

Physicians' Views of Self-Monitoring of Blood Glucose in Patients With Type 2 Diabetes Not on Insulin

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ABSTRACT

This qualitative study examines to what extent and why physicians still prescribe self-monitoring of blood glucose (SMBG) in patients with non-insulin-treated type 2 diabetes (NITT2D) when the evidence shows it increases cost without improving hemoglobin A_{1c} (HbA_{1c}), general well being, or health-related quality of life. Semistructured phone interviews with 17 primary care physicians indicated that the majority continue to recommend routine self-monitoring of blood glucose due to a compelling belief in its ability to promote the lifestyle changes needed for glycemic control. Targeting physician beliefs about the effectiveness of self-monitoring of blood glucose, and designing robust interventions accordingly, may help reduce this practice.

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INTRODUCTION

Evidence on self-monitoring of blood glucose (SMBG) in patients with non-insulin-treated type 2 diabetes (NITT2D) shows that routine testing increases cost¹ without improving glycemic control, general well-being, or health-related quality of life.^{2,3} Self-monitoring of blood glucose can be painful, inconvenient, and depressing.⁴ The Society of General Internal Medicine advises against daily glucose testing,⁵ yet the American Diabetes Association recommends it.⁶ Proponents of daily glucose monitoring argue that it improves glycemic control, distress, and self-efficacy when used in a targeted manner.⁷ Examining to what extent and why physicians continue to recommend SMBG is essential for understanding how this debate permeates care. Thus, we undertook this qualitative study.

METHODS

From December 2016 to June 2017, semistructured interviews were conducted with full-time (>0.8 FTE) Cleveland Clinical Internal Medicine (IM) and Family Medicine (FM) physicians in Ohio. Eligible physicians from 25 sites were randomly ordered and sequentially e-mailed invitations to participate. Phone interviews were conducted in order of response and ceased when thematic saturation was reached.

The interview guide was based on the Health Belief Model, a literature review, and advice from a panel of diabetes experts. Questions were grouped into sections: beliefs about SMBG, recommendations, and use during clinical encounters. Two team members (S.H. and E.P.) conducted and analyzed all interviews. Interviews were audio-recorded and transcribed. Transcripts were iteratively coded to capture themes. Physicians were categorized as proponents or opponents based on whether they recommended routine SMBG to most patients with NITT2D. Proponents were further categorized as continual proponents (ie, long-term, routine testing for all) or limited proponents (ie, routine checking for newly diagnosed and/or uncontrolled type 2 diabetes).

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RESULTS

Seventeen physicians from 10 sites participated. Five were female and 12 were male. Ten were FM and 7 were IM. In total, there were 14 proponents: 8 continual proponents and 6 limited proponents (Table 1). There were small differences in the breakdown of proponents and opponents when comparing FM to IM physicians (continual proponents: 40% FM [4] vs 71% IM [5]; limited proponents 40% FM [4] vs 14% IM [1]; opponents: 20% FM [2] vs 14% in IM [1]).

There were 4 major themes identified. Overall, proponents believed SMBG plays a significant role in education and lifestyle change, resulting in better glycemic control. Opponents were concerned about lack of efficacy in lowering hemoglobin A_{1c} (HbA_{1c}), and more often cited evidence (2/3) than proponents (4/14). Physician perspectives for each theme are summarized below and additional quotations are provided in Table 2.

Theme 1. Education for Lifestyle Change Patient Activation

The majority of proponents believed SMBG works best at initial diagnosis, facilitating education and self-management. "If someone is educated on a behavior or therapy and follows through, and they can see...the benefit of that sugar coming down...that causes a feedback loop that is amazing" (Physician 16).

Opponents believed in-office education alone encourages patient activation and cited evidence that

SMBG does not improve patient outcomes "...the net analysis has not shown any direct impact [of SMBG] on [Hb]A_{1c} or other outcomes" (10).

Patient-Centered Care

Proponents reported tailored negotiations about daily choices based on SMBG readings. "I had a patient who was drinking five beers a night, so his sugars were 300...we negotiated to cut back on the alcohol—maybe switch to vodka and a diet sprite or do two versus the five beers. It's a lesser of two evils" (5).

