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Safe at School®: Guidance for the Use of Continuous Glucose Monitoring in the School Setting

The purpose of this guidance document is to provide general information about the use of continuous glucose monitors (CGMs) in the school setting to monitor a student's blood glucose (blood sugar). The student's individualized Diabetes Medical Management Plan (DMMP), developed and approved by the student's diabetes provider or diabetes provider's orders, contain directives for managing the student's CGM at school and should be followed and implemented by the school. The student's individualized Section 504, Individualized Education Program (IEP), or other written accommodations plan should be consistent with the DMMP/provider's orders. Specific questions unique to individual students should be directed to the student's diabetes care provider. This document will be updated as new evidence-based research emerges and devices are approved by the U.S. Food and Drug Administration (FDA), so we encourage you to check back frequently.

The use of CGMs by students with diabetes has increased dramatically in recent years. According to data from a large type 1 diabetes registry, over 50% of children with type 1 diabetes under the age of 18 have adopted this technology, and these numbers continue to rise as the technology becomes more accessible, easier to use, and further reduces disease burden.[1]

How does a CGM work?

A CGM consists of a thin, flexible sensor that sits in the skin, a transmitter that works with a sensor, a receiver, or another device which displays the glucose reading. The sensor measures glucose concentrations in the interstitial fluid and converts that information to an estimated blood glucose.

Why use a CGM?

The use of a CGM provides valuable information about glucose levels for the student, parent/guardian, school team (e.g., school nurse), and diabetes care provider. For example, CGMs update glucose data every one to five minutes, depending on the system. In addition, CGMs have trend arrows that, in combination with the current glucose level, allow the user to know how glucose levels are changing. Studies have demonstrated the safety of direct dosing from CGM data without confirmatory fingersticks.[2]

However, a blood glucose meter should be available for use if the CGM sensor becomes detached or fails. A meter may also be needed if low blood glucose (hypoglycemia) or high blood glucose (hyperglycemia) is noted on the CGM or if the child has symptoms which do not match the CGM reading.

A Summary of Benefits[3]:

1. **Immediate access to glucose levels.**CGMs continuously provide updated glucose data.

2. **Personalized alarms** are displayed on the device (e.g., receiver, pump, or phone) to identify the need for an immediate response to high or low glucose levels and hopefully minimize the frequency of unnecessary educational disruptions.

3. **Trend arrows** that demonstrate the direction and speed of the change in a student's glucose, and in some cases, the ability to predict hypoglycemia so actions can be taken to avert it.

4. **Insight into cause and effect** and the ability to see how different foods, activities, stress, and other factors may affect glucose levels.

5. **Retrospective data review** of glucose trends which can inform changes to the student's insulin regimen or behavior.

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6. **Remote monitoring**, allowing parents/guardians and other caregivers to view the CGM tracing in real time and receive customizable alarms.

7. **Pairing** between certain CGMs and insulin pumps in a hybrid closed loop with automatic insulin adjustments based on CGM readings.

Types of CGMs:

Dexcom G6 or G7 CGM

- Provides readings every five minutes
- G6 system includes a separate sensor and non-disposable transmitter. Warm-up period is two hours.
- G7 system is smaller with a disposable integrated sensor and transmitter. Warm-up period is 30 minutes.
- Sensor lasts for 10 days
- Compatible with a reader, selected pumps (Tandem t:slim X2 with Control IQ or Basal IQ and Omnipod 5), and smart devices (e.g., phone, watch, tablet)
- Approved for insulin dosing

Abbott FreeStyle Libre 2 and Libre 3 CGM

- Provides readings every minute
- Integrated sensor/transmitter which is disposable
- Sensor lasts for 14 days
- One-hour warm-up period after placement
- Compatible with reader and smart phones
- Approved for insulin dosing
- Readings may be falsely raised by vitamin C or lowered by salicylic acid

Medtronic Guardian 3 or 4 CGM System

- Provides readings every five minutes
- Transmitter is rechargeable and not disposable
- Sensor lasts for seven days
- G3 still requires calibration every 12 hours
- Compatible with smart phones and certain pumps (Medtronic MiniMed 600 and 700 series)
- A blood glucose meter must be used to make insulin dose decisions with the G3; G4 is approved for insulin dosing
- Acetaminophen may falsely elevate glucose readings

General Guidelines:

A school cannot prohibit the use of a CGM if it is ordered by the DMMP/provider's orders.

