Downsizing the Downsides of CGM

By Gary Scheiner MS, CDE

Virtually everyone who has worn a continuous glucose monitor will tell you, "It ain't always pretty." Today's CGM systems are far from ideal. Their accuracy is still considered inferior to fingerstick testing. The alarms can be an annoyance. They can be uncomfortable, and the cost can be prohibitive. This article is all about dealing effectively with system drawbacks so that you can realize the full benefits that CGM has to offer.

Strategy Number One: Lower Your Expectations

If you haven't already, accept that CGM has accuracy issues and is not going to eliminate your need for fingersticks. The "numbers" generated by CGM are merely estimates. CGM is measuring interstitial fluid, not blood. There is an inherent lag time in the data, and signal transmission can be affected every time you move. Despite the fact that sensor accuracy improves with each new system generation, CGM-generated glucose values still vary from simultaneous fingersticks by an average of 10-20%.

If it helps, ignore the numbers entirely. Pretend they aren't even there. Put a piece of duct tape over the glucose value field on the display if you must, and pay attention to the other stuff. The true value of CGM comes from the high/low alerts, trending information, and data analysis that can be performed after wearing the sensor over a period of time. When set properly, the high/low alerts should do a good job of alerting you of out-of-range readings long before you would have recognized them on your own. Upward and downward trend arrows and graphs are almost always accurate since the sensor is measuring glucose concentration changes from one point in time to the next. And retrospective data analysis allows for intelligent adjustments based on recurring *patterns* as opposed to any single event.

Strategy Number Two: Bolster the Accuracy

Calibration is what CGM "nourishes" off of. Nothing is produced without it. Feed your CGM a steady diet of accurate and well-timed calibration values, and its accuracy will be optimized. Specifically:

- Calibrate only when glucose levels are relatively stable to avoid discrepancies related to lag time. This is particularly true for the Medtronic system; never calibrate when up or down arrows are present on-screen. Abbott's Navigator won't allow calibration when glucose is in a state of flux. Dexcom has reported that calibrations may be performed when glucose is rising or falling, but it still may be best to wait until things are stable.
- Calibrate at the times and frequency recommended by the device manufacturer. Going for too long without calibrating is like driving without your hands on the wheel. Calibration helps the CGM to get back on track in the event it is drifting off track.
- Ensure that the fingerstick readings used for calibration are accurate: test on the finger (rather than an alternate site), clean the finger before testing (dirt, lotion and food residue will affect the readings), apply a sufficient drop of blood to the test strip (don't underdose), and make sure the meter is coded properly (on meters that require coding). This may seem petty to those who have been checking for years, but even experienced testers can get sloppy. And sloppy procedure can lead to inaccuracies.

- Enter the fingerstick value immediately after performing the test. We all know that glucose values can change suddenly, so waiting even a few minutes to enter your reading may cause the CGM to calibrate improperly.

In addition, remember to not use medications that are known to hinder the accuracy of certain CGM systems, such as acetaminophen with the Dexcom.

And when it comes to accuracy, most sensors act like a new employee at a company. At first, there are bound to be mistakes. But with experience, the employee becomes much more efficient and precise. Eventually, after years of quality service, there comes a time when senility or burnout kicks in, and the situation falls apart. Likewise, sensors are most inaccurate and troublesome at the beginning and end of their life cycle. Be patient with them for the first 12-24 hours, and then see how things look. Accuracy tends to improve steadily after the first 12-24 hours, and continues until the sensor's enzymes run out, the site becomes inflamed/irritated, or the sensor just falls off. Then you'll know it's time to start anew.

Accuracy can sometimes come into question when false high/low alerts occur, particularly with the "predictive" alerts found in the Medtronic and Abbott Freestyle systems. This is usually caused by setting the predictive alarm to go off too far in advance of the anticipated high or low. The longer the time interval, the greater the chances that the glucose trend line will deviate from its current path. This is similar to trying to predict the weather tomorrow (short time interval), in three days (medium time interval), or in seven days (long time interval). If you choose to use predictive alerts and want more accurate predictions, stick with a short time interval.

