

# ISPAD Clinical Practice Consensus Guidelines 2022: Management and support of children and adolescents with diabetes in school

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## 1 | WHAT'S NEW/CHANGED

This chapter provides updated guidance on promoting optimal management of children and adolescents with diabetes within the school environment with a focus on those who require insulin. It includes details of educational resources to help school personnel provide support, encouragement, and supervision to students with diabetes, and specific details about nutrition and insulin administration. Updated recommendations on glucose monitoring, central to achieving optimal glycemic outcomes at school, include a focus on newer technologies such as continuous glucose monitoring (CGM) devices. These updates emphasize that a collaborative approach among parents, the student's health care team, and schools, together with advancements in communication and technology should be used to optimally support students for successful diabetes management at school.

## 2 | EXECUTIVE SUMMARY AND RECOMMENDATIONS

The following recommendations, reached by consensus, are largely based on expert opinion (E). They represent the ideal or best practice approach, recognizing that full implementation may vary geographically both within and between countries, and depending on availability of and access to resources.

### 2.1 | Terminology

Parent refers to a parent, legal guardian, or other person having responsibility for, or legal custody of, a child.

Child/children refers to individuals up to 19 years of age.

Medical team refers to the usual health care team treating the child with diabetes.

Diabetes educator refers to health care providers who specialize in the provision of diabetes self-management education for people with diabetes. This may include but is not limited to nurses, dietitians, nurse specialists, advanced practice nurses, physician assistants, certified diabetes educators, pharmacists.

School personnel refers to teaching and administrative staff, school nurses, and others who may be involved with the care of the student.

Diabetes management plan (DMP) is used as a general term for documents detailing the care required for the management of an individual student's diabetes while at school.

## 2.2 | Recommendations

- The number of young people with diabetes attending school is increasing (A), placing a significant burden on families, health care systems, and schools (E).
- Optimal management of diabetes, including at school, is a prerequisite for learning (B) and to avoid diabetes-related complications (A).
- Children may spend more than 30 h per week in the school environment. Maintaining normoglycemia during school hours is important. Glycemic targets during the time a child is at school should not differ from targets in any other setting (E).
- All students with diabetes must have an individualized plan that details the requirements for diabetes management. The plan must be developed and agreed on with parents in advance of school attendance (C). The plan should be reviewed and amended as and when necessary, according to the needs of the student, and/or at least annually (E).
- The type of insulin regimen used at school be tailored to the needs, ability, and wishes of the student/parent and should not be dictated by the availability of school resources (E).
- Parents cannot be expected to compensate for a lack of school resources and attend to their child's medical management during the school day (E).
- The World Health Organization and many common law countries recognize diabetes as a disability. Legal frameworks exist in many nations to ensure the child with a disability has equal opportunity to participate in all aspects of school life (A).
- Public policies and legislation to support students with diabetes in school should become the standard in every country. Governments must support schools with adequate resources to ensure they can provide the reasonable accommodations required to create a safe environment and facilitate optimal medical management as prescribed, allowing students with diabetes to participate in education on the same basis as their peers (C).
- Schools have a nondelegable duty of care to their students, and school personnel should take reasonable care to protect them from harm that is reasonably foreseeable. The expectation is that, irrespective of age and ability, all students with diabetes must receive the support, encouragement, and supervision of school personnel (E).

- Minimum reasonable accommodations include ensuring school personnel provide support as needed with insulin administration, blood glucose monitoring (BGM), and emergency management (E). Students with diabetes can be safely cared for in schools by a variety of trained personnel, including licensed (e.g., registered nurse) and unlicensed staff (e.g., teachers, education and special needs assistants, administrative staff, and so forth).
- Each school should identify trained and authorized school personnel to provide age- and developmentally- appropriate support for diabetes care during school hours (E).
- Lack of security for food, insulin, and glucose monitoring compounds the challenge of integrating diabetes self-care in the school setting, particularly in low-resourced countries. This does not negate the responsibility of policymakers and schools to ensure full school participation of students living with diabetes and to provide supportive and safe diabetes management in the school setting (E).
- All school personnel, including teachers, administrative staff, counselors, sports staff, nursing staff, and out-of-school-hours care staff, must receive appropriate diabetes education. Schools are responsible for adequately training their personnel about diabetes, but the content of the training is the responsibility of the health care team and parent (E).
- The medical team/parent must provide clear instructions for managing hypoglycemia (C). School personnel should be educated about the signs/symptoms of hypoglycemia, and a hypoglycemia emergency kit should always be with the student at school and off-site school-sponsored activities (E).
- Educational materials should provide information according to the level of contact staff have with the student with diabetes:

Level 1: Introductory education for all staff, ensuring a basic understanding of diabetes and of the emergency response plan for hypoglycemia;

Level 2: Intermediate education for staff with classroom or school-sponsored extracurricular contact, providing more detailed information around diabetes management and treatment of hypo- and hyperglycemia.

