In Brief

The usefulness of self-monitoring of blood glucose (SMBG) requires patients with diabetes to be competent and confident in their ability to carry out glucose testing and interpret its results to guide lifestyle choices and improve outcomes. SMBG instruction can be offered in a variety of settings by a wide array of health care professionals. However, patients too often receive no formal SMBG training. The two skills sets required to successfully perform SMBG include *1*) operating a glucose meter and *2*) appropriately interpreting SMBG data. Whenever diabetes education is provided, both skill sets, as well as potential barriers, should be assessed for all patients.

The Two Skill Sets of Self-Monitoring of Blood Glucose Education: The Operational and the Interpretive

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Self-monitoring of blood glucose (SMBG) is an important aspect of treatment for all people with diabetes. It provides immediate feedback and data that enable people with diabetes to assess how their food choices, physical activity levels, and medications affect their blood glucose control. SMBG results can aid people with diabetes in evaluating their current diabetes management efforts by either reinforcing or calling into question their lifestyle choices.[1]

The last American Diabetes Association (ADA) consensus conference on SMBG was held in 1994.[2] Table 1 provides a list from that conference of potential applications for SMBG data.[2] Not surprisingly, many of these applications are directly related to insulin therapy.

More recently, other consensus panels have made recommendations related to SMBG use.[3,4] In 2009, the International Diabetes Federation (IDF) convened an international working group to consider SMBG recommendations for people with noninsulin-treated type 2 diabetes.[5] All six of its recommendations underscored the fact that, for SMBG to be useful for people with type 2 diabetes and effective in managing their diabetes (improving outcomes), it must be part of an educational program, individualized, and used in partnership with patients' health care providers (HCPs) (Table 2).

Although many health care professionals can teach the operational use of, and interpretive strategies for, SMBG, this article focuses on the role of diabetes educators in this process. Diabetes educators consider SMBG one outcome measurement component of "monitoring," which is included in the American Association of Diabetes Educators' AADE7

Table 1. Potential Applications for SMBG Data[1]

- Achieve and maintain target goals for blood glucose
- Prevent and detect hypoglycemia, including hypoglycemia unawareness
- Prevent and detect hyperglycemia and avoid diabetic ketoacidosis or hyperglycemic hyperosmolar syndrome
- Evaluate the glycemic response to types and amounts of food and physical activity
- Determine appropriate insulin-to-carbohydrate ratios, correction factors, and basal insulin rates for intensive management (multiple daily injections and insulin pumps)
- Adjust treatment in response to changes in lifestyle and the need to add, subtract, increase, or decrease dosages or types of pharmacological therapies
- Determine the need for adjustment in insulin dosages during illness
- Determine the need for insulin therapy in gestational diabetes

Self-Care Behaviors.[6] The other six diabetes self-care behaviors are being active, following a healthy eating plan, taking medications, practicing healthy coping strategies, reducing risks, and problem solving.

Components of SMBG Education

The goal of SMBG education is to ensure that people who use a blood glucose meter are competent and confident in their ability to perform blood glucose tests and interpret the resulting data to make lifestyle choices, which have an impact on clinical outcomes. Competence and confidence are necessary for people to use SMBG effectively as a tool in their diabetes self-management plan.

The two skill sets necessary for successful SMBG are *1)* operational skills and *2)* interpretive skills (Table 3). Because blood glucose meters can be obtained from a variety of sources,

Table 3. SMBG Education Checklist[1]

Operational Skills: Using the Meter
- Selecting a meter
- Ensuring meter accuracy
- Documenting SMBG data
- Addressing individual needs

Interpretation Skills: Using SMBG Data
- Knowing blood glucose targets
- Knowing the appropriate frequency and timing of glucose tests
- Using pattern management in decision-making

diabetes educators may not be directly involved initially in either teaching or assessing both of these skill sets. At the time of diabetes education, regardless of how long ago a person was prescribed a blood glucose meter, it is important for diabetes educators to assess both of these skill sets to uncover potential barriers to using the meter and SMBG data.

