

Self-Monitoring of Blood Glucose in Type 2 Diabetes

Preface

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It has been a pleasure to serve as guest editor of this *Diabetes Spectrum* From Research to Practice section on self-monitoring of blood glucose (SMBG). This research section focuses on SMBG for people with type 2 diabetes. It presents aspects of glucose monitoring in type 2 diabetes that are not often discussed in depth, particularly the educational aspects of SMBG.

There has been much discussion and no shortage of opinions about SMBG in people with type 2 diabetes who are not using insulin. A recent set of point-counterpoint articles published in *Diabetes Care* presented the arguments for and against the use of SMBG in this population.^{1,2}

It is not my intention to repeat those arguments here. However, in thinking about the value of SMBG for people with type 2 diabetes, I am reminded of the parable of the blind men touching an elephant. Each blind man describes the elephant based on his own perspective and direct contact. When it comes to SMBG, particularly for people with type 2 diabetes, health care providers (HCPs), diabetes educators, researchers, and economists all have opinions based on their own perspectives and experiences and may not see all of the benefits or obstacles related to SMBG.

Excluded from the ongoing discussion have been those most affected: people with type 2 diabetes. An editorial in this issue by Amy Tenderich, MA, (p. 67) provides the patient voice in this discussion and gives us much to think about. Ms. Tenderich conducted an online survey to uncover some of the thoughts and concerns that people with type 2 diabetes have about SMBG. Her findings call into question the entire process through which people with type 2 diabetes are introduced

to SMBG and the often-inadequate follow-up they receive. I have no doubt that the results of this qualitative survey paint an accurate picture of the state of SMBG in the type 2 diabetes population. Ms. Tenderich's editorial is a must-read for all who provide diabetes care.

From a diabetes educator's perspective, the success of SMBG is more about whether performing SMBG provides a benefit, as defined by the patient, and less about how many strips were used to achieve a certain A1C goal and at what cost. The cost of SMBG is increasingly becoming a direct payment issue for people with diabetes. If they do not find it beneficial in managing some aspects of their diabetes care, they will simply choose not to monitor their blood glucose at all. Educators see this on a daily basis.

Diabetes is a demanding chronic condition that requires education on a variety of self-care behaviors, including SMBG. SMBG data, when used to problem-solve, can facilitate positive self-care behaviors, but only if people with diabetes know what actions to take in response to their SMBG results. SMBG itself is not a therapeutic intervention; actions taken as a result of SMBG data are the intervention. Again, this cannot occur if people with diabetes, and their HCPs, do not have the tools and education they need to optimize SMBG.

A recent study by Rodbard et al.³ showed that clinicians' ability to interpret and appropriately respond to patients' SMBG data was optimized when the clinicians used an automated decision-support tool. I am encouraged by these results because, for far too long, we have not had universal recognition of the need for structure in recommending SMBG testing times

and tools to assist in interpreting SMBG results. People with diabetes and their HCPs can both benefit from the availability of validated, structured testing times and interpretation tools.

The first article in this research section (p. 83), which I wrote, outlines the two skill sets necessary for SMBG education. SMBG requires people with diabetes to be proficient and accurate in both operating a blood glucose meter and interpreting their SMBG results to take action (i.e., glucose pattern management [GPM]). For people with diabetes to maximize their time and monetary investment in SMBG, proficiency and accuracy in performing blood glucose checks and recording results are not enough. The value of SMBG is realized only when they are able to use their SMBG data to manage their diabetes and improve outcomes. This requires the ability to interpret SMBG results. The frustration many patients feel when they do not know what to do with SMBG data was captured in the survey described in Ms. Tenderich's editorial.

Our second article, by Margaret A. Powers, PhD, RD, CDE, and her colleagues (p. 91), illustrates how SMBG education can be woven into a diabetes self-management education (DSME) program. To my knowledge, this is the first published account of the process and framework for integrating SMBG education and GPM into a DSME program. This approach has been shown to be successful in individual and group education sessions. A six-month study⁴ found that A1C decreased by 1.7% in individual sessions and by 2.5% in group sessions. We take it as given that "monitoring" is a core educational component of any DSME program. However, I would be surprised if all aspects of SMBG education, including GPM, were addressed in all DSME programs. This article provides practice pearls for all diabetes educators involved in teaching patients about SMBG.

The desired result of SMBG is the use of the data it provides to promote positive behavior change, which ultimately yields improved outcomes. However, the results Ms. Tenderich's survey indicate that it is equally likely that people with diabetes will or will not receive training by an HCP on how to use a blood glucose meter.

However, new technologies are being applied to SMBG that may help bridge the gap for some individuals

who may not receive adequate SMBG training and guidance from their HCP. Our third article, by Jennifer Shine Dyer, MD, MPH (p. 98), examines the use of "consumer-facing technologies" and their effect on patient engagement, behavior change, and health-related outcomes. If you have ever used a self-checkout lane at a store or used a store's kiosk to locate a gift registry, you have used a consumer-facing technology. These technologies are making their way into health care and are being studied for their effects on health outcomes. Dr. Dyer's article cites Fogg's Behavior Model (FBM),⁵ which is often used by consumer technology designers to promote and sustain engagement with the goal of clinical improvements. Dr. Dyer also describes a consumer-facing mobile application that she developed and that employs the three elements of FBM.

In our next article (p. 102), Marjorie Cypress, PhD, CNP, CDE, and Donna Tomky, MSN, CNP, CDE, discuss the role SMBG in DSME, behavior change, and treatment. They make the point that SMBG and DSME cannot and should not be viewed in isolation, but rather that SMBG is an integral part of DSME.

These authors also offer guidance to HCPs regarding how to design an appropriate individualized SMBG schedule to meet patients' specific needs and evaluate the effectiveness of their particular diabetes medications, based on the medications' mechanisms of action. Determining the best SMBG schedule for a particular patient can be challenging; there are no formal guidelines or recommendations regarding when people with type 2 diabetes should test their blood glucose. As revealed in the Tenderich survey, people with type 2 diabetes are often told to test once a day (i.e., fasting only), regardless of their medication therapy. However, new diabetes medications and combinations of medications are appearing on the market continuously. It is important to fully understand their mechanisms of action to recommend an SMBG schedule that will provide actionable information based on their effects.

As an example, in our final article (p. 107), Oliver Schnell, MD, and Anne-Marie Felton discuss the recent European expert recommendations for SMBG for patients using glucagon-like peptide-1 (GLP-1) medications.⁶ The

authors outline five clinical scenarios involving GLP-1–based treatment in which SMBG can play a valuable role. The timing and frequency of testing can vary from "less intensive" to "intensive" depending on the types of pharmacological therapies used along with the GLP-1 agent.

From a diabetes educator's perspective, continuing the academic debate regarding the value of SMBG for type 2 diabetes does not serve people with diabetes very well. Diabetes is a self-managed disease. SMBG data may be the only clinical feedback that patients receive between medical visits.

To be an effective aid to patients' self-management efforts, SMBG must yield information of value to patients' particular diabetes care regimen. This is more likely to occur if 1) patients are taught about SMBG in a structured, standardized process; 2) both patients and their HCPs are educated about how to interpret SMBG data; 3) patients use their SMBG data to guide their lifestyle choices; and 4) HCPs use SMBG data to optimize their patients' diabetes treatment. Hopefully, this From Research to Practice section can lead the ongoing debate in a more productive direction.

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