

BY JAMES A. FAIN, RN, BC-ADM, PHD, FAAN

BLOOD

Help your patient carefully weigh the available options so he can choose wisely.

SOMEONE WHO HAS DIABETES can use blood glucose monitoring to get immediate glucose readings to guide his decisions on dietary intake, medications, and exercise. If he feels ill, he can quickly check whether his blood glucose level is out of control or something else is causing the problem. Along with hemoglobin A1C values, self-monitoring data give his health care providers information on the effectiveness of his diabetes therapy.

If your patient is about to start self-monitoring or thinking about getting a new meter, how does he choose one that's right for him? Here are some considerations you can discuss with him to help him sort through the many available options.

All meters are not alike

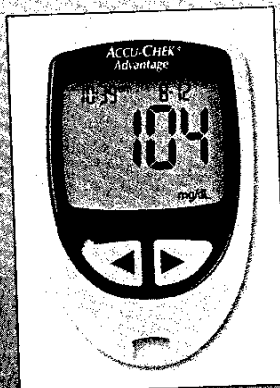
Although all blood glucose meters measure the level of glucose in whole blood, different meters—even those made by one manufacturer—offer dif-

ferent features. Your patient should discuss these features with a diabetes educator to decide which meter best suits his abilities, finances, and personal preferences. (See *Questions to Consider* for what the patient should think about.)

The styles of blood glucose meters range from very simple, affordable models to meters with such extras as a built-in alarm clock, the option to manage data via computer, and the ability to measure additional factors, including ketones. (Details on certain models appear throughout this article.) Cost, ease of use, and the ability to maintain accuracy are key considerations.

Cost. Health insurance plans commonly cover the cost of blood glucose monitoring, so your patient should ask his carrier about his coverage for a meter and the supplies he'll need to use it. Some plans cover only specific meters and accessories; some limit reimbursement. For example, at

ACCU-CHEK Advantage

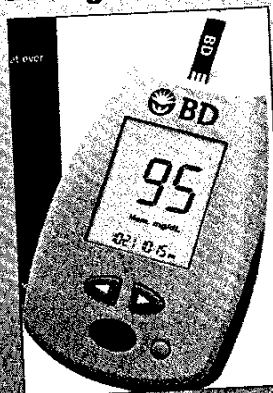


Number one in hospital use

- fingertip sampling: 4 mcl using ACCU-CHEK Comfort Curve strips, 10 mcl using ACCU-CHEK Advantage strips
- calibrated with snap-in code key supplied with each new vial of test strips
- compatible with ACCU-CHEK Compass software, Diabetes Assistant, and ACCU-CHEK CAMIT Pro

Learn more at http://www.accu-chek.com/products/meters_advantage.asp
 Roche Diagnostics

BD Logic



Small sample, less pain for frequent testers

- 0.3-mcl fingertip sampling
- results in 5 seconds
- calibrated by pushing a button with each new vial of test strips
- data downloaded into BD InterActiv diabetes software can be displayed graphically or in charts

Learn more at <http://www.bd.com/usa/usa/usa/products.asp>
 Becton, Dickinson and Company

glucose meters: different strokes for different folks

one time the only Medicare recipients who were reimbursed for blood glucose meters were those who used insulin; in July 1998, Medicare began paying for meters and supplies for all recipients with diabetes, regardless of their treatment.

The cost of test strips, lancets, and cartridges used to monitor blood glucose can be prohibitive for some people. Before choosing a meter, your patient should clarify with a diabetes educator how many times a day he's supposed to check his blood glucose level—a key factor in calculating expenses. Although he can buy test strips over the counter, having a written prescription from a health care provider indicating how many times a day to monitor blood glucose may qualify him for certain types of insurance coverage. If your patient is considering generic test strips to cut costs, he needs to make sure they're compatible with the meter he's considering.

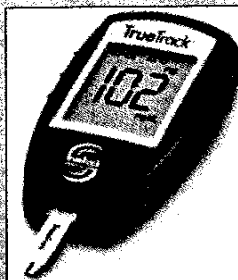
If your patient's insurance plan doesn't cover the costs of blood glucose monitoring supplies or he can't afford the co-payments, refer him to the local chapter of the American Diabetes Association for assistance.