Level 3: Individualized skills training for staff providing direct diabetes care (E).

- Education resources are available in multiple languages to support diabetes awareness and knowledge in schools. These have been successfully implemented in both high- and low-resources settings (E).
- Care of the student must be individualized given variable experience, level of understanding, access to resources, coping skills, and economic circumstances of the student as well as varying roles and levels of diabetes expertise of school staff. Whether children can self-manage certain aspects of their diabetes and/or self-administer insulin is not necessarily age-dependent and can only be determined by the parent and health care team (E).
- Students with diabetes must be allowed to monitor their blood glucose (BG) levels, administer insulin, and to treat low/high BG values at any time during the school day, with adult supervision and assistance if needed (E).

- Administration, or careful supervision of insulin administration, by injections or insulin pump, requires school personnel to be specifically trained and legally authorized with informed parental consent (E).
- Glucose monitoring is central to achieving optimal glycemic targets at school. School personnel must know how and why to monitor glucose and be familiar with glucose monitoring devices (including glucometers and CGMs) (E).
- Access to food in schools is an integral part of enabling children to grow normally and balance their insulin and food intake. Managing nutrition during school hours, including calculating the carbohydrate content of school meals, is an important part of optimal diabetes management and requires collaboration between parent, the student, and school personnel (E).
- Students with diabetes must be enabled and should be encouraged to participate in physical activity. Adjustments for safety and optimal performance should be clearly outlined in the student's diabetes care plan (E).
- Successful diabetes management at school heavily depends on effective communication and problem-solving with the family (B). Schools should clarify expectations and coordinate communication (E).
- Young people with diabetes have a significantly increased risk of experiencing discrimination, stigma and bullying, all of which may affect self-esteem, motivation, and emotional health. Diabetes care tasks should be integrated into the student's regular daily routine as unobtrusively as possible to preserve their privacy, dignity and support their social and educational development (E).
- Some studies report higher rates of mental health disorders such as depression, anxiety, and eating disorders in young people with diabetes (B). Schools have a unique opportunity to identify and address mental health concerns in students with diabetes (E).
- Exams and other assessments are associated with stress and increased risk of acute transient episodes of hypoglycemia or hyperglycemia (B), which can affect performance (B) and require accommodation. Specific written arrangements should be in place (including access to BG monitoring equipment; fast-acting carbohydrates; and hypoglycemia emergency kit) for exams (E).
- The DMP is to be followed in school-based activities outside of regular school hours, including but not limited to before and after school programs, school camps, field trips, school related sports events (E).
- A collaborative approach between parents, the child's health care team and the schools, together with advancements in communication technology should be used to optimally support students for successful diabetes management at school (E).

### 3 | INTRODUCTION

Diabetes is one of the most common chronic medical conditions in childhood. Incidence rates of both type 1 and type 2 diabetes are increasing,<sup>1–3</sup> thus the number of young people with diabetes at

school will continue to increase. Better glycemic management results in more optimal short- and long-term health outcomes.<sup>4,5</sup> Given that children spend a considerable proportion of their waking hours in school, failure to optimize diabetes management during this time contributes to suboptimal glycemic outcomes<sup>6–8</sup> and can increase the risk of diabetes complications. The effect of BG on learning is also important. Students with diabetes can achieve full participation in academic and extracurricular activities when diabetes is managed safely and effectively throughout the school day. Consistent and successful diabetes care at school will facilitate learning and social development, promote participation in all aspects of school life, and minimize absenteeism.<sup>9,10</sup> School personnel must be educated about diabetes and trained to support students, to meet contemporary standards of diabetes care, optimize learning, and create a supportive school environment.<sup>11–16</sup>

Everyday activities such as eating and physical activity affect BG levels, which can rapidly drop too low (hypoglycemia) or climb too high (hyperglycemia) outside of the target range. Attention to daily diabetes management at school can reduce the likelihood of these fluctuations. Knowing the risk of and how to respond to both hypoglycemia and hyperglycemia and being vigilant about the potential dangers will help prevent severe blood sugar emergencies in the school setting.

These guidelines have been written with multiple stakeholders in mind, including students, parents, school personnel, and medical teams. Policy makers for health, education, and labor are also important stakeholders given that legislation can influence change and ensure minimal standards are established and met. Expectations for support in schools should be pragmatic and sustainable and must balance successful diabetes care, the student's right to be safe, supported and included, and the demands on school staff. Currently, many countries do not have legal or statutory provisions in place mandating that children with diabetes receive prescribed health care support at school. Because many jurisdictions do not have school nurses, the responsibility of insulin administration and BG monitoring falls on the family or on school personnel.<sup>17,18</sup>

While children may become technically skilled at an early age, students cannot be expected to be wholly responsible for their diabetes management at school, irrespective of their age and ability. All students with diabetes must receive support and encouragement from and be supervised by school personnel, especially when it comes to recognizing and treating hypoglycemia. Even older adolescents who usually self-manage their diabetes may have impaired judgment and cognition when their BG level is low.

