TITLE: Continuous Glucose Monitoring Systems for Pediatric Patients with Type 1 Diabetes: Clinical and Cost-Effectiveness

DATE: 06 December 2016

RESEARCH QUESTIONS

1. What is the clinical effectiveness of continuous glucose monitoring for pediatric patients with type 1 diabetes?

2. What is the cost-effectiveness of continuous glucose monitoring for pediatric patients with type 1 diabetes?

KEY FINDINGS

Four systematic reviews and meta-analyses, two randomized controlled trials, and five non-randomized studies were identified regarding continuous glucose monitoring systems for pediatric patients with type 1 diabetes.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, ECRI Institute (Health Devices Gold), Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit retrieval by publication type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2011 and November 28, 2016. 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>
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<th>Table 1: Selection Criteria</th>
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<tr>
<td><strong>Population</strong></td>
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<td><strong>Intervention</strong></td>
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<td><strong>Comparator</strong></td>
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<td><strong>Outcomes</strong></td>
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<td><strong>Study Designs</strong></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, non-randomized studies, and economic evaluations.

Four systematic reviews and meta-analyses, two randomized controlled trials, and five non-randomized studies were identified regarding continuous glucose monitoring systems for pediatric patients with type 1 diabetes. No economic evaluations were found.

Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

Four systematic reviews\(^1\textsuperscript{-}^4\) were identified regarding continuous glucose monitoring (CGM) systems in pediatric patients with type 1 diabetes. One systematic review\(^1\) aimed to assess the effects of CGM on glycomic control in pediatric patients with type 1 diabetes and found that real-time CGM can be more effective than self-monitoring of blood glucose in these patients. Another systematic review\(^2\) aimed to assess systematic reviews comparing CGM with self-glucose monitoring but the authors were unable to identify any relevant reviews. Another systematic review\(^3\) comparing CGM to self-monitored blood glucose found no significant effect in children. The final systematic review,\(^4\) also comparing CGM with self-glucose monitoring, found that CGM, particularly real-time CGM, had favourable effects on glycomic control and decreased the incidence of hypoglycemic episodes.

Two randomized controlled trials\(^5\textsuperscript{-}^6\) (RCTs) were identified regarding the use of CGM in pediatric patients with type 1 diabetes. One RCT\(^5\) found that CGM in 4-9 year olds did not improve glycomic control despite a high degree of parental satisfaction with the method. One RCT\(^6\) aimed to evaluate the efficacy of short-term CGM versus self-monitored blood glucose in type 1 diabetic pediatrics. The study found that CGM can be valuable in treating these patients, but the
authors suggested that further research was needed to accurately estimate if it outperforms self-monitoring of blood glucose.

Five non-randomized studies\textsuperscript{7-11} also examined CGM in pediatric patients with type 1 diabetes. One study\textsuperscript{8} compared CGM to self-monitoring blood glucose and found that glycemic parameters did not differ significantly between the groups during follow-up periods. Four non-randomized studies\textsuperscript{7,9-11} were pre-and-post treatment studies. One study\textsuperscript{7} concluded that CGM was effective in improving glycemic control in children, adolescents, and young adults aged 7-21 years. Another study\textsuperscript{9} found that CGM was not associated with a significant reduction in hemoglobin A1c in children and hypoglycemic events were not reduced. Another study\textsuperscript{10} concluded that CGM demonstrated frequent hyperglycemic excursions, with a large variability in glucose readings. The final study\textsuperscript{11} found that a CGM-based overnight predictive low-glucose suspend system can substantially reduce overnight hypoglycemia without an increase in morning ketosis.
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses


Randomized Controlled Trials


Non-Randomized Studies


Economic Evaluations
No literature identified.

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APPENDIX – FURTHER INFORMATION:

Health Technology Assessment – Mixed Population


Systematic Reviews and Meta-analyses – Mixed Population


Randomized Controlled Trial – Mixed Population


Non-Randomized Study – Alternate Population


Review Articles