Opponents felt HbA_{1c} sufficiently fosters patient-centered care. "We look at the most recent [HbA_{1c}]... and talk with the patient about shared decision making if changes are suggested, based on the [Hb]A_{1c} being too low or too high" (10).

Theme 2. Value-Based Care

All physicians agreed HbA_{1c} surpasses SMBG when making medication choices. "I make way more treatment and management decisions based on [Hb]A_{1c} than I do based on home glucose monitoring, because [HbA_{1c}] is more of a trend than an isolated data point" (7).

Affordability for Patients

Proponents and opponents cited cost as a major barrier to SMBG adherence. "Strips cost anywhere between 50 cents or more per day...that could turn out to be the cost of another medication" (13). Physicians practicing in lower-income populations cited this concern more often.

Table 1. Summary of Physician Perspectives on SMBG in Non-Insulin-Treated Type 2 Diabetes

	Continual Proponents	Limited Proponents	Opponents
Beliefs on recommendation of SMBG	"It allows for, first, assessment of hypo- or hyperglycemia. Two, it reinforces patient behavior as it relates to nutrition, exercise, and diet. Three, it allows for appropriate medication adjustments... Four, if there is any sudden change in their glucose, their glucose status allows for us to intervene in between office visits" (15).	"I think self-monitoring is helpful for patients who have uncontrolled blood sugars to move them in the direction of getting their blood sugars under control, with therapeutic interventions such as diet, exercise, and medications" (12).	"I will tell them, 'Based on recent evidence, there is no indication that you have to check your sugar to control your diabetes, because we are checking the three-month blood level. I think it's okay, and I feel safe with you not doing this as long as you're comfortable'" (5).
Frequency of prescribing SMBG	"[I advise checking] twice a day, morning and evening. Some people, if they are very well controlled, I will say, 'You know what. Why don't you check every other day'" (5).	"I recommend that all sugars be done at fasting, first thing in the morning [initially]. After we get to a point where they are stable and we are not recommending daily sugar checks, I will recommend they check their sugars [only] if they are feeling sick...nauseous, or light-headed" (1).	"I try to steer non-insulin dependent patients away from testing at home, mainly because it doesn't change what I do. I monitor their diabetes based on the HbA _{1c} and occasional sugar checks" (6).
Beliefs on stopping SMBG	"I never recommend that they stop completely" (3).	"If they know what foods to eat... and their HbA _{1c} is under great control, then there is really no reason for them to check their blood sugars" (17).	"I don't tend to ever start [SMBG] in someone who is just on orals. Many times I am inheriting patients who are already on it and used to it, so I encourage them to stop. But, they don't necessarily want to stop" (10).

HbA_{1c} = hemoglobin A_{1c}; SMBG = self-monitoring of blood glucose.

Health Care System Costs

A few proponents argued that engaging patients with SMBG could reduce expensive complications. "The most important way for us to manage the ever-increasing cost of care in this country is to engage our patients to be part of the solution in managing their health" (16).

Opponents expressed concern about SMBG's contribution to health care spending and limited impact on treatment decisions. "Routine testing—I bet there are millions of dollars we are wasting" (6).

Theme 3: Patient Safety

Proponents and opponents frequently cited hypoglycemia as a reason to prescribe SMBG. "If they are ... at

risk for hypoglycemia, and if I am concerned they are at risk for silent or asymptomatic hypoglycemia, that's where testing can be helpful" (15).

