

Comparative Analysis of the Efficacy of Continuous Glucose Monitoring and Self-Monitoring of Blood Glucose in Type 1 Diabetes Mellitus

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Abstract

Background:

Self-monitoring of blood glucose (SMBG) and continuous glucose monitoring (CGM) have been proven effective in improving hemoglobin A1c (HbA1c) and in reducing hypoglycemia in patients with type 1 diabetes mellitus (T1DM). It is not clear, however, if CGM provides further efficacy and safety benefits beyond SMBG in the management of T1DM.

Methods:

MEDLINE (1966–November 2009), COCHRANE REGISTRY (all years), and EMBASE (1980–November 2009), and article bibliographies were searched for randomized controlled trials (RCTs) investigating the use of CGM in patients with T1DM, with clinical outcomes, including HbA1c and hypoglycemia and/or hyperglycemia.

Results:

Fourteen RCTs met eligibility criteria [$n = 1188$ patients, 97.4% with T1DM, age 29.0 ± 14.3 years, diabetes duration 11.7 ± 7.0 years, and baseline HbA1c $8.3 \pm 0.8\%$ (mean \pm standard deviation)]. Compared with SMBG, the use of CGM was associated with a greater reduction in HbA1c [-0.3% (confidence interval: 0.4, -0.2), $p < .0001$]. The number of hypoglycemic events was not significantly different between the CGM and SMBG groups (0.52 ± 0.52 versus 0.52 ± 0.63 events/day, $p = .5$), but duration of hypoglycemia was shorter for the CGM group (75 ± 39 versus 89 ± 19 min/day), with an incremental reduction of hypoglycemia duration of -15.2 min/day, $p < .0001$. Continuous glucose monitoring also resulted in a shorter duration of hyperglycemia than SMBG (172 ± 125 versus 217 ± 152 min/day, $p = .04$).

Conclusions:

The use of CGM is associated with improvement in metabolic control in T1DM, with significant short- and long-term reductions in HbA1c and reduction in the duration of periods of hypoglycemia and hyperglycemia versus SMBG.

J Diabetes Sci Technol 2012;6(5):1094-1102

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Abbreviations: (BG) blood glucose, (CGM) continuous glucose monitoring, (CI) confidence interval, (HbA1c) hemoglobin A1c, (RCT) randomized controlled trial, (SMBG) self-monitoring of blood glucose, (T1DM) type 1 diabetes mellitus

Keywords: glucose monitoring, meta-analysis, monitoring device, type 1 diabetes

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