

Use of Blood Glucose Meters Among People With Type 2 Diabetes: Patient Perspectives

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The clinical value of regular self-monitoring of blood glucose (SMBG) in people with type 2 diabetes remains controversial. Some studies have found either no significant difference in A1C outcomes in groups performing or not performing SMBG¹ or no evidence that SMBG confers benefits for outcomes other than A1C, such as mortality, long-term complications of diabetes, body weight, patient satisfaction, or quality of life.² These studies^{2,3} have also indicated that there is “little indication that [patients are] using self-monitoring to effect and maintain behavior change.”

One reason typically cited for the apparent lack of efficacy for SMBG in patients with type 2 diabetes is that patients simply do not adequately follow recommendations from their health care professionals.⁴ To date, few studies have explored the patients’ perspective on SMBG beyond including standardized scales of “well-being” in more mechanized studies.

In addition to formal recommendations from professional diabetes associations, leading diabetes clinicians and patient advocates with whom I am associated also disagree about the role of SMBG in the management of type 2 diabetes. My discussions with these individuals have provided further context for this topic. From them, I have heard:

- People with type 2 diabetes should not test very much at all because an A1C test performed every 3 months can provide sufficient information without the frustration of having to draw blood for daily tests that serve little purpose.

- Patients are just not getting the right education or motivation to be empowered to check their blood glucose levels and actually see the impact of their testing efforts.
- SMBG should be shifted from data collection to helping patients use the meter as a way to learn about their own body and how their health choices affect them.
- Patients are not focusing on the right thing—food. SMBG is underutilized as a tool for gathering information about how patients’ blood glucose responds to different types and amounts of food. A meter makes the results of a patient’s food choices immediately apparent.

As the founder and editor-in-chief of a leading diabetes blog and also the chief patient advocate for a large health-focused social networking company, I helped to develop an online survey to query people with type 2 diabetes regarding their use of SMBG. The survey was designed to explore patients’ experiences using blood glucose meters; strong emphasis was placed on open comments for qualitative analysis.

Survey Methods

In early September 2012, 732 individuals completed an online survey on the patient community site DiabeticConnect.com. The survey contained 16 multiple-choice questions with ample area for adding additional answers and personal comments. The questions pertained to how respondents obtained a blood glucose meter; who trained them to use it; to what extent, how often, and

in what ways they (and their health care team) currently use their meter; and their feelings about the testing experience and their SMBG results. Respondents were also asked about their perceived value of blood glucose testing and what they would most like to learn about SMBG if further training was available. Although the survey was limited by its design (i.e., involving only people who visited the site and chose to respond), it did reveal some interesting information.

Demographics

Respondents were asked to self-identify only in terms of their diabetes: 93% (698) indicated they were diagnosed with type 2 diabetes. Of those, 19% were diagnosed within the past year; 23% were diagnosed within 1–3 years; 28% were diagnosed within 3–5 years; and 30% had type 2 for more than 8 years.

Results

In addition to the numerical data, a total of 4,633 respondent comments were gathered in response to 12 open-ended questions following the multiple-choice questions described above. As a baseline, 87% (583 of 732) said a doctor or other health care provider prescribed them a meter. Only 10.7% of respondents (78) said they purchased a glucose meter on their own, and just four people said they were provided a free glucose meter. Ninety-six percent said they use their meter regularly. Among the 4% indicating that they do not use their meter, reasons for non-use were:

- I can't afford the test strips
- I don't understand what the numbers mean
- I don't know how
- Testing doesn't help me control my diabetes
- It's too painful
- The meter doesn't work properly
- Other

The number-one reason indicated for not using the meter was "other" with a variety of comments, the most common being, "I can't remember to do it" and "It's a hassle to carry around."

Of the preset choices for meter non-use, the top two responses were,

"Testing doesn't help me control my diabetes" and "I can't afford the test strips."

When asked, "Who showed you how to use your meter?," 663 individuals responded. The number-one answer was "no one, I learned myself" (41%), the number-two answer was "a nurse or certified diabetes educator (CDE)" (38%), and just 5% said they were instructed by a doctor or endocrinologist.

Of the 583 participants who reported being prescribed a meter by their doctor, 36% still said they learned to use it themselves. A nurse or CDE instructed 41% on the use of the glucose meter, and a doctor or endocrinologist trained only 12% of the respondents.

All participants were then asked, "Were you given a good explanation of glucose targets by your health care professional?," to which 661 responded. Of those, 61% (400) said yes, 25% (165) said no, and 15% said they did not recall or did not know what a glucose target is.

Interestingly, the comments included frequent mention of the Internet (i.e., online communities, blogs, and videos) as a source of information and training. This was despite the fact that none of the questions or preset answer choices offered the Internet as an option.

Of the 657 participants who responded to the question, "Were you given a good explanation of the best times of day to test your blood glucose by your health care professional?," 60% (393) said yes, 30% said no, and 10% said they don't recall. Sixty comments were gathered; common replies were that patients were "basically told to test before meals without too much elaboration" or told "nothing other than morning fasting testing."

When asked "Were you given good guidance on how to treat high and low glucose results by your health care professional?," the results were about half and half: 48% said yes, 46% said no, and 6% said they did not recall. Sixty-one comments were entered; a common reply was that patients were told how to treat lows only, but not highs. An interesting side note on this question was

that numerous respondents complained that their doctors showed little concern or empathy.