Operational skills

During education sessions in which the operational skills of monitoring are being taught, it is important that educators demonstrate the mechanics of performing a blood glucose test and then ask participants for a return demonstration. In addition to successfully performing blood glucose tests confidently and competently, individuals should learn how to use a lancet device, properly dispose of lancets and strips, use control solution, obtain an adequate blood sample, alternate testing sites, code the meter (if required), clean the meter, and document their SMBG results in a logbook or download blood glucose data from the meter. Educators should heed universal precautions when demonstrating how to operate a meter.[7] Other aspects of successfully operating a meter are discussed in detail in the following sections.

Selecting a meter. Many factors should be considered when choosing an appropriate meter for an individual with diabetes. These include patients' visual acuity, manual dexterity, and preferences, as well as meter size and readout options (e.g., back lighting, flagging, and messaging), calibration (coding), and memory and downloading features. However, in many cases, meter selection is limited by patients' insurance coverage. If there is a choice of covered meters, the educator should present the available options, and the selection should be based on individuals' needs and preferences.

It is important for educators to evaluate whether the meter itself is a barrier to SMBG for each patient. This may be the result when patients' insurance plan switches approved meters without patients receiving additional training or education. Unless such patients are comfortable and confident using the replacement meter, continued SMBG may be jeopardized.

The nuances of insurance coverage for meters and test strips can also become a barrier to SMBG. Educators should encourage their patients to contact their insurance plan and ask if the blood glucose meter and strips are considered a pharmacy benefit or a durable medical equipment benefit. It is not unusual for patients to go to a pharmacy to obtain their meter and strips only to be told that these items are not a covered benefit. However, by asking the right questions of their insurers, patients sometimes find out that, although not covered under a pharmacy benefit, these items are covered if mail-ordered from a medical supply company.

Ensuring meter accuracy. The accuracy of the SMBG results depends on both meter capabilities and the human factor in performing a blood glucose test. The U.S. Food and Drug Administration requires all glucose meters to meet a minimum performance requirement set by the International Organization of Standardization (ISO). The international standard for glucose meters, known as ISO 15197, requires 95% of the meter results > 75 mg/dl to be within ± 20% of the true value as measured by a standardized laboratory blood glucose test system. For results < 75 mg/dl, 95% must be within ± 15 mg/dl of the true value.[8] It is expected that more stringent ISO standards for glucose meters will be released in the near future.

To ensure accurate data and limit human error when performing SMBG, educators should encourage individuals to:
- Store their meter and strips properly (Each meter has its own storage requirements; strips should

be stored with cap on bottle and not exposed to light, moisture, or temperature variations.)
- Use strips that are compatible, defect-free, and not expired (Expiration dates are not always provided when strips are supplied through a mail-order company.)
- Code their meter if the device requires coding
- Perform a control-solution check with every new container of strips and more often if necessary (if meter error is suspected because of unpredictable results). Control solution must be prescribed by a provider to be processed as a covered benefit.
- Use a meter that is clean and free of dried blood or debris
- Use an adequate-sized blood sample. Educators may need to teach patients techniques for obtaining an adequate blood droplet, including how to select a lancing device and appropriate puncture depth.
- Use clean, dry fingers (Using an alcohol swipe is not necessary.)

Documenting SMBG data. It is essential for SMBG results to be available in a format that allows people with diabetes to assess the relationship between their blood glucose results and their food intake, physical activity, and medication regimen. Meter memory features can be useful in verifying logbook accuracy, but used alone without a paper logbook may not provide patients with the opportunity to visualize multiple testing results over time.

For patients who have downloadable meters and the capability and capacity to download their results (usually displayed in various graphic formats), educators should review the downloading process to ensure that patients are interpreting the graphic displays correctly. If it is also possible to transmit blood glucose results by phone or electronically, patients and providers or educators should come to an agreement about how often and when transmission should occur.

