



Come Spy with Me: Continuous glucose monitoring in diabetes

CLINICAL QUESTION

Compared to self-monitoring blood glucose (SMBG), does continuous glucose monitoring improve clinical outcomes or HbA1c for adults with diabetes?

BOTTOM LINE

Continuous glucose monitors use subcutaneous sensors and include “real-time” and “flash” monitors (described below). Real-time monitors lower severe hypoglycemic events by 2-4% compared to SMBG (to ~6% from ~8%) in type 1 diabetes, with no reported events in type 2 diabetes. Effects on HbA1c may not be clinically meaningful. Compared to SMBG, flash monitors are no different on risk of severe hypoglycemia, and HbA1c effects are inconsistent (type 1) or no different (type 2). Cost may limit use.

EVIDENCE

- Systematic reviews from last five years. Minimal clinically important HbA1c change:¹ 0.5%. Results statistically different unless indicated.
- Type 1 diabetes:
 - Real-time versus SMBG:

- Eight systematic reviews [11-22 randomized controlled trials (RCTs), 1399-2461 patients]:¹⁻⁸
 - Severe hypoglycemic events (requiring third-party assistance), 3 systematic reviews without significant methodological flaws.¹⁻³ At 4-12 months: 3.5-8% versus 6.5-10% SMBG, number needed to treat (NNT)=30-55.
 - Patient satisfaction, one systematic review¹ (2 RCTs, 369 patients): No difference.
 - HbA1c (mean difference): ~0.2-0.4% lower with real-time at 4-6 months.¹⁻⁷
 - Flash versus SMBG at 6 months:
 - Two systematic reviews (1-2 RCTs, 64-239 patients):^{1,7}
 - Severe hypoglycemia,¹ discontinuation rates, HbA1c^{1,7}: No difference.
 - Recent RCT (156 adults):⁹
 - Severe hypoglycemia: No difference.
 - HbA1c: 0.5% lower with flash.
- Type 2 diabetes (most on insulin):
 - Real-time versus SMBG, three systematic reviews (5 RCTs, 227-439 patients):^{5,10,11}
 - Severe hypoglycemia:^{5,10} None reported.
 - HbA1c: 0.25-0.5% lower with real-time over ~3-6 months.
 - Flash versus SMBG:
 - One systematic review (2 RCTs, 101-224 patients)¹². At 2.5-6 months:
 - Severe hypoglycemia, HbA1c: No difference.
 - Discontinuation: 6% versus 15% (SMBG) (PEER calculation), NNT=12.
- Limitations: Most RCTs unblinded, industry funded;¹³ quality of life/satisfaction inconsistently reported.

CONTEXT

- Real-time monitors: automatically display readings (example: Dexcom 6™); Flash monitors: manual upload required (example: Freestyle Libre™).
 - Sensors need replacement every 7-14 days.¹⁴
- Flash/real-time readings may lag behind SMBG by ~15 minutes.¹⁵
 - SMBG recommended before dose adjustments.¹
- Cost/year: \$2500-\$6000 versus \$1200 for four-times daily SMBG.^{14,16}

REFERENCES

1. National Institute for Health and Care Excellence. Type 1 diabetes in adults: diagnosis and management, Evidence reviewed for continuous glucose monitoring in adults with type 1 diabetes. Available at: <https://pubmed.ncbi.nlm.nih.gov/35593766>. Accessed September 12, 2022.
2. Wang Y, Zou C, Na H, et al. Comput Math Methods Med. 2022; 2851572.
3. Teo E, Hassan N, Tam W, et al. Diabetologia. 2022; 65:604-19.

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4. Dicembrini I, Cosentino C, Monami M, *et al.* Acta Diabetologica. 2021; 58:401-410.
5. Garcia-Lorenzo B, Rivero-Santana A, Vallejo-Torres L, *et al.* J Eval Clin Pract. 2018; 24:772-81.
6. Benkhadra K, Alahdab F, Tamhane S, *et al.* Clin Endocrinol. 2017; 86:354-60.
7. Elbalshy M, Haszard J, Smith H, *et al.* Diabet Med. 2022; 00:e14854. DOI: 10.1111/dme.14854.
8. Maiorino MI, Signoriello S, Maio A, *et al.* Diabetes Care. 2020; 43: 1146-56.
9. Leelarathna, L, Evans ML, Neupane S, *et al.* New Engl J Med. 2022; 387:1477-87.
10. Dicembrini I, Mannucci E, Monami M, *et al.* Diabetes Obes Metab. 2019; 21:2619-2625.
11. Janapala RN, Jayaraj JS, Fathima N, *et al.* Cureus. 2019; 11(9):e5634. DOI: 10.7759/cureus.5634.
12. Castellana M, Parisi C, Di Molfetta S, *et al.* BMJ Open Diab Res Care. 2020; 8:e:001092.
13. CADTH. Canadian Journal of Health Technologies. 2022; 2(8): 1-50. Available at: <https://www.cadth.ca/sites/default/files/pdf/htis/2022/RC1442%20rtCGM%20for%20TD1.pdf> Accessed January 10, 2023.
14. Diabetes Canada. Glucose monitoring. Available at: https://www.diabetes.ca/DiabetesCanadaWebsite/media/Managing-My-Diabetes/Tools%20and%20Resources/Glucose_Monitoring_Comparison_1.pdf. Accessed December 15, 2022.
15. CADTH. Flash glucose monitoring system for diabetes. 2017 (revised Mar 2018); 158:1-15. Available at: https://www.cadth.ca/sites/default/files/pdf/eh0053_flash_glucose_monitoring_system_for_diabetes_mar2018.pdf. Accessed January 10, 2023.
16. Diabetes Canada. Coverage of self-monitoring of blood glucose (SMBG) strips. Available at: <https://www.diabetes.ca/DiabetesCanadaWebsite/media/Advocacy-and-Policy/Advocacy%20Reports/Pro-Comparison-Test-Strips-Comparison-EN.pdf>. Accessed December 5, 2022.

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