Theme 4. Considerations for Specific Patient Populations

Both groups identified populations (eg, patients with physical or cognitive disability) who were nonideal candidates for SMBG "[For] patients with rheumatoid arthritis, it would be quite challenging to do finger sticks" (13). Physicians modified SMBG use among patients with low socioeconomic status, who face adherence barriers including poor health literacy. One proponent said: "I'm...less stringent about their [SMBG] requirements, because it's just going to be

Table 2. Additional Physician Perspectives Related to Major Themes

Proponents	Opponents
Theme 1. Education for Lifestyle Change	
Patient Activation	
"Over and over again, I have noticed that people who check their blood sugar tend to be more engaged in the self-management of their diabetes" (14).	"I tend to see the patients who keep monitoring are the ones who are generally more engaged around their self-care...In my experience, [SMBG] has been mostly correlated with their level of activation rather than the disease" (10).
Patient-Centered Care	
"If I have somebody who is pretty much in the action phase of wanting to control their disease and their blood sugar is in the >9 category, I would be more aggressive with them checking and trying to manipulate the diet. But I'm very patient-centered, so I would ask them, 'On a scale from 1-10, how important is it for you to check your blood sugar?' If they say it's 7-8 or 9, I would say, 'Okay, what is your ideal state of checking a blood sugar.' Then, I would see what they would say and do a confidence scale, 'On a scale from 1-10, how confident are you that you can check your blood sugar?' Let's say they say 4 times a week. If I can get them above a 7, then I would go for it" (4).	"Usually, they are a bit hesitant [to stopping SMBG]...50% of patients don't want to stop checking, because they are so used to it, so I will let them continue it. I won't force them to stop" (5).
Theme 2. Value-Based Care	
Affordability for Patients	
"I take into account that I know these strips are very expensive, and for many patients, that's a barrier. So I may tell them to check just once a day but at different times during the day" (13).	"This sounds painful and possibly expensive, you should stop and save your blood" (10).
Health Care System Costs	
"It helps to give us more short-term strategies to fix things rather than waiting for a three-month follow-up, when things can get ahead of us too far" (12).	"For those patients not on insulin, I think we are probably wasting a lot of money. We are doing tons of testing unnecessarily" (5).
Theme 3. Patient Safety	
"If a person is having symptoms that suggest hypoglycemia, then I would use [SMBG]. If we were able to actually avoid the hypoglycemia, then we can avoid potential cognitive damage or an injury related to hypoglycemia, like loss of consciousness and a fall" (8).	"I talk about a constellation of symptoms and when they might expect to feel those. It's usually within a few hours of taking certain medicine or on days when they notice that they are skipping meals or that they are very sick from the cold. We talk a little bit about the general feeling of dizziness, lethargy, sweating, hunger, disorientation, and try to educate both the patient and whoever might be around them that these are signs or symptoms to look out for—to focus first on the intervention, which is go eat or drink something, but then also to check their blood sugar if they have time" (10).
Theme 4. Considerations for Specific Patient Populations	
"For a patient in their eighties who may have some cognitive disability, measuring their blood sugars every day or a couple of times a week, especially if they are doing well, may not really be very useful" (13).	"Some patients really need to see that number at certain times of the day, because it helps them become motivated to bring it down. Other ones, though, it's the complete opposite. It interferes with their care, because they see it and they don't understand" (6).

SMBG = self-monitoring of blood glucose.

a difficult situation trying to figure out how they're going to get their glucometer to work" (3).

DISCUSSION

The majority of physicians still recommend routine SMBG because they believe it drives the lifestyle changes needed for improved glycemic control. This view may be rooted in strong memories of patients who successfully modified their habits. The fact that the American Diabetes Association recommends SMBG based on expert opinion may further reinforce beliefs that SMBG facilitates change. Opponents often cited peer-reviewed evidence as a reason not to prescribe SMBG. Training background (family vs internal medicine) did not strongly affect SMBG viewpoints. Limitations include physicians from a single institution, minimal participant demographic information, and exclusion of nonphysician providers.

Health care systems can look to SMBG as an opportunity to reduce spending with little to no harm to patients.⁸ Given that educational outreach alone has small benefits in changing behavior,⁹ targeting physicians' beliefs about the effectiveness of SMBG, along with policy-based interventions,¹⁰ could reduce this practice.

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Key words: Self-monitoring of blood glucose (SMBG); glucose monitoring; home monitoring; glucometer; test strips; non-insulin-treated type 2 diabetes; insulin naïve diabetes; HbA_{1c}; evidence-based medicine

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