Patients should be encouraged to bring their meter and blood glucose documentation to every medical visit. This provides the opportunity to review results, clean the meter, verify meter codes if necessary, and perform a control-solution test.

Addressing individual needs. Certain populations have specific needs related to meter selection and use. The elderly, children, and the visually impaired may have unique SMBG needs.

For the elderly, choice of meter and strips may be influenced by potential limitations in manual dexterity, slowed reaction time, or fluctuating vision.[9] How patients receive their monitoring supplies may affect their blood glucose testing. It may be more convenient and cost-effective for the elderly to receive their supplies via mail-order. Educators should address this option and remind patients that they must request shipments of their supplies because "auto-shipments" of meter supplies is no longer allowed.

Children may benefit from meters that require a small sample of blood and lancing devices that hide the lancet and minimize discomfort. Parents often appreciate features such as back lighting for the display, which makes testing in the middle of the night easier, and a memory capacity to store multiple results. When children begin performing their own blood glucose checks, supervision should be provided to ensure that they are performing SMBG properly and recording results accurately.

People with visual impairments would benefit from a meter that is small, is portable, provides a clear speech output, has tactile markings on strips, and offers a method for consistent placement of the blood sample. A limited number of products offer these features. The National Federation for the Blind continuously evaluates products and services for people with diabetes who are blind and can be contacted through its Web site (http://nfb.org) for a list of currently available products.[10]

Interpretive skills
Interpreting SMBG results is considered a problem-solving self-care behavior. It is not uncommon for people who are testing their blood glucose, especially people with type 2 diabetes, to be proficient at and feel confident in their ability to perform tests, but to not use their SMBG data in lifestyle decision-making. Additionally, if patients' HCPs do not use the SMBG data in clinical decision-making, then SMBG is of no value and a waste of resources.

Table 4. ADA and AACE Target Blood Glucose Goals for Non-Pregnant Adults[10,11]		
	ADA Guidelines	**AACE Guidelines***
A1C (%)	• < 7.0; individualized based on duration of disease, age/life expectancy, comorbid conditions, known cardiovascular or advanced microvascular complications, hypoglycemia unawareness, and individual patient considerations • More (< 6.5) or less (8.0) stringent glycemic goals may be appropriate for individual patients	• ≤ 6.5 for most; individualized on the basis of age, comorbidities, and duration of disease • Closer to normal for healthy • Less stringent for "less healthy"
Fasting and preprandial blood glucose (mg/dl)	• 70–130	• < 110
Postprandial blood glucose (mg/dl)	• < 180 at "peak" levels, 1–2 hours after the start of a meal • Postprandial glucose may be targeted if A1C goal not met despite reaching preprandial glucose goals	• < 140, 2 hours after the start of a meal

As an analogy, one may know how a parachute works and how to wear it properly, but unless one uses a parachute when jumping out of a plane, the parachute is of no value. The same can be said for SMBG: it provides value when the data obtained are used. Using SMBG data depends on knowing blood glucose targets, understanding how often and when to test, and using glucose pattern management (GPM) in decision-making, not only for the people with diabetes, but also for their HCPs.

Knowing blood glucose targets. ADA[11] and the American Association of Clinical Endocrinologists (AACE)[12] have set guidelines for blood glucose targets. From a practical standpoint, it matters little which organization's blood glucose target guidelines are followed as long as patients who have been instructed to perform SMBG receive *some* blood glucose target recommendations.

HCPs have the responsibility to provide patients with blood glucose targets based on individual needs. ADA target blood glucose guidelines can be applicable to all people, given that tighter individual targets can be recommended that are within the ADA-recommended target range (Table 4).

The ADA postprandial peak value of < 180 mg/dl can be explained to individuals as aiming for a blood glucose that is no higher than 180 mg/dl, 1–2 hours after a meal. This range is helpful to individuals who find it difficult to check their blood glucose exactly 2 hours after the start of the meal.

