

Story from the Front Lines

A middle-aged man with a history of T2DM (last A1C_c 7.5%), HTN, gout, and chronic homelessness presented to establish primary care at a safety net clinic. He is currently taking 1000 mg metformin BID, empagliflozin 10 mg daily for his diabetes and checks his blood glucose every night before he goes to bed. His A1C for the past year has been 7.4-7.8% and he has been on stable doses of metformin and empagliflozin over this same time period. He has several things he would like to have addressed at this visit, one of which includes getting new strips for his glucometer. He also wants to know if he needs to check his blood sugar every day, which he has been doing since he was first diagnosed 6 years ago, because he is worried about “low sugars” with medication, but stated “it is starting to get annoying.”

Teachable moment

Self-monitoring of blood glucose (SMBG) has an undeniable role in management of patients with T1DM and those with T2DM on insulin as it can help titrate insulin doses to avoid prolonged hyperglycemia and hypoglycemic events. However, the role in T2DM for patients taking oral medications and not on insulin has increasingly been called into question. An open-label RCT published in 2017 randomized 450 patients across three groups: no SMBG, SMBG only, and SMBG with instant feedback personalized messages sent to the meter. The study found no difference at one year in A1C, health-related quality of life scores on the SF-36, or initiation of insulin between the three groups (Young, 2017). Further, a meta-analysis of six RTCs and seven non-randomized studies showed varying data on the efficacy of SMBG compared to no SMBG. Pooled analysis of the RTCs demonstrated a statistically significant reduction in A1C (0.39%) for SMBG, which translates to a ~14% relative risk reduction in T2DM-related microvascular complications (Welschen et. al, 2005). When evaluated individually though, only two of the studies showed significant reduction in A1C_c. Well-being and treatment satisfaction were the same between the two groups (Welschen et. al, 2005). When looking at seven non-randomized studies though, there was no significant difference in A1C_c but distress, worries and depressive symptoms were greater in the SMBG group (Welschen et. al, 2005). Another RCT evaluating newly diagnosed patients with T2DM who were followed for a year found there was never a time point where there was a significant difference in A1C, BMI, use of oral hypoglycemic drugs, or reported incidence of hypoglycemia (O’kane, 2008). This study did show a statistically significant increase of 6% on the depression scale of those in the SMBG group (O’kane, 2008).

Besides the paucity of and conflicting evidence supporting the efficacy of SMBG in lowering A1C there is also a cost to the health system to pay for strips to monitor blood glucose. In a study examining the cost effectiveness of SMBG in Canada, blood glucose strips were in the top 5 classes of total expenditure in some publicly funded insurance plans (Cameron et. al, 2010). The study performed a systematic review and found a 0.25% reduction in A1C with SMBG and used the United Kingdom Prospective Diabetes Study model to “forecast diabetes-related complications, corresponding quality-adjusted life years and cost” (Cameron et. al, 2010). It found that monitoring daily had a greater incremental cost per quality-adjusted life-year (QALY)

than would offset the cost of strips (Cameron et. al, 2010). It did mention though that a decreased frequency of SMBG to 1-2 times/week would be cost effective. Conversely, a longitudinal model study from the US found that once daily SMBG modestly increased quality-adjusted life years by 0.047 and the corresponding incremental cost-effective ratio (ICER) was \$26,206/QALY, though “results were most sensitive to time horizon, with SMBG not cost-effective over a 5-year simulation period” (Tunis & Minshall, 2010).

As reviewed, the literature does not support the use of daily SMBG as a means of improving glycemic control. In addition to its ineffectiveness, SMBG is a burden to the patient and health system. As cost-effective models are predicated on the lowering of A1C for improvement in QALYs and ICER, after review of the above articles, it is not likely that daily SMBG is cost-effective. Alternatively, close 3-month follow-ups with a PCP to monitor A1C levels, ensure proper diabetic health follow up such as medication compliance, diabetic foot care, ophthalmic exams would be more prudent.

Citations

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5. Young, L. A., Buse, J. B., Weaver, M. A., Vu, M. B., Mitchell, C. M., Blakeney, T., ... & Donahue, K. E. (2017). Glucose self-monitoring in non-insulin-treated patients with type 2 diabetes in primary care settings: a randomized trial. *JAMA internal medicine*, 177(7), 920-929.