

WHAT IS CONTINUOUS GLUCOSE MONITORING (CGM)?

- Continuous Glucose Monitoring (CGM) is a system that automatically monitors glucose levels every 5 minutes, providing a constant picture of the glucose values—a pattern, as opposed to a “moment-in-time” snapshot that comes from intermittent finger prick readings.



- A sensor inserted under the skin (every 6 to 7 days) provides sensor glucose readings and sends these readings wirelessly to an insulin pump, remote receiver and/or smart phone where they can be viewed. The results are available in real time and can also be uploaded and reviewed by parents at the end of the day. Some families are able to access their child’s CGM readings remotely on their smart phone.
- Working in combination with CGM, some insulin pumps have a safety feature called “Low Glucose Suspend” (LGS) or SmartGuard™ technology, where the pump will automatically stop delivering insulin for 2 hours if the glucose level is low on the CGM and the user hasn’t intervened to increase it.
- CGM does not fully replace traditional blood glucose (BG) checking. Finger prick tests are still needed:
 - at least twice a day to calibrate the CGM - this should be done at home.
 - to confirm any alerts that require treatment
 - before meals to guide insulin dosing. Note: some CGM systems are approved for dosing insulin without needing a finger prick. A student’s Individual Care Plan (ICP) should outline when to do finger pricks and when you can use the CGM.
 - after treating a low blood glucose to assess response
- CGM sensors measure “interstitial glucose”, or the glucose found in the fluid between cells. This is different from blood glucose, which is measured by a finger prick using a glucose meter. It is important to know that the interstitial sensor glucose readings can lag behind blood glucose by **up to 20 minutes**. So if you treat a low glucose, the sensor readings will take longer to come back up to normal levels than the blood glucose readings on the meter. This is why checking with a meter is recommended after treating a low.

BENEFITS OF CGM:

The purpose and use of CGM will differ between home and school.

At school, the primary role of CGM is to:

- Prevent or minimize low blood glucose, and
- Minimize the need for finger prick glucose checks before and after activity or throughout the day

At home, it provides families with information about patterns that help inform their child’s management and treatment decisions. It also allows for timely adjustments to glucose trends, which should maximize the time the glucose levels are in range.

The Individual Care Plan (ICP) should outline expectations around the use of CGM at school, so that the plan is reasonable and feasible for both families and school personnel.

OVERVIEW OF CGM TECHNOLOGY:

CGM technology is evolving rapidly, and may be more advanced than described in this document. In general terms, the information from CGM may be viewed in 1 of 3 ways:

1. On the screen of an insulin pump (integrated system),
2. On a separate handheld CGM receiver, or
3. On a smart device (phone or watch)

In addition to showing the sensor glucose at a given moment in time, CGM is also able to:

- Trigger an alarm when sensor glucose levels are above or below a particular level (determined by the family/user);
- Show “trend arrows” to indicate if the sensor glucose is rising or dropping quickly;
- Trigger the pump to suspend delivery of insulin if the sensor glucose is low and no intervention made (pump setting change/ food given) that results in an increase in the sensor glucose (integrated system only).

At home, families may use these features regularly. At school, frequent alarms may become disruptive in the classroom and may result in so-called “alarm fatigue”. Also, it is not feasible for a teacher to actively monitor a student’s glucose trends while teaching the class.

It is important that the care plan find a safe and respectful balance between the needs of the student with type 1 diabetes and what is workable within a school setting.

RECOMMENDATIONS:

Before starting CGM use at school:

- The child must wear the CGM for a week with no alarms set during school hours before implementing a CGM care plan at school. Before integrating the use of CGM into the student’s Individual Care Plan, families must be comfortable using the device and have had the opportunity to make insulin adjustments (based on the data reviewed at the end of the school day) to reduce the likelihood of high and low glucose level alerts.
- The **CGM must be calibrated** before coming to school each day.

After entering into CGM care plan at school:

- The **CGM must be calibrated** before coming to school each day.
- Parents may choose to allow the CGM sensor reading to be used before meals/snacks and activity (rather than a meter blood glucose reading). That is an individual decision and depends on how accurate they consider CGM to be. This must be clearly outlined in the student’s ICP.
- If CGM and meter results differ, **the meter blood glucose is considered the most reliable.**
 - CGM readings should not be used if:

- the user has received acetaminophen (Tylenol), or
- the student's symptoms do not match CGM sensor reading, or
- after treating a low blood glucose.