HCPs should encourage individuals to write their targets in their blood glucose logbook or recording form; this helps to reinforce this information. Some meters with downloading capabilities can show results in a graphic format. The blood glucose targets that are individually set on the meter should be clearly stated to the person using the meter and written down somewhere for reference when tests are performed.

Knowing the appropriate frequency and timing of glucose tests. There are no universally accepted standards for frequency and timing of SMBG. Many factors must be considered when determining how often and when to test blood glucose. These factors include patients':
- Type of diabetes
- Willingness to perform SMBG
- Level of diabetes control
- Medication regimen
- Lifestyle and daily schedule with regard to activity, food, and work
- Physical ability to check blood glucose
- Ability to problem-solve and take action
- Financial limitations
- Comorbid conditions

Few doubt the value of SMBG for patients using a multiple daily injection (MDI) insulin regimen or insulin pump therapy because of its utility in detecting hypoglycemia and dosing insulin. For people with type 1 diabetes or those with type 2 diabetes using an MDI regimen, blood glucose testing should occur at least before meals and snacks, occasionally postprandially, at bedtime, before exercise, when hypoglycemia is suspected, after hypoglycemia treatment (until normoglycemia is attained), and before crucial tasks such as driving.[11]

However, what is more typically done in this population is testing while fasting and before meals to determine mealtime insulin doses. Occasionally, postprandial SMBG is performed to monitor the effect of a meal on the postmeal rise in blood glucose. To ensure safety, testing before bedtime and before driving are warranted for some individuals. Additional testing is useful during times of insulin dose adjustment, illness, pregnancy, strenuous physical activity, or prolonged exercise.

As with type 1 diabetes, there is no universal standard for testing frequency for type 2 diabetes. In this population, especially those who are not on insulin therapy, SMBG can be useful to reinforce lifestyle habits or changes and to monitor medication regimens. Schwedes et al.[13] showed that when individuals with type 2 diabetes who were not on insulin therapy checked meal-related glucose levels and participated in a structured counseling program, a majority significantly improved their glycemic control. Similarly, in a study by Barnett et al.[14] of patients with type 2 diabetes on oral medications showed that SMBG resulted in improved A1C levels.

The 2009 IDF SMBG guidelines for people with noninsulin-treated type 2 diabetes[5] have gone furthest in suggesting a testing regimen (timing and frequency) for type 2 diabetes (also called "structured testing"). These guidelines suggest numerous "focused" SMBG regimens based on the specific glucose data required (i.e., fasting vs. postprandial). Parkin et al.[15] examined studies involving structured testing as a component of comprehensive diabetes management and concluded that the results support the IDF's recommendations. In addition to these regimens, the *Type 2 BASICS* curriculum guide[16] of the International Diabetes Center in Minneapolis, Minn., suggests a 3-point profile to check fasting blood glucose and the effects of the largest meal.

Table 5 summarizes some of the possible testing regimens, all of which use a variation of paired testing. The 5- and 7-point regimens and the staggered-frequency regimen are considered meal-based testing schemes. The goal of these regimens is to discover the effect of food consumed on the rise in blood glucose after specific mealtimes. Educators can discuss these options with patients to decide which regimen they are willing to do. Patients who find performing SMBG seven times per day over several days unacceptable could instead perform fewer tests over several days at a specific mealtime and then rotate testing every several days until all mealtimes can be assessed. As patients test their blood glucose before and after meals, the resulting data should provide insight into when out-of-target blood glucose levels are occurring.

The 3-point testing regimen, which provides information about glucose control in the fasting state and around the largest meal of the day, can be particularly useful for newly diagnosed individuals with type 2 diabetes. Often patients with newly diagnosed type 2 diabetes are told to check their blood glucose only once per day, first thing in the morning. If their fasting blood glucose level is consistently within the target range, however, this offers little insight into their overall glycemic control. By testing both while fasting and before and after their largest meal, patients can begin to assess the impact of the food they eat on their glycemic control. This is particularly important for people who are working with a registered dietitian because meal-time monitoring is necessary to develop an individualized meal plan that will promote glycemic control.

