact on patient management and time following up results, length of hospital stay and costs, and adverse events and safety.

How were decisions on the relevance of primary studies made?
Two reviewers selected studies for inclusion, although it is unclear whether this was done independently.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

**Methods of synthesis**

How were the studies combined?
The results of the individual studies were described, grouped by outcome.

How were differences between studies investigated?
Differences between the studies were discussed in the text of the review.

**Results of the review**

Nineteen studies were included in the review. Nine studies reported data on relevant outcomes and were included in this abstract: 4 randomised controlled trials (RCTs), 3 before-and-after studies, one laboratory-based quasi-experimental study and one interrupted time series.

Patient management and time following up results (3 studies).

Two studies found that physicians that used CPOE reached a diagnosis or ordered appropriate treatment quicker than those that did not. One study also reported that physicians using CPOE were more likely to arrive at a correct diagnosis. The third study found that time spent following up results was significantly reduced when CPOE was used (p<0.001).

Length of hospital stay (5 studies).

One before-after study reported a significant reduction in duration of hospital stay following the introduction of a CPOE system. The other studies, two of which were RCTs, reported no significant effect of CPOE systems on length of hospital stay.

Adverse events and safety (4 studies).

Three studies reported no impact of CPOE systems on adverse events such as mortality, dialysis, readmission or transfer to an intensive care unit, and delirium. One RCT reported that pharmacists intervened more often among control physicians than CPOE physicians for errors considered to be life-threatening, severe or significant (p=0.003).

**Cost information**

Three RCTs reported data on hospital costs. Two RCTs reported lower hospital costs in patients randomised to CPOE systems, while the other reported no difference in costs.

**Authors’ conclusions**

There are little data on the impact of CPOE systems on patient outcomes.

**CRD commentary**

The review addressed a broad objective with inclusion criteria defined only in terms of the intervention and study design. The literature search was thorough but made no specific attempts to identify unpublished studies, thus the review may be subject to publication bias. Details of the review process were poorly reported and it is not possible to determine whether appropriate steps were taken to minimise bias and errors. In addition, since the quality of the included studies was not assessed, the validity of the included studies is unclear. This is particularly problematic given the varying types of study design employed by the included studies.

Appropriate individual study details were tabulated clearly. A narrative synthesis was appropriate given the heterogeneity between the studies, but the results of each individual study were summarised and little attempt made to synthesise results across studies. This makes the results difficult to interpret. Although the review suffered from a number of limitations, the authors’ conclusions are sufficiently cautious to be likely to be reliable.
Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that further research is needed to determine the potential of CPOE systems to improve the functioning of pathology laboratories.

Funding
Australian Research Council.

Bibliographic details

PubMedID
16567121

DOI
10.1016/j.ijmedinf.2006.02.004

Indexing Status
Subject indexing assigned by NLM

MeSH
Diffusion of Innovation; Humans; Medical Order Entry Systems; Pathology Department, Hospital

AccessionNumber
12007001795

Date bibliographic record published
07/01/2008

Date abstract record published
09/08/2008

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.