Always follow the student's DMMP before using a CGM. Though many CGMs are approved for insulin dosing, the DMMP/provider's orders should have direction as to whether the CGM can be used for insulin dosing based on CGM readings, or if a glucometer should be used.

Current CGMs on the market are highly accurate and readings do not need to be confirmed by or directly compared to a glucometer reading unless instructed to do so in the student's DMMP.[4,5] However, CGM readings may lag behind blood glucometer readings by 5–15 minutes depending upon the device. Discrepancies with a glucometer may occur when the students' glucose level is changing rapidly.

Using a CGM in School

Blood glucose monitoring is required for diabetes management in school. If a student with diabetes uses a CGM for their glucose monitoring, the school nurse and/or trained non-clinical school staff are expected to use the CGM in accordance with the student's DMMP or provider's orders. CGM readings and trend arrows should be reviewed at times when blood glucose levels would ordinarily be checked with a glucometer (e.g., before meals, with physical activity, before getting on the bus, with symptoms of low or high blood glucose) as outlined in the DMMP.

Trained staff are expected to promptly respond to CGM alarms in the school setting, as consistent with the student's DMMP or provider's orders. This may include alarms for hypoglycemia, hyperglycemia, or rate of glucose change. The parent/guardian should ensure their child is equipped with a device showing CGM data and/or that communicates alarms to school staff, such as a smart device, receiver, or insulin pump. Students should be provided with access to the school's wireless network if using a smart device for their CGM and/or engaging in remote monitoring (see below). The school district should assure parents they will review CGM

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readings at appropriate check times (as noted above) and respond to alarms in a timely manner.

Remote Monitoring
CGMs use Bluetooth to connect to a smart device, allowing users to view their CGM data. This enables an added feature whereby children may be remotely monitored, or "followed," by specified caregivers. These caregivers can view the CGM data on their phone or other device, even if they are not near the child, and receive customizable alarms. The student's CGM data is shared via an app on a smart device using a wireless network or cellular data. Remote monitoring by parents has been associated with improved glycemia[6] and improved parent psychosocial outcomes[7], particularly sleep and worry over hyperglycemia. Other caregivers may be invited to remotely monitor as well, which may include additional family members, the school nurse, and trained non-clinical staff at the school. In some studies, school or daycare caregivers have reported increased reassurance when they are remotely monitoring CGM.[8,9]

Remote monitoring by school staff adds another layer of supervision for diabetes management. The utility and need for school nurses and trained non-clinical school staff to remotely monitor should be individualized for each student based on their age and unique needs. The school nurse and 504 team, including the parent/guardian, should discuss each student's needs and determine if remote monitoring is necessary based on the DMMP/provider's orders. Different factors may influence the school's capacity to provide remote monitoring.

In all cases, schools should follow the DMMP/provider's orders to use the CGM for routine/periodic and emergent blood glucose monitoring and ensure a timely response to all CGM alarms. Additionally, parents should work with the school to set up a communication system with the school nurse to provide actionable updates on trends throughout the school day if needed and to establish expectations regarding the frequency of such communication.[3] Examples of actional updates may include hyperglycemia requiring a correction bolus and/or impending hypoglycemia with downward trend arrows on the CGM tracing.

For school nurses who do plan to remotely monitor a student's CGM on a separate device, we recommend:

- The school/school district or parent/guardian should provide a device (e.g., tablet) to link to the CGM sharing app for the child's system in accordance with the student's DMMP/provider's orders. School nurses and trained non-clinical school staff generally should not be expected to use their personal device to follow students.

- School nurses and trained non-clinical school staff can follow multiple students on one device using respective applications associated with each device.

- The school district and parent/guardian should discuss expectations for CGM remote monitoring during the school day as part of the 504 plan. Specifically, the response to alarms, timing of remote monitoring, and delineating actions/communication to be taken in response to alerts and/or glucose trends.

- Where a school nurse and trained non-clinical school staff member is remotely monitoring the CGM, this should not supersede any other strategies to identify and manage hypoglycemia as outlined in the student's DMMP/provider's orders.