Noninsulin-requiring people with type 2 diabetes typically only have

Table 5. Examples of SMBG Regimens[1]							
	Pre-Breakfast	Post-Breakfast	Pre-Lunch	Post-Lunch	Pre-Supper	Post-Supper	Bedtime
Three-point SMBG profile to check fasting blood glucose and the effect of the largest meal							
Monday	×				×	×	
Tuesday	×				×	×	
Wednesday	×				×	×	
Thursday	×				×	×	
Friday	×				×	×	
Saturday	×				×	×	
Sunday	×				×	×	
Five-point SMBG profile							
Monday	×	×		×	×	×	
Tuesday	×	×		×	×	×	
Wednesday							
Thursday							
Friday							
Saturday							
Sunday	×	×		×	×	×	
Seven-point SMBG profile							
Monday							
Tuesday							
Wednesday							
Thursday	×	×	×	×	×	×	×
Friday	×	×	×	×	×	×	×
Saturday	×	×	×	×	×	×	×
Sunday							
Staggered SMBG profile							
Monday	×	×					
Tuesday			×	×			
Wednesday					×	×	
Thursday	×	×					
Friday			×	×			
Saturday					×	×	
Sunday	×	×					

Table 5. Examples of SMBG Regimens[1], *continued from p. 87*

Meal-based SMBG profile (less intensive)

Monday	×	×					
Tuesday							
Wednesday			×	×			
Thursday							
Friday							
Saturday					×	×	
Sunday							

SMBG profile to assess or detect fasting hyperglycemia

Monday							×
Tuesday	×						
Wednesday							×
Thursday	×						
Friday							×
Saturday	×						
Sunday							

insurance coverage for 30 test strips per month (unless their provider prescribes and justifies the need for more strips). It is important for educators to work with patients to determine how their monthly allotment of strips will be used to obtain actionable information. If their test strip allowance is limited, this may result in no SMBG testing on some days.

Using pattern management in decision-making. Some decisions such as treating hypoglycemia do not require multiple SMBG results to justify taking action. However, most clinical and lifestyle decisions, such as adjusting medication doses, changing food intake, or understanding the effects of exercise, will require three to four blood glucose results taken at the same time of day before taking action.

Pattern management involves both patients and providers performing a systematic review and analysis of the patients' recorded blood glucose levels. Some available meters and software programs provide automated pattern detection. Regardless of how patterns are detected, the goal is to proactively make changes in lifestyle or the therapeutic regimen to resolve consistent patterns of high or low blood glucose and attain blood glucose targets.[17]

A study by Wang et al.[18] suggested that teaching patients problem-solving skills to act on SMBG results is crucial to improving outcomes; testing blood glucose alone, without taking action based on the results, will not necessar-

ily lead to improved clinical outcomes. Diabetes educators can play a key role in teaching problem-solving skills. Encouraging individuals to write their blood glucose values in a logbook that allows testing times and results to be recorded in a linear and vertical manner facilitates the process of reviewing results (Table 6). There are also meters available that can detect blood glucose patterns and provide users with feedback.

Additionally, the framework for interpreting SMBG records developed by Powers[19] provides the questions that need to be considered when assessing blood glucose results. (See related article in this issue, p. 91.) That framework groups questions in a three-step process: obtaining suf-

Table 6. Sample SMBG Log Recording Results in a Linear and Vertical Manner[1]

Target range 70–130 mg/dl fasting and before meals, < 180 mg/dl 2 hours after meals

	Pre-Breakfast	Post-Breakfast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Bedtime
Monday	128	256			188		
Tuesday	114	248					
Wednesday	118	212	122				
Thursday							
Friday						65	
Saturday							
Sunday							

ficient and accurate SMBG data; identifying all possible interpretations; and making individual plans and recommendations.

