

CONTINUOUS GLUCOSE MONITORING SYSTEM (CGMS)

Continuous glucose monitoring devices (CGMs) are increasingly being used for PWDs (persons with diabetes), both type 1 or type 2. Blood-glucose data are collected every 5 minutes, utilizing a small device placed on the body by the patient. A chemical filament extends under the skin to measure interstitial-fluid glucose level. (The Eversense CGM is implanted under the skin in a simple procedure by a health care provider and is replaced every 3 months.)

These devices measure the glucose level in the interstitial blood glucose, which typically lags behind real-time blood glucose by approximately 15 minutes. Nevertheless, these devices are approved by the FDA for use in determining insulin dosing. Users can use smart phones or a handheld receiver/reader to gather blood-sugar data.

CGMs provide up to 288 blood-glucose datapoints per day, giving the user and health care provider abundant information to identify daily glucose patterns and trends. Clinical studies show that patients using a CGM demonstrate improved diabetes self-care behaviors [Taylor, 2018].

Who Would Benefit?

A person with either type 1 or type 2 diabetes would benefit from the use of CGM. Calibration of a CGM is often not required or, depending on the device, is limited to 2-3 checks per day.

For devices not requiring calibration, a PWD can elect to eliminate fingerstick testing. Patients who perform rare finger sticks have limited data available for themselves and their health care providers. They can then be at risk for poorly controlled diabetes if they are given insulin without monitoring blood sugars – either hypoglycemia or hyperglycemia.

Alarms or alerts, depending on the device, will notify the user if blood glucose is low or high or trending low or high. These alerts also lessen the burden for the PWD, as the fear of hypoglycemia is often allayed. With some devices, blood-glucose data can be shared with family members who can follow real-time CGM data. This would be particularly important for patients with hypoglycemia unawareness.

For patients interested in CGM technology, referral to a diabetes educator can be beneficial. A diabetes educator can provide initial instruction on inserting and using the CGM data (except for Eversense), with further independent change every 7-14 days depending on the device. Patients will also need to learn how to disseminate data through software reports.

What Do CGMs Report?

CGM reports are standardized and organized with data that can be analyzed and used to appropriately adjust insulin therapy. The Ambulatory Glucose Report (AGP) provides important metrics that you can visualize on one single page.

Typically, a report looks at 14 days' worth of data (more than 4,000 datapoints). Included in this report is the Time in Range (TIR) which is a standardized glucose reading between 70-180 mg d/L blood sugar. The goal for TIR is 70% or greater each day. If maintained, a 70% TIR would calculate to an A1C of 7%. The goal for low blood glucose readings (under 70 mg d/L) is 4% of the day (less than an hour) or less, and very low (under 50 mg d/L) is 1% (less than 15 minutes) or less [Bergenstal, 2020].

TIR and low and high blood glucose values provide useful daily data, in contrast to an A1C, which provides an estimate of the previous 3-4 months' blood glucose average without any indication of trends, patterns, or hypoglycemia.

Finally, the CGM report gives an estimated 14-day average, referred to as the GMI (glucose management indicator). This provides helpful information for the short term and when determining if recent therapy changes have been beneficial.

CGMs can be used in conjunction with other technologies to improve overall glucose management. Smart pens, that keep track of insulin injections, and insulin pumps, that deliver small amounts of insulin continuously along with mealtime boluses, can be paired with CGM devices. Together,

they help more accurately determine doses and control glucose levels.

CGM data can also be shared with the health care team for review. Diabetes data management is particularly useful in this era of COVID quarantine and "telemedicine," as face to face interactions may occur less frequently.

Are CGMs Covered?

Insurance coverage can be a challenge when trying to acquire this technology for patients. Medicare and Medicaid will cover a device if a patient has type 1 or 2 diabetes, takes insulin at least 3 times/day, and currently monitors blood sugars 4 times/day. Patients must also be seen by their health care provider every 6 months. Some insurances will only cover the device for people with type 1 diabetes. For some, it is a pharmacy benefit; for others, they must use a durable medical-equipment company for supplies. Do note that whatever the current rules are for coverage, they are likely to change and evolve, often quite rapidly.

Overall, CGM use is likely to continue to increase as patients and clinicians take advantage of their ease of use, along with the invaluable data that can be used to improve overall diabetes control.

References and Resources

Taylor PJ et al. Effectiveness and acceptability of continuous glucose monitoring for type 2 diabetes management: A narrative review. *J Diabetes Investig.* 2018;9(4);713-725.

Bergenstal RM et al. Ambulatory Glucose Report. Diatribe Foundation. August 2020.

For more information, visit the websites:

www.dexcom.com

www.freestylelibre.com

www.eversense.com

www.medtronicdiabetes.com