When asked, "Do you use your meter results to guide you in making lifestyle changes?," a total of 653 responded. Of those, 29% (187) said always, 41% (265) said most of the time, 20% (133) said sometimes, and the rest said rarely or never. Thirty-eight comments were gathered, many noting that they do not know what the numbers mean and were not aware they were supposed to make changes based on meter results.

To the question, "How often do you check your blood glucose when you're away from home?," 650 responded. Of those, 46% (296) said frequently, 29% (189) said sometimes, 19% (122) said rarely, and 7% (43) said never. Of the 48 comments collected, most indicated that they test more often when not at home because they are out of their usual routine. This seems to indicate a level of sophistication that contradicts other results in the survey.

We also asked respondents: "Is there an emotional component to using your meter? (For example, do you get upset if the results are not ideal?)." Of the 652 individuals responding, 42% (275) said sometimes, 18% (115) said most of the time, and 9% (60) said always. The remaining 31% said rarely or never. Thus, a full 69% indicated an emotional component. Fifty-one people provided comments, many noting that they were often "afraid to know the results," would get upset if they "have been 'consciously good' and the numbers are still high," or are uncomfortable about loved ones seeing their numbers, as this makes them feel guilty or they may be reprimanded for their "bad numbers."

Asked whether their health care team downloads and/or looks at the data on their meter during appointments, 648 responded. Of those, 43% (280) said never, 25% (163) said always, 11% (72) said most of the time, and the remaining 20% said sometimes or rarely. Seventy-nine people provided comments. Particularly notable was that almost all commenters said they either e-mail meter results or print them

out and bring them to the doctor's office proactively, indicating that review of meter data was self-initiated by patients. No one remarked on their doctor's proactive efforts to download or otherwise obtain meter results. About 20 respondents indicated in the comment section that they do not have a "health care team" at all.

When asked, "Does the cost of test strips limit you from using your meter as much as you'd like?" 651 people responded. Of those, 47% (309) said yes, and 53% (342) said no. While the numerical results were split, there were 94 comments on this question, indicating that it is a "hot-button" issue for patients. Even those who said they were thankful to have insurance coverage lamented that test strips are far too expensive and that most insurance plans only cover two test strips per day, "not enough to test at odd times for highs or lows." Those who wish to test more aggressively had plenty to say about what is wrong with the current coverage model.

In conclusion, we asked respondents, "If you were able to get additional education on how best to use your meter, what would you most like to learn?" They were asked to check all that apply from six choices.

Results were, in order of priority:

- 335 chose how to best react to too-high or too-low results
- 296 chose how to use your meter results as a guide to lifestyle changes
- 208 chose best time(s) of day to test
- 169 chose how to make sense of data downloaded from the meter
- 160 chose how to view and/or download the test results
- 157 chose what to do with the control solution

In a final, open-ended section, we asked respondents, "What else would you like to share about glucose meters and testing?" A total of 274 people made comments. The most consistent theme was the lack of adequate support for testing among people with type 2 diabetes.

This included insurance coverage and affordability of testing supplies.

Core Findings

Regardless of how they obtained it, > 40% of respondents said they learned to use their glucose meter on their own. Although > 50% of respondents reported being told the best times of day to test, only about half were given good guidance on how to treat too-high and too-low results. More than 40% of respondents said their health care providers never downloaded or even looked at their meter results.

Receiving education about glucose monitoring was highly correlated with meter use: 97% of those receiving good training on times of day to test and reactive treatment said they use their meters regularly. More than 60% of those currently using their meters to guide lifestyle changes were given good training. Of those not using their meter regularly, nearly 60% said they were not even told the best times of day to test. More than 50% of respondents reported wanting to learn more about making meter data actionable: how to react to high and low results and how to use the results to guide lifestyle changes.

Negative emotions associated with testing are common: nearly 70% of respondents indicated frequent negative reactions. This was also correlated with lack of training: 57% of those reporting frequent negative emotions said they were not given good guidance. Of those who reported less frequent negative emotions, 50–60% said they did receive good guidance on various aspects of meter use.

Discussion: Take-Home Messages

Our data indicate significant motivation among people with type 2 diabetes to learn to use their meters in a productive way to identify and treat high and low blood glucose levels and to make meaningful lifestyle changes. However, there is a great deal of frustration stemming from a lack of useful meter training. Comments indicated that this frustration extends to a more general sense of inattention and lack of empathy from health care providers

and to a common lack of the financial means to make the most of using these tools.

Although a 2009 meta-analysis⁴ mentioned that more frequent SMBG use was linked to more frequent congratulations and helpful feedback from health care providers, our survey appears to indicate that positive feedback from health care providers is sorely lacking.

A 2012 study⁵ also concluded that "there was no significant evidence available that SMBG had an effect on patient satisfaction, general well-being, or general health-related quality of life." Although our survey did not tap into the larger picture of quality of life, it does indicate that glucose testing itself is often a negative experience for patients no matter how well trained they feel.

Comments gathered in this survey indicated that patients would appreciate more emphasis on using glucose meters as proactive tools rather than as a means of "discovering mistakes." A lack of satisfactory patient education appears to be contributing to a self-fulfilling prophecy: the notion that SMBG is not useful for people with type 2 diabetes or that it is useful only for patients taking insulin or other glucose-lowering medications that increase the risk of hypoglycemia.⁶

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Editor's note: A more comprehensive discussion of the author's survey findings can be found at <http://www.diabetesmine.com/t2monitoring>.