It is crucial for people with diabetes to understand all of the factors that can raise or lower their blood glucose. Unless this is clear, patients will not understand what action or lifestyle changes they need to undertake.

It is also important for patients and providers who are analyzing SMBG data to understand that the timing of a blood glucose test can provide valuable insight. For example, if fasting blood glucose results are not within the target range, this assesses the overnight effect of medication(s) taken the night before. If postmeal blood glucose levels are above target, this assesses the adequacy of premeal diabetes medications in light of the meal eaten; if no medications are taken before meals, this assesses the effect of the meal. Table 7 provides direction regarding what to assess when trying to problem-solve out-of-range blood glucose levels.

Paired testing, through which blood glucose is checked before and again 1–2 hours after a meal, has gained attention in recent years.[20] Postprandial testing provides insight on the effect of the meal, the efficacy of the medication(s), and the effect of physical activity on blood glucose levels. Research by Monnier et al.[21] concluded that, as A1C approaches a target of 7%, postprandial blood glucose contributes more to the A1C result than does fasting blood glucose. In such situations, diabetes educators should encourage individuals to focus their efforts on reaching their postprandial blood glucose targets.

It is important to remember that blood glucose testing alone is not sufficient to improve glycemic outcomes.[17] Patients should be educated not only about how to perform SMBG, but also about how to interpret the results, and providers may need SMBG education as well. A study by Rodbard et. al[22,23] showed that improvements in glycemic control occurred when structured SMBG was combined with comprehensive clinical education about SMBG data interpretation and use for medical providers.

Conclusion
Successful SMBG requires education; all patients who are prescribed a meter should also be provided with a referral for diabetes self-management education. It is not enough to understand how to operate a blood glucose meter and successfully perform a test.

The educational components of SMBG include two types of skills: operational (how to operate the meter) and interpretive (how to interpret and act on SMBG results [i.e., GPM]). The value of monitoring is realized when people with diabetes are able to competently and confidently perform SMBG and then analyze the resulting data to make self-care choices that positively affect their diabetes management.

It is crucial for SMBG results to be shared with patients' HCPs and considered when making clinical decisions. Between medical office visits, SMBG results may be the only feedback individuals have to critically assess their glycemic control and management. Educators and HCPs must not only teach patients how to correctly perform SMBG, but also be confident and competent in their own ability to interpret and use SMBG data

Table 7. Information Provided by SMBG at Different Times of Day[1]