Strategy # Three: Minimize the Nuisances

CGM systems can produce enough beeps and buzzes to drive almost anyone (and their partner) up a wall. There are high and low glucose alerts, predictive high and low alerts, rate of change alerts, and general system alarms (low battery, sensor change reminders, calibration reminders, etc.). When alarms go off too frequently, not only are they annoying, but we might start to ignore them completely.

To minimize the frequency of alarms, set the high and low glucose alerts at levels that are well above and below actual target glucose ranges, particularly during the first several weeks of using a CGM. These levels can gradually be brought towards desired target ranges with improvements in control and experience using the system. It may also be best to leave the other alarms (predictive alarms, rate of change alarms) in the off mode until you have become comfortable with the system's basic features. Calibration reminder alarms can be avoided entirely by calibrating on a regular schedule. Calibrating before bedtime should eliminate reminders during the night altogether.

Skipped data can be another source of frustration. To minimize data loss, wear your receiver/display on the same side of the body as your sensor. This reduces "water interference" caused by the body itself (radio signals from the transmitters do not travel well through water). Make sure the transmitter is properly charged and seated/attached to the sensor. Report any repeated problems to the manufacturer; it is possible that the transmitter or receiver is defective and needs to be replaced.

If you find sensor changes to be a hassle, here's some good news. It is not usually necessary to change sensors when their "approved" usage life has expired. Experience has shown that CGM sensors can often be worn for two or more "life cycles". This rarely causes site irritation or a downgrade in system accuracy. However, be prepared to apply extra tape over the sensor and transmitter to prevent accidental detachment.

Strategy Number Four: Ease Your Pain

Although the sensors are composed of a flexible material, the introducer needle used to insert them can cause momentary pain. To ensure proper/rapid insertion with minimal discomfort, use the mechanical insertion device that accompanies the sensor. Inserting at the appropriate angle (not too sharp or close to the skin surface) also reduces pain over the life of the sensor. Likewise, choosing an insertion site that has adequate subcutaneous fat (not near bone, scar tissue or muscle) can improve comfort considerably.

Some people feel the need to apply numbing cream to the site prior to insertion. I have never been a fan of this practice, as the cream may interact with the sensor and will definitely hinder tape adhesion. If you feel the need to numb your skin, rub an ice cube over the site for a couple of minutes, then dry the area completely before inserting.

Strategy Number Five: Cut Your Costs

The out-of-pocket cost for a CGM system and sensors continues to be beyond the reach of many people with diabetes. However, health insurance coverage is improving all the time. Many private and public health plans offer some level of coverage. CGM is usually considered "durable medical equipment" and is subject to the same deductibles and copays as other types of DME.

Every CGM company has a team of specialists dedicated to helping customers obtain maximum coverage. They can help you to obtain a letter, form or prescription from your physician (preferably an endocrinologist) and collect all the necessary documentation. Your physician's letter is likely to do the job if it states that you have experienced several of the following:

- A history of hypoglycemia, documented in the physician's chart/records
- Presence of hypoglycemia unawareness
- Erratic blood glucose levels
- Suboptimal HbA1c
- Frequent blood glucose monitoring
- Completion of diabetes self-management education

In addition, there are several online resources you can use to improve your chances of obtaining coverage:

The Juvenile Diabetes Research Foundation details the steps for obtaining case-by-case coverage for CGM at its website: http://www.jdrf.org/index.cfm?page_id=106514

CGM coverage policies for select health plans are listed at: http://www.jdrf.org/index.cfm?page_id=111281

Excellent sample letters for establishing medical need can be found at: http://www.diabeteshealth.com/read/2009/02/27/6096/sample-request-for-cgm-insurance-coverage/

For Additional resources for CGM Insurance Coverage, visit the CGM Anti-Denial Campaign Website: http://cgm-antidenial.ning.com

A comprehensive list of published research articles supporting CGM can be found at: http://www.theCGMresoucecenter.com

Nothing worthwhile is without a few challenges. With a little bit of creativity and a few "tricks of the trade," you should be able to minimize the downsides associated with CGM and really start to enjoy what sensors have to offer.

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