TITLE: Continuous Subcutaneous Insulin Infusion for Type 1 Diabetes: Clinical Effectiveness, Cost-Effectiveness, and Guidelines

DATE: 06 April 2015

RESEARCH QUESTIONS

1. What is the comparative clinical effectiveness of continuous subcutaneous insulin infusion versus intermittent subcutaneous insulin injections for adults with type 1 diabetes?

2. What is the comparative clinical effectiveness of continuous subcutaneous insulin infusion versus intermittent subcutaneous insulin injections for children with type 1 diabetes?

3. What is the cost-effectiveness of continuous subcutaneous insulin infusion in adults versus children with type 1 diabetes?

4. What are the evidence-based guidelines for insulin delivery in patients with type 1 diabetes?

KEY FINDINGS

Two health technology assessment reports, six systematic reviews (including five meta-analyses), and seven randomized controlled trials were identified regarding the comparative clinical effectiveness of continuous subcutaneous insulin infusion versus intermittent subcutaneous insulin injections for adults or children with type 1 diabetes. Three evidence based guidelines were identified regarding insulin delivery in patients with type 1 diabetes.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2015, Issue 3), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, economic studies and guidelines. Where possible, retrieval was limited to the human population. The
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search was also limited to English language documents published between January 1, 2010 and March 30, 2015. Internet links were provided, where available.

SELECTION CRITERIA

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

<table>
<thead>
<tr>
<th>Table 1: Selection Criteria</th>
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<tbody>
<tr>
<td><strong>Population</strong></td>
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<tr>
<td>Q1: Adults with type 1 diabetes (subgroups of interest: ≥ 25 years of age and &lt; 25 years of age)</td>
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<tr>
<td>Q2: Children with type 1 diabetes</td>
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<td>Q3 &amp; 4: Patients with type 1 diabetes</td>
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<td><strong>Intervention</strong></td>
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<td>Q1 &amp; 2: Continuous subcutaneous insulin infusion via insulin pump</td>
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<td>Q3: Continuous subcutaneous insulin infusion via insulin pump in adults</td>
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<td>Q4: Continuous subcutaneous insulin infusion via insulin pump; intermittent subcutaneous insulin injections</td>
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<td><strong>Comparator</strong></td>
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<tr>
<td>Q1 &amp; 2: Intermittent subcutaneous insulin injections</td>
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<tr>
<td>Q3: Continuous subcutaneous insulin infusion via insulin pump in children</td>
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<td>Q4: No comparator necessary</td>
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<tr>
<td><strong>Outcomes</strong></td>
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<tr>
<td>Q1 &amp; 2: Clinical benefits and harms (e.g., control of blood glucose levels [A1C], hypoglycemic events, complications related to diabetes)</td>
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<td>Q3: Cost-effectiveness</td>
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<td>Q4: Guidelines</td>
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<td><strong>Study Designs</strong></td>
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<tr>
<td>Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, economic evaluations, evidence-based guidelines</td>
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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, economic evaluations, and evidence-based guidelines.

Two health technology assessment reports, six systematic reviews (including five meta-analyses), and seven randomized controlled trials were identified regarding the comparative clinical effectiveness of continuous subcutaneous insulin infusion versus intermittent subcutaneous insulin injections for adults or children with type 1 diabetes. Three evidence based guidelines were identified regarding insulin delivery in patients with type 1 diabetes. No economic evaluations were identified regarding the cost-effectiveness of continuous subcutaneous insulin infusion in adults versus children with type 1 diabetes.

Additional references of potential interest, including non-randomized studies, are provided in the appendix.
Health Technology Assessments

Pediatric Populations, Adults, and Pregnant Women

   See: Evidence on safety, page 64
   Evidence on efficacy, page 70

   PubMed: PM20223123

Systematic Reviews and Meta-analyses

Pregnant Women

   PubMed: PM25713996

Mixed Populations

   PubMed: PM22777524

   See: Comparative Effectiveness of CSII Versus MDI in:
   Children and Adolescents with Type 1 Diabetes, page 17
   Adults with Type 1 Diabetes, page 34
   Pregnant Women with Pre-existing Type 1 Diabetes, page 61
   Comparative Effectiveness of CSII Versus MDI, page 101


Randomized Controlled Trials

Adults


Pediatric Populations


Mixed Populations or Unclear Age


Economic Evaluations
No literature identified

Guidelines and Recommendations


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APPENDIX – FURTHER INFORMATION:

Systematic Reviews – Unclear Outcomes

PubMed: PM22538155

Randomized Controlled Trials – Alternate Outcome

PubMed: PM23496302

Non-Randomized Studies

Pregnant Women

PubMed: PM24724804

PubMed: PM23981186.

PubMed: PM23680243

PubMed: PM23316799

PubMed: PM20210564
Pediatric Populations


Unclear Age


Economic Evaluations – No Age Comparison


Clinical Practice Guidelines – Methodology Unclear


See: D. Pharmacologic and overall approaches to treatment, page S21

Review Articles


Additional References