| SMBG Timing	Information Provided
Fasting	Assesses overnight effect of medications: • If fasting is higher than bedtime, possible nocturnal hypoglycemia or dawn effect
Premeal	Assesses basal insulin therapy needs
Postmeal	Assesses adequacy of premeal medications (rapid- or short-acting insulin or oral medications) in light of the meal eaten • If no premeal medications, it assesses effect of the meal
Bedtime	Assesses the effect of the evening meal and basal therapy needs
Random	Can help determine whether presenting symptoms are the result of blood glucose fluctuations (hypoglycemia)
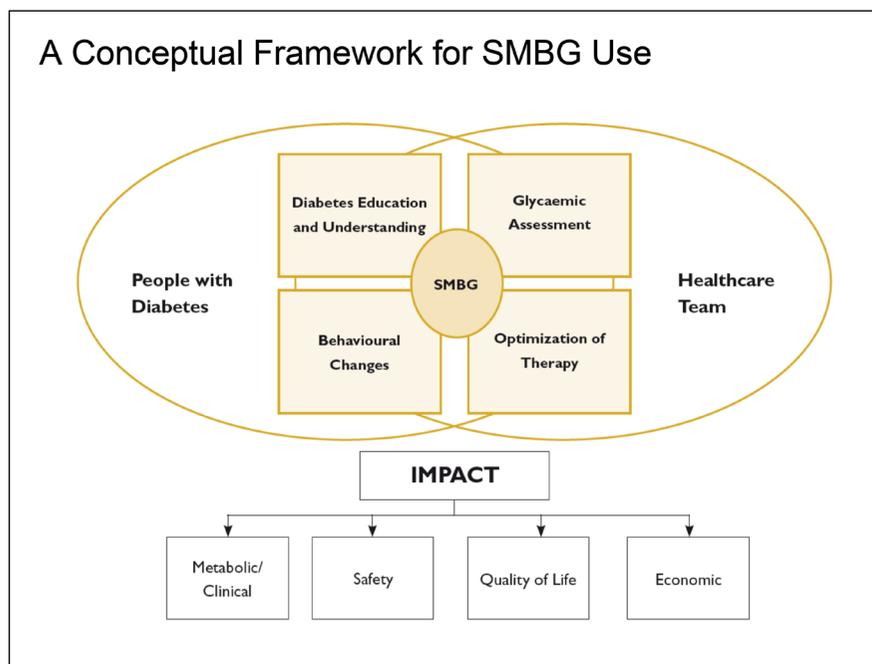
Figure 1. SMBG as a component of the education/treatment program. This figure illustrates and summarizes how SMBG can be used by individuals and HCPs and suggests the potential effect of SMBG on metabolic/clinical outcomes, safety, quality of life, and economic considerations. Reprinted with permission from ref. 5.

to teach problem-solving skills to their patients. Figure 1[5] illustrates and summarizes how SMBG can be used by individuals and HCPs and suggests the potential effect of SMBG on metabolic/clinical outcomes, safety, quality of life, and economic considerations.

References

[1]Austin MM, Powers MA: Monitoring. In *The Art and Science of Diabetes Self-Management Education Desk Reference*. 2nd ed. Mensing C, Ed. Chicago, American Association of Diabetes Educators, 2011, p. 167–194

[2]American Diabetes Association: Self-monitoring of blood glucose [consensus statement]. *Diabetes Care* 17:81–86, 1994

[3]Klonoff DC, Blonde L, Cembrowski G, Chacra AR, Charpentier G, Colagiuri, Dailey G, Gabbay RA, Heinemann L, Kerr D, Nicolucci A, Polonsky W, Schnell O, Vigersky R, Yale, JF: Census report: the current role of self-monitoring of blood glucose in non-insulin-treated type 2 diabetes. *J Diabetes Sci Technol* 5:1529–1548, 2011

[4]Hirsch IB, Bode BW, Childs BP, Close KL, Fisher WA, Gavin JR, Ginsberg BH, Raine CH, Verderese CA: Self-monitoring of blood glucose (SMBG) in insulin- and non-insulin-using adults in diabetes: accuracy, utilization, and research. *Diabetes Technol Ther* 10:419–439, 2008

[5]International Diabetes Federation: Guideline: self-monitoring of blood glucose in non-insulin-treated type 2 diabetes. Brussels, Belgium, International Diabetes Federation, 2009. Available from www.idf.org/webdata/docs/SMBG_EN2.pdf

[6]DeCoste K, Maurer L: The diabetes self-management education process. In *The Art and Science of Diabetes Self-Management Education Desk Reference*. 2nd ed. Mensing C, Ed. Chicago, American Association of Diabetes Educators, 2011, p. 21–69

[7]American Association of Diabetes Educators: Position statement: educating providers and persons with diabetes to prevent the transmission of blood borne infections and avoid injuries from sharps. *Diabetes Educ* 23:401–403, 1997

[8]International Organization for Standardization: In vitro diagnostic test systems: requirements for blood-glucose monitoring systems for self-testing in managing diabetes mellitus (ISO 15107). Geneva, International Organization for Standardization, 2003

[9]Peragallo-Dittko V: Clinical and educational usefulness of SMBG with the elderly. *Diabetes Spectrum* 8:17–19, 1995