A recent factor in calculating costs is whether the patient plans to use his blood glucose meter to communicate with a data management system to compare data and track

Questions to consider

- Your patient's answers will help you make your choice of a blood glucose meter.
- Have you ever used a blood glucose meter before?
 - If so, what features were most helpful? What features were most important?
 - Is cost a concern? Does your insurance cover the cost of a blood glucose meter, lancets, and test strips?
 - Do you have problems with your vision?
 - Do you have problems with your hands to do small tasks?
 - Would you like a meter that is smaller than your fingertip?
 - Are you interested in electronically tracking your blood glucose results, insulin dosages, and food intake?

TrueTrack Smart System



Value and availability

- 1-ml fingertip or forearm sampling
- automatic "On" with audible beep when meter detects adequate blood sample
- meter and test strips up to 30% less expensive than other brands

• supplies available nationwide at pharmacies and under brand names of major retailers (such as Walgreens, CVS)

- calibration chip included with each batch of test strips
- internet uploading capability available

Learn more at www.3m.com/healthcare/diabetes/products/true-track

OneTouch UltraSmart



Meter and logbook in one

- 1-ml sampling from fingertip or arm
- 5-second test result
- built-in 3,000-record logbook lets patient record information (such as exercise, food intake, and medications), comment on health at the time of testing, and view glucose trends

• calibrated by inserting a test strip and matching the meter reading to the code number on the strip

- compatible with OneTouch Diabetes Management software (free on lupin.com Web site)

trends. Several manufacturers make software available for storing such information as the date and time of each insulin dose, the patient's food intake and carbohydrate grams, and exercise. Although some systems are free, others cost \$20 to \$100.

Ease of use. Getting the feel for different blood glucose meters is essential, especially if your patient might have problems handling the meter or reading the print. A larger meter is easier to handle for someone who has problems with manual dexterity. Someone with impaired vision might choose a meter with a large digital readout. Some meters even have an electronic voice (available in several languages) to guide the user through monitoring and announce the results. Most meters have a memory that automatically records readings, and different styles can store from 10 to 450 readings.

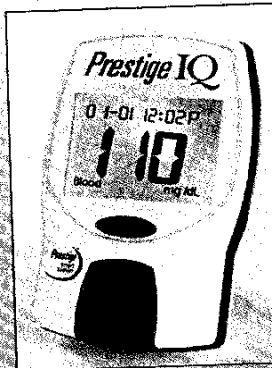
Newer glucose test strips use capillary action to draw the precise amount of blood needed for an accurate reading. The amounts range from 0.3 to 10 mcl, a factor the patient should consider before deciding on a meter. Smaller amounts require less skin penetration, so getting an adequate specimen is less painful.

Maintaining accuracy. All blood glucose meters sold today are relatively accurate when used correctly. But accuracy can suffer if errors occur during calibration or sampling.

Blood glucose meters require calibration at least monthly or according to the manufacturer's recommendation (such as whenever the patient suspects a problem or opens a new bottle of test strips). Some meters have automatic calibration; others require pushing a button or inserting a "code chip" with each new package of strips. After calibrating the meter, the patient should check accuracy by testing a control solution containing a known amount of glucose.

Some meters are appropriate for finger sticks as well as alternative-site testing, such as on the forearm, thigh, or upper arm. Alternative sites tend to be less painful and allow more options for site rotation, but they may produce less blood than a fingertip. Some studies comparing finger-stick and forearm results have shown inconsistencies, especially when testing was done after the patient ate and when blood glucose levels were low.

Prestige IQ



Help for patients with impaired vision or dexterity

- 4-mcl fingertip sampling
- large, easy-to-read display
- large, easy-to-handle test strip with highlighted target area and confirmation spot on back
- blood application outside meter; results in 10 to 50 seconds

• supplies available nationwide through mail service or under brand names of major retailers (such as Walgreens, CVS)

- one-button calibration
- Internet uploading capability available

Learn more at <http://www.lifescanchoice.com/products.asp>
 Home Diagnostics, Inc.