In all these cases, blood glucose should be checked with a meter.

- **Alarm thresholds:** These can be customized and should be set at levels to ensure student safety. For school, we recommend:
 - Set low glucose alarm no higher than 4.0 mmol/L (most will chose 3.5 to 4.0).
 - Turn off high glucose alarm during school hours.
 - Turn off fall rate and rise rate alarms during school hours (these alarm if the glucose level is rising or falling rapidly but still in the normal range).
- Response to **low glucose alarms and trend arrows.**
 - Teachers and school staff are not expected to monitor or respond to trend arrows for students when their glucose is in the target range and they have no symptoms.
 - If the low glucose alarm is activated, these hypoglycemic events will be treated as per the student's Individual Care Plan. With CGM, treatment *may* also be provided for a glucose level below 5 mmol/L (or as per the ICP), when trend arrows point down **and** the student has signs and symptoms of hypoglycemia.
- **Remote access to CGM data.**
 - For privacy reasons, school staff are not permitted to use their own personal devices to monitor the child's glucose levels. School staff may agree to use devices purchased by the family, but this is not an expectation and will depend on local school policy and comfort level.
- **School staff will not be required to perform maintenance on the CGM device.** If the CGM or CGM receiver fails or if the CGM has not been calibrated, the following will apply:
 - Glucose will be checked using a blood glucose meter, at the routine times indicated in the ICP; and/or,
 - A family member will attend the school and assume responsibility for their child's care until the device is working safely.

School Responsibilities related to CGM:

- School staff will look at the CGM readings or assist with finger prick testing at a frequency outlined in the Individual Care Plan (not more than every 2 hours, as a routine).
- School staff will treat hypoglycemia according to the Individual Care Plan in response to:
 - low blood glucose alerts or BG levels < 4 mmol/L.
 - glucose between 4 and 5 mmol/L **and** symptoms of hypoglycemia **and** downward trend arrows.
- Notify parent/ guardian in the event of a calibration alert, CGM malfunction, or when glucose levels above or below certain levels as outlined in the Individual Care Plan.
- Ensure supply staff are aware that the student is using a CGM and will be carrying a receiver / smart device.

Parents responsibilities related to CGM:

- Provide the CGM and receiver. The receiving device will stay with the student (not with school staff) unless specific arrangements are made. Plans should be made for activities, e.g. gym class, when the student may not be able to wear the device.
- Perform a calibration prior to the student going to school in the morning (school staff are not expected to do calibrations).
- Provide a glucose meter, lancets and test strips and ensure that the student's care plan includes details for checking blood sugar in case of: a CGM malfunction; calibration alert; symptoms that don't match the CGM reading; or when the student is not wearing the CGM.
- Review the child's CGM data and patterns at the end of the school day and make appropriate adjustments to diabetes management.
- Set the CGM alarms as follows during the school day:
 - High alert: off
 - Low alert: 4.0 mmol/L (some may prefer a level of 3.5)
 - Low snooze alarm: 30 minutes
 - Fall and rise rate alerts: off

WHAT IS FLASH GLUCOSE MONITORING?

A flash glucose monitoring system is another way to track glucose levels without routine finger pricks. Patients insert a sensor on their upper arm every two weeks and carry a separate device that reads the glucose levels. When the reader is swiped close to the sensor, the sensor transmits both an instantaneous glucose level and graph that shows glucose levels over the previous 8 hours. This allows people to get individual glucose readings (like a blood glucose meter) and trend information (like CGM). However, unlike CGM, this method does not have low or high glucose alarms and will only provide a trend graph if it has been swiped in the last eight hours.

The currently available flash monitoring system does not require finger prick calibration, so users can dose insulin based on its readings (except for when hypoglycemic, when glucose levels are rapidly changing, or when symptoms don't match the system's readings). It should be clear in the Individual Care Plan that parents are asking the school to use the flash monitoring system to replace finger prick blood glucose monitoring. It should also be noted that current flash glucose monitoring is not approved in people under 18 years of age, so some school or provincial policies will still require a blood glucose reading at school.