[10]Bartos BJ, Cleary MJ, Kleinbeck C, Petzinger RA, Whittington A, Williams AS: Diabetes and disabilities: assistive tools, services and information. *Diabetes Educ* 34:600–605, 2008

[11]American Diabetes Association: Standards of medical care in diabetes—2013. *Diabetes Care* 36(Suppl. 1):S11–S66, 2013

[12]American Association of Clinical Endocrinologists: Medical guidelines for clinical practice for developing a diabetes mellitus comprehensive care plan. *Endocr Pract* 17 (Suppl. 2):1–53, 2011

[13]Schwedes U, Siebolds M, Mertes G: Meal-related structured self-monitoring of blood glucose: effect on diabetes control in non-insulin treated type 2 diabetic patients. *Diabetes Care* 25:1928–1932, 2002

[14]Barnett AH, Krentz AJ, Strojek K, Sieradzki J, Azizi F, Embong M, Imamoglu S, Perusicová J, Uliciansky V, Winkler G: The efficacy of self-monitoring of blood glucose in the management of patients with type 2 diabetes treated with a gliclazide modified release-based regimen: a multi-centre, randomized, parallel-group, 6-month evaluation (DINAMIC 1 study). *Diabetes Obes Metab* 10:1239–1247, 2008

[15]Parkin CG, Buskirk A, Hinnen DA, Axel-Schweitzer M: Results that matter: structured vs. unstructured self-monitoring of blood glucose in type 2 diabetes. *Diab Res Clin Pract* 97:6–15, 2012

[16]International Diabetes Center: *Type 2 Diabetes BASICS Curriculum Guide*. 3rd ed. Minneapolis, Minn., International Diabetes Center, 2009

[17]Hinnen D, Tomky D: Combating clinical inertia through pattern management and intensifying therapy. In *The Art and Science of Diabetes Self-Management Education Desk Reference*. 2nd ed. Mensing C, Ed. Chicago, American Association of Diabetes Educators, 2011, p. 531–575

[18]Wang J, Zgibor J, Matthews JT, Charron-Prochownik DM, Sereika S, Siminerio L: Self-monitoring of blood glucose is associated with problem-solving skills in hyperglycemia and hypoglycemia. *Diabetes Educ* 38:207–214, 2012

[19]Powers MA: *Handbook of Diabetes Medical Nutrition Therapy*. Aspen Publishers, 1996

[20]Polonsky WH, Fisher L, Schikman CH, Hinnen DA, Parkin CG, Jelsovsky Z, Petersen B, Schwitzer M, Wagner R: Structured self-monitoring of blood glucose significantly reduces A1C levels in poorly controlled, noninsulin-treated type 2 diabetes: results from the Structured Testing Program study. *Diabetes Care* 34:262–267, 2011

[21]Monnier L, Lapinski H, Colette C: Contributions of fasting and postprandial plasma glucose increments to the overall diurnal hyperglycemia of type 2 diabetic patients. *Diabetes Care* 26:881–885, 2003

[22]Rodbard HW, Schnell O, Unger J, Rees C, Amstutz L, Parkin CG, Jelsovsky Z, Wegmann N, Axel-Schweitzer M, Wagner R: Use of an automated decision support tool optimizes clinicians' ability to interpret and appropriately respond to structured self-monitoring of blood glucose data. *Diabetes Care* 35:693–698, 2012

[23]Rodbard HW, Schnell O, Unger J, Rees C, Amstutz L, Parkin CG, Jelsovsky Z, Wegmann N, Axel-Schweitzer M, Wagner R: Supplementary data: use of an automated decision support tool optimizes clinicians' ability to interpret and appropriately respond to structured self-monitoring of blood glucose data. Available from http://care.diabetes-journals.org/lookup/suppl/doi:10.2337/dc11-1351/-/DC1. Accessed 6 January 2013

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