Ascensia BREEZE



Strips on a disk, multiple sampling sites

- 3-mcl sample from finger, forearm, palm, arm, abdomen, or thigh
- 10-test-strip disk automatically calibrates the meter
- single-function buttons and push-pull ejection for easier use

• compatible with AscensiaSM GLUCOFACETS program available free at company Web site; connection cable available for purchase at <http://www.glucometerstore.com>

Learn more at <http://www.bayercare.com/products/products/breeze/index.asp>

BAYER HEALTHCARE

Inadequate sampling is another source of error. To combat this problem, some meters signal when the test strip is full; others won't start if the sample is insufficient.

Any time a patient who's using a blood glucose meter suspects a problem, a clinician should review his technique and draw blood for a lab assessment to compare the results. The lab glucose test, done on serum, is generally about 15% higher than results on whole blood because glucose is more concentrated in serum. This is a consideration for patients who use older meters, but virtually all newer meters and strips are calibrated to record "serum" blood glucose values.

Keeping up with the latest

Technology is providing more user-friendly options all the time. Besides innovations in alternative-site testing, error prevention, and data management in blood glucose meters, additional techniques are being used to supplement conventional monitoring. One—a noninvasive glucose sensor—is worn as a watch; the patient calibrates the watch daily by per-

forming traditional blood glucose monitoring and entering the value into the watch. The device then correlates the value to glucose in his perspiration and reports corresponding "blood" glucose values as often as every 10 minutes for up to 13 hours and sounds an alarm if readings are too high, too low, or declining too rapidly. This device reduces the number of blood samples needed each day.

Homework pays off

When a patient with diabetes is about to decide on a blood glucose meter, doing a little homework pays off. By helping him review his options and find a good "fit," you increase his ability to monitor his blood glucose as recommended and better manage his disease.

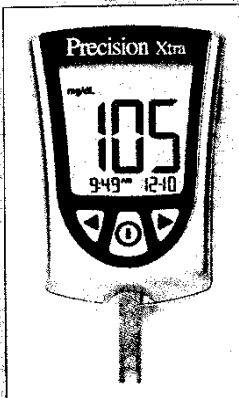
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American Diabetes Association: "Resource Guide 2004: Blood Glucose Monitors and Data Management," *Diabetes Forecast*. 57(1):RG78-RG81, January 2004.

Kleinbeck, C., and Williams, A.: "Disabilities, Diabetes, and Devices," *Home Healthcare Nurse*. 22(7):469-475, July 2004.

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Precision Xtra



Glucose and ketone testing

- currently the only meter that measures both blood glucose and ketone levels
- 1.5-mcl sample from fingertip, forearm, upper arm, or base of the thumb
- calibrator with each lot of test strips calibrates automatically when inserted into meter
- testing won't start without adequate blood sample
- unique chemical reaction

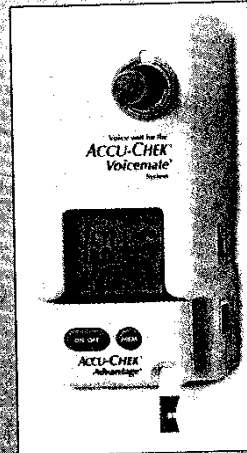
minimizes altered glucose values due to such agents as acetaminophen, vitamin C, and uric acid.

- used with Precision Link software

Learn more at <http://www.glucose-precision.com/service/units/pages/2244cat-0>

ABBOTT DIABETES CARE

ACCU-CHEK Voicemate



Prompts for patients with visual impairment

- 4-mcl fingertip sampling
- voice prompts guide the user and report results
- Comfort Curve strip has a groove to place finger for sampling
- snap-in code key calibrates the meter with each new box of test strips
- compatible with ACCU-CHEK Compass (free at ACCU-CHEK Web site), Diabetes Assistant, and ACCU-CHEK CAMIF Pro software (C)

Learn more at <http://www.accu-check.com/products/units/voicemate.jsp>

ROCHE DIAGNOSTICS