TITLE: Insulin Pens in Acute Care Settings: Safety, Cost-Effectiveness, and Guidelines

DATE: 04 March 2015

RESEARCH QUESTIONS

1. What is the clinical evidence on the safety of insulin pens in acute care settings?
2. What is the cost-effectiveness of insulin pens in acute care settings?
3. What are the evidence-based guidelines regarding the use of insulin pens in acute care settings?

KEY FINDINGS

One non-randomized study and two economic evaluations were identified regarding the safety and cost-effectiveness of insulin pens in acute care settings.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2015, Issue 2), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2010 and February 19, 2015. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.
SELECTION CRITERIA

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Patients with diabetes requiring subcutaneous insulin in an acute care setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Insulin pens</td>
</tr>
<tr>
<td>Comparator</td>
<td>Insulin vials</td>
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<tr>
<td></td>
<td>Any comparator</td>
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<tr>
<td>Outcomes</td>
<td>Clinical harms (e.g., insulin-related errors, administration to the wrong patient)</td>
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<tr>
<td></td>
<td>Cost-effectiveness</td>
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<tr>
<td></td>
<td>Evidence-based guidelines</td>
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<tr>
<td>Study Designs</td>
<td>Health technology assessment reports, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations, evidence-based guidelines</td>
</tr>
</tbody>
</table>

RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, economic evaluations, and evidence-based guidelines.

One non-randomized study and two economic evaluations were identified regarding the safety and cost-effectiveness of insulin pens in acute care settings. No relevant health technology assessment reports, systematic reviews, meta-analyses, randomized controlled trials, or evidence-based guidelines were identified.

Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

One non-randomized study\(^1\) and two economic evaluations\(^2,3\) were identified regarding the safety and cost-effectiveness of insulin pens in acute care settings.

The non-randomized study\(^1\) assessed the safety outcomes for hospital in-patients and staff, as well as the economic impact associated with switching methods of insulin delivery from vials and syringes to pre-filled injector pens. In the six months after the switch to insulin pens, there were fewer staff needle-stick injuries compared with the six months before the switch. However, four wrong-drug errors (including one wrong-patient error) and one wrong-time error were also associated with the use of insulin pens during this time. Total costs for insulin stocks in the six months after the conversion were approximately half of the hospital's insulin costs from before the switch.

One economic evaluation\(^2\) studied the impact of a transition from stocking 10 mL insulin vials to 3 mL insulin vials and 3 mL pens on hospital costs by comparing pharmacy purchasing and administrative data within nine months before and after the conversion. Overall acquisition costs decreased and fewer units were purchased after the switch to 3 mL insulin vials and pens, but
the costs associated with the conversion from 10 mL vials specifically to 3 mL pens increased by 10%. \(^2\) A second economic evaluation\(^3\) studied the changes in hospital costs six months after the switch from stocking 3 mL insulin pens and 10 mL insulin vials to 3 mL vials exclusively. This study reported that, following this conversion, acquisition costs for rapid- and short-acting insulin decreased by 13% and 67%, respectively. The authors attributed these decreased costs to the lower costs of 3 mL insulin vials relative to the costs of purchasing 3 mL pens for subcutaneous insulin delivery as well as 10 mL vials for intravenous administration. \(^3\)
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses
No literature identified.

Randomized Controlled Trials
No literature identified.

Non-Randomized Studies


Economic Evaluations


Guidelines and Recommendations
No literature identified.

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APPENDIX – FURTHER INFORMATION:

Non-Randomized Studies – Pre-Clinical Studies


Guidelines and Recommendations – Unclear Methodology


   See: Storage – Insulin Pens
   Preparing Equipment – Insulin Pens

Review Articles


Insulin Pens in Acute Care Settings

Additional References

   See: Safe Practice Recommendations, page 2