Parent/Guardian Considerations
Please discuss the use of a CGM with your designated school team members, including the school nurse and/or other trained staff (preferably those who participate in the development of your child's 504 plan). You should review expectations for actionable communication between the school team, yourself, and your child's health care provider. Information from your child's DMMP or updated provider's orders will guide this discussion as it prescribes the plan for your child's diabetes management at school directly from your child's diabetes provider team.

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The plan for CGM management at school should be consistent with your child's DMMP/provider's orders and included in your child's Section 504 Plan, IIEP, or other written accommodations plan.

- If possible, have this discussion with your child's educational team prior to the start of the student's first day school, and otherwise as soon as possible.

- Keep in mind that the school team members, including school nurses and school staff who are trained to care for students with diabetes, aim to provide support that will promote the student's safety and facilitate learning. While daily diabetes management and glucose monitoring can be challenging, it is important to keep in mind the shared goal of your child's safety and well-being. Developing a collaborative relationship between the parent/guardian, diabetes care provider, and school staff is key.

Hypoglycemia (Low Blood Glucose)

- The DMMP will specify CGM alarm levels for each student.

- Follow the DMMP/provider's orders for treatment related to low CGM alarms, including whether a confirmatory meter glucose is needed. It is prudent to check a meter glucose if the child has symptoms of hypoglycemia which do not match the CGM reading..

- Following treatment for low glucose, due to sensor lag times and rapidly changing glucose levels, the improvement in glucose levels may not yet be visible by a CGM. To avoid over-treating lows, use a fingerstick reading before treating a second time if the sensor reading continues to appear low.

- **For all CGM users**, if the student exhibits symptoms of hypoglycemia and a blood glucose meter is not readily available for confirmation of the glucose level, the priority should be to treat the low glucose level per the DMMP.

- If CGM use and/or remote monitoring is disrupted due to device malfunction, Bluetooth/Wi-Fi issue, or other interruptions, the student'sDMMP should be referenced to ensure that appropriate diabetes management continues.

Hyperglycemia (High Blood Glucose) and Ketones:

- The student's DMMP will indicate a threshold high sensor reading which may require action. This could include checking a confirmatory meter glucose, encouraging water intake, administering an insulin correction dose, and/or checking for urine ketones. Check the student's blood glucose with a meter if their symptoms do not match the CGM.

- The student may require additional insulin if ketones are present.

- If ketones are present in a student who uses an insulin pump, give the correction insulin by injection only and alert the student's family, and, if the family is not available, the student's diabetes care team.[6] Ketones may be an indication of a pump site issue. Please note, students using hybrid closed loop systems may need their insulin pump settings changed to "manual mode" for one to two hours after the injection is administered to prevent over-correction.

Use of Trend Arrows

The use of trend arrows and other advanced CGM features should be clearly enumerated in the DMMP. For some children with diabetes, their management plan may include dose adjustments based on trend arrows at routine dosing times. How to monitor for and respond to trend arrows and related concerns should be discussed with the child's diabetes care provider. The goal should be to manage diabetes needs while also promoting student well-being and minimizing unnecessary interruptions in the school day.[10]

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Concerns Related to CGM Supplies:

- If a CGM sensor falls off at school, the school nurse should help the student place all pieces into a sealable plastic bag to be sent home with the student. No portion of the CGM should be discarded while at school.

- Until the sensor is replaced, the child should be monitored by fingerstick with a blood glucose meter.

- It is recommended that the sensor be replaced by the student's family if the student is unable to insert a new sensor themselves.

- Students who have been approved to self-manage their diabetes at school should be permitted to insert a new sensor while at school. The student's DMMP should be referenced to confirm that this is appropriate for the student.

- Confirm that appropriate diabetes care supplies are available at school and schedule routine inventory of the supplies. Maintain inventory to ensure that supplies have not expired (e.g., glucose meter test strips).

References

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The information provided in this guide does not constitute medical or legal advice.
For medical advice, contact your child's diabetes provider, and for legal advice, contact an attorney.

Be sure to check out additional **Safe at School®** training resources and tools at **diabetes.org/safeatschool**

Thank you to the ADA's Safe at School Working Group members for their contributions to this guidance.