

Glucose Monitoring

Glucose monitoring has three main purposes:

1. Help ensure the safety of people taking insulin and some oral medications by detecting or preventing low blood sugar (hypoglycemia)
2. Help people living with diabetes make dosing decisions regarding their medication (especially insulin)
3. Judge how well changes to diet, activity, and medications are working to maintain healthy blood sugar levels

How regularly people must monitor depends on the type of diabetes they have, their current treatment regimen, and their risk of low blood sugar.



Continuous Glucose Monitoring Systems (CGM)



Flash Glucose Monitoring Devices



Test Strips and Meters – Self-Monitoring

Target Population:

According to Health Quality Ontario, people with type 1 diabetes who have severe low blood sugar and/or are unable to recognize or communicate symptoms of low blood sugar (i.e. hypoglycemic unawareness) may be offered CGM.¹ According to the Diabetes Canada Clinical Practice Guidelines, CGM may be offered to people with type 1 diabetes to improve glycemic control and reduce hypoglycemia.² Must be willing to use CGM the vast majority of time.^{1,2}

According to Diabetes Canada's Clinical Practice Guidelines, flash glucose monitoring may be offered to people with type 1 diabetes or type 2 diabetes to decrease time spent in hypoglycemia.²

The recommended frequency of testing may be individualized to each person's unique circumstances, as per Diabetes Canada's Clinical Practice Guidelines.² For example, the minimum recommended testing for people who inject insulin four or more times a day is at least four times a day, but this may vary depending on individual needs.

Potential Benefits:

- Prevent life-threatening emergencies such as comas or seizures through alarms provide early warning of low or high blood sugar levels allowing corrective actions. User and/or caregivers can receive alerts.
- More time in target blood sugar range. Better blood sugar control and fewer complications.
- Accumulated data helps users and health care providers better adjust treatment plan.
- Reduces need for test strips.
- Reduced time experiencing hypoglycemia.
- Shows patterns of sugar values which can help users improve their treatment.
- Patients can make treatment decisions using historical data (8-hour graph), future data (trend arrow), and specific reading (scan data).
- Accumulated data helps users and health care providers better adjust treatment plan.
- Minimizes the need to use test strips, as there is no need to calibrate the device.
- May help users stay within their target blood sugar range.
- Adequate for many individuals, depending on their profile, preferences, and regimen.

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Potential Limitations:

- Adhesive issues and site irritation
- Requires calibration with test strips
- Cost may be prohibitive
- Alarm fatigue, which occurs when a user is exposed to a large number of frequent alarms and becomes desensitized to them. This can lead to missed alarms

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- Needles are unpleasant and painful
- Patients often omit blood sugar monitoring due to discomfort
- Provides only a snapshot of blood sugar levels
- Information provided is limited for predicting or preventing low or high blood sugar
- Cost may be prohibitive

Cost:

Approximately \$3,000 to \$6,000 annually.

Approximately \$2,500 annually.

Test strips cost approximately \$0.70-\$1.00 each.

How it Works:

- Tracks sugar levels found in the fluid surrounding cells (interstitial fluid) every few minutes using a sensor inserted under the skin and a transmitter.
- Information is automatically relayed in real time to a device, such as a smartphone, that the individual, caregiver, parent or health care provider can read.
- Identifies early on if the sugar level is trending low or high.
- Includes alarm notifications that can alert a user or caregiver when a person is outside her/his pre-set blood sugar range.
- Can provide a sugar level trend over 5-7 days with readings every 5 minutes.
- Finger pricks for blood sugar testing may be required for calibration depending on the model.
- Sensors are changed every 7-10 days depending on the model.
- May be used alone or with an insulin pump (for additional protection from low blood sugar with some pump models).

- Tracks sugar levels found in the fluid surrounding cells (interstitial fluid) every minute using a sensor that is inserted under the skin, and stores data every 15 minutes.
- To obtain a glucose reading, the user performs a 1-second scan of the reader over the sensor, which allows them to see their current glucose reading, 8-hour history, and a trend arrow showing if their glucose is going up, down, or changing slowly.
- The sensor maintains the last eight hours of glucose data, which creates the possibility for a complete 24-hour glucose record
- The accumulated data helps patients and providers make better disease management decisions, such as therapy adjustments.
- Finger pricks and blood sugar testing are not required for calibration.
- The sensor can be worn for up to 14 days.

- Individuals prick their finger to obtain a drop of blood for a test strip.
- A blood glucose meter then provides a single reading of the blood sugar level.
- Blood sugar levels are tested at set times or when desired by the person with diabetes or caregiver.
- Finger pricks are required for every test.

1. Health Quality Ontario. *Continuous Monitoring of Glucose for Type 1 Diabetes*. February 2018. <https://www.hqontario.ca/evidence-to-improve-care/health-technology-assessment/reviews-and-recommendations/continuous-monitoring-of-glucose-for-type-1-diabetes>
2. Diabetes Canada. *2018 Diabetes Canada Clinical Practice Guidelines*. "Monitoring Glycemic Control." <http://guidelines.diabetes.ca/cpg/chapter9>