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REVIEW ARTICLE

Efficacy of Continuous Glucose Monitoring in Improving Glycemic Control and Reducing Hypoglycemia: A Systematic Review and Meta-Analysis of Randomized Trials

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Abstract

Objective:

We conducted a systematic review and meta-analysis to assess the efficacy of continuous glucose monitoring (CGM) in improving glycemic control and reducing hypoglycemia compared to self-monitored blood glucose (SMBG).

Methods:

We searched MEDLINE, EMBASE, Cochrane Central, Web of Science, and Scopus for randomized trials of adults and children with type 1 or type 2 diabetes mellitus (T1DM or T2DM). Pairs of reviewers independently selected studies, assessed methodological quality, and extracted data. Meta-analytic estimates of treatment effects were generated using a random-effects model.

Results:

Nineteen trials were eligible and provided data for meta-analysis. Overall, CGM was associated with a significant reduction in mean hemoglobin A1c [HbA1c; weighted mean difference (WMD) of -0.27% (95% confidence interval [CI] -0.44 to -0.10)]. This was true for adults with T1DM as well as T2DM [WMD -0.50% (95% CI -0.69 to -0.30) and -0.70 (95% CI, -1.14 to -0.27), respectively]. No significant effect was noted in children and adolescents. There was no significant difference in HbA1c reduction between studies of real-time versus non-real-time devices (WMD -0.22%, 95% CI, -0.59 to 0.15 versus -0.30%, 95% CI, -0.49 to -0.10; p for interaction 0.71). The quality of evidence was moderate due to imprecision, suggesting increased risk for bias. Data for the incidence of severe or nocturnal hypoglycemia were sparse and imprecise. In studies that reported patient satisfaction, users felt confident about the device and gave positive reviews.

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Abbreviations: (CGM) continuous glucose monitoring, (CI) confidence interval, (HbA1c) hemoglobin A1c, (RCT) randomized controlled trial, (RR) relative risk, (SMBG) self-monitored blood glucose, (T1DM) type 1 diabetes mellitus, (T2DM) type 2 diabetes mellitus, (WMD) weighted mean difference

Keywords: biosensing techniques, blood glucose self-monitoring, diabetes mellitus

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Abstract cont.

Conclusion:

Continuous glucose monitoring seems to help improve glycemic control in adults with T1DM and T2DM. The effect on hypoglycemia incidence is imprecise and unclear. Larger trials with longer follow-up are needed to assess the efficacy of CGM in reducing patient-important complications without significantly increasing the burden of care for patients with diabetes.

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