Impact of Alert Specifications on Clinicians’ Adherence

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Impact on safety and quality

• Alerts have impact on
  – safety (higher guideline compliance, reduce duplicate orders, overdoses, allergic reacties) Kaushal 2003, Rosenberg 2008
  – and quality (Beneficial effects on clinicians’ performance in daily practice) Garg 2005

BUT

• 49% to 96% of the alerts are still overridden Van der Sijs, 2006

• “Alert-fatigue” as a result of low specificity Van der Sijs 2006, Shah 2006
Objective

• Minor change in the design of an alert shown on a computer screen may have a major impact. Bates 2003

  So

• Systematic Literature Review

• Objective: To assess impact of alert design specifications on clinicians’ adherence
Method:

1. CPOE and Electronic prescribing systems (OR)
2. Alert and Reminder systems (OR)
3. Usability and Design aspects (OR)

Y=1990-2009
Lang=English

AND

Medline (PubMed, Ovid) (1055)
EMBASE (656)

Duplication exclusion (1325 out of 1711)

Relevant articles (7 out of 1325)

Inventory of Eval Studies

Refs Relevant
Refs Review

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Results

Alert specifications

- Alert type
  - Intrusive/non-intrusive
  - Interruptive/non-interruptive
- Alert design
  - Graphical
  - Screen
- Message content

Impact on

- Clinicians’ alert adherence

MIE 2011
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## Alert Type

<table>
<thead>
<tr>
<th>Study design</th>
<th>System</th>
<th>Alert specifications</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>EHR</td>
<td>Automated alerting vs. on-demand alerting</td>
<td>Automated improved adherence significantly</td>
</tr>
<tr>
<td>RCT</td>
<td>CPOE</td>
<td>Automated alerting vs. on-demand alerting</td>
<td>No significant difference</td>
</tr>
<tr>
<td>Cohort study</td>
<td>CPOE</td>
<td>Tiered based on severity level; • Interruptive -&gt; stop • interruptive -&gt; stop / provide reason • not interruptive</td>
<td>Overall compliance increased 10% -&gt;29%</td>
</tr>
<tr>
<td>Descriptive</td>
<td>EHR</td>
<td>Automated alerting vs. on-demand alerting</td>
<td>No significant difference</td>
</tr>
<tr>
<td>Descriptive</td>
<td>CPOE</td>
<td>Tiered based on severity level; • Interruptive -&gt; stop • interruptive -&gt; stop / provide reason • not interruptive</td>
<td>Adherence rate of 67% for interruptive alerts</td>
</tr>
</tbody>
</table>
# Alert design

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<th>Study design</th>
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<th>Effect</th>
</tr>
</thead>
</table>
| Cross-sectional | CPOE   | Colors to indicate severity:  
  • red  
  • yellow  
  • white  
Different icons for domain of notification:  
• Pregnancy,  
• Breast-feeding,  
• Medication | Unclear, but quickly adopted in daily routine |
## Message content

<table>
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<tr>
<th>Study design</th>
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<th>Alert specifications</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>CPOE</td>
<td>• clinical importance of alert</td>
<td>29% of non-adherence</td>
</tr>
<tr>
<td>Descriptive</td>
<td>CPOE</td>
<td></td>
<td>34% of non-adherence</td>
</tr>
<tr>
<td>RCT</td>
<td>CPOE</td>
<td>• incorrect/ ambiguous drug/disease information</td>
<td>16% of non-adherence</td>
</tr>
<tr>
<td>Descriptive</td>
<td>CPOE</td>
<td></td>
<td>4% of non-adherence</td>
</tr>
</tbody>
</table>
Discussion and conclusion

- Alert not a MeSH term
- Few impact studies
- Few studies on adherence
- Focused on the effect of one single alert specification on clinicians’ adherence
Recommendations and future work

• Display severity rating for alerts
• Extend review beyond impact studies
  – Include study designs with lower evidence:
    User preferences, and expert opinions

• Next: rate evidence based on Framework developed by Cochrane (http://www.cebm.net/index.aspx?o=4200)
  – Example: SR -> RCT -> ... -> ... -> expert opinion
Thank you for your attention

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