Review: Computer-based clinical decision support systems can improve physician performance in some areas


Question
Do computer-based clinical decision support systems (CDSSs) affect physician performance and patient outcomes? (A CDSS was defined as software designed to aid in clinical decision making, with individual patient data matched to a knowledge base to generate patient-specific assessments or recommendations.)

Data sources
This study updates a 1994 review. Trials published from 1974 to March 1998 were identified by searching MEDLINE, EMBASE/Excerpta Medica, INSPEC (International Information Service for the Physics and Engineering Communities), Science Citation Index, the Cochrane Library, bibliographies of relevant studies, and by contacting authors.

Study selection
Studies were included if participants were health professionals in clinical practice or postgraduate training, clinician performance or patient outcomes were assessed, and data were collected prospectively for patient care with a CDSS compared with care without a CDSS.

Data extraction
Data were extracted on patient characteristics, setting, intervention, and outcomes. 2 authors independently assessed each study for methodologic quality.

Main results
68 studies (59 randomized controlled trials) met the inclusion criteria and had sufficient data for analysis. The studies assessed CDSSs related to intravenous medication and warfarin dosing (n = 15), diagnostic aids (e.g., for chest or abdominal pain) (n = 5), preventive care reminders (e.g., vaccinations or cancer screening) (n = 19), and other aspects of medical care (n = 29). Meta-analysis was not possible because of study differences in clinical problems, participants, interventions, and outcomes. The results were presented in terms of whether a statistically significant effect was reported.

<table>
<thead>
<tr>
<th>CDSS topic</th>
<th>Number of studies reporting improved clinician performance</th>
<th>Number of studies reporting improved patient outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug dosing</td>
<td>9/15</td>
<td>1/5</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>1/5</td>
<td>1/1</td>
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<tr>
<td>Prevention</td>
<td>14/19</td>
<td>0/1</td>
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<tr>
<td>Other</td>
<td>19/26</td>
<td>4/7</td>
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</table>

Commentary
The generalizability of results from CDSS studies is a major issue. Many of the successful studies were done in centers rich in veteran clinician advocates, content experts, and administrative support for CDSSs. It is likely that unreported failures of CDSSs without such facilitating conditions exist.

CDSS establishment costs and clinician acceptability are critical factors that have received little evaluation to date. Only Tierney and colleagues (2) showed potential savings, and clinician time to use CDSSs has been found to both increase (2) and decrease (1). Before CDSS systems proliferate at considerable expense, much better information on factors that predict their success or failure is required.

Conclusions
Computer-based clinical decision support systems can improve physician performance related to drug dosing, preventive care, and other aspects of medical care. Effects on patient outcomes have not been sufficiently studied.

Abstract and Commentary also published in ACP Journal Club. 1999;130:79.

References