Each student with diabetes must have a plan (sometimes known as a DMP) that includes individualized instructions for glucose monitoring, insulin administration and other aspects of diabetes care, and a detailed emergency plan. The parent/student, medical team and the school should agree on the plan, which should be reviewed and updated at least once a year or following any major life event or change in management. While terminology used for the various elements of the DMP (and the DMP itself) will vary from one jurisdiction to another, and the person completing tasks will differ based on the context, what is critical is that expectations, roles, and responsibilities are clear and that required supports are in place.

This chapter includes a review of the key essential resources and education required to support both the school staff and the student with diabetes. It outlines both minimal standards for low-resourced settings and optimal standards for all settings, respecting students' needs and rights as well as capacity of education and medical systems.

## 4 | DIABETES MANAGEMENT

### 4.1 | Insulin

The type of insulin regimen, injections, pump, or automated insulin delivery system should be tailored to the needs, ability, and wishes of the child with diabetes and their parents and may change over time as the child physically and psychologically matures. The optimal regimen provides insulin prior to each meal and snack (insulin pump or multiple daily injections). While insulin regimens that avoid lunchtime doses are still occasionally used, they are less flexible and make it difficult to balance insulin for lunch and snacks. The insulin regimen should not be dictated by school resources, but rather by the needs of the child and the availability of resources to manage diabetes (e.g., insulin; BG monitoring equipment).

Insulin pumps help facilitate optimal insulin delivery. They provide continuous basal insulin and require the user to manually enter the carbohydrate content of food consumed (meal bolus) and current BG (for corrections) prior to meals and snacks. The advantage of pumps at school is that manual injections are rarely needed. However, young students will need supervision or hands-on support to administer an insulin bolus for meals and snacks. While some pumps can automatically adjust basal and correction boluses according to the glucose levels from a connected CGM, these devices still require a manual bolus for food. In the future, it is anticipated that pumps linked to CGM will be able to automatically adjust insulin for food.

Every student with diabetes must be assured safe insulin administration at school. Designated school personnel have the responsibility to assist with insulin administration or, at least, to supervise and support the student doing it. Not all school personnel will agree to take on this responsibility; therefore, the school principal may ask for staff volunteers or designate staff members. School personnel require training by the health care team or by a parent. Medical orders and explicit informed consent and authorization by the parent for school personnel to give insulin to their child must be in place in advance for the protection and safety of the student and school staff (see Section 5). The key steps for insulin administration at school are: (a) determining the dose; and (b) delivering the insulin.

School personnel responsible for supporting students with diabetes should be trained to calculate insulin doses for those on injections. Parents must provide the carbohydrate counts for all foods, as well as the insulin-to-carbohydrate ratio and the correction factor or variable dosing scale. Insulin pens are recommended (rather than syringes) to promote earlier independence and to reduce the chance of dosage error.

Use of insulin dose calculators promotes earlier independent decision-making in young children.<sup>19</sup> Where available, bolus calculation can be facilitated using the "bolus advisor" feature on some commercially available home BG meters, approved smartphone apps or smart insulin pens, and is routinely available on pumps. Some students may use a fixed dose of insulin each day. Specific instructions regarding insulin administration and insulin dose adjustments at school should be incorporated into the student's DMP.

Premeal insulin should be given 10–20 min before eating<sup>20</sup> however, it can be difficult to apply this rule at school and for very young children.

### 4.2 | Blood glucose monitoring

Glucose monitoring is essential to achieving optimal diabetes management and must be supported in the school setting. BGM is necessary before insulin administration for safe and appropriate practice. The DMP should include glycemic targets, the frequency of BGM during the school day, and the method for monitoring (glucose meter, real-time CGM, or intermittently scanned CGM). At a minimum, BGM should occur before each meal, and before and after physical activity. Because both high and low BG levels may adversely affect performance,<sup>21,22</sup> BGM should also take place when the student is experiencing symptoms of hypo- or hyperglycemia and before or during school tests or exams.

The family is responsible for providing the BG meter/CGM and any related supplies (e.g., glucometer strips, lancets, batteries, and so forth). For students who cannot independently manage diabetes, school personnel should be trained to use the student's BG meter and/or respond to CGM alerts and alarms. The DMP should include instructions on when CGM values should be confirmed with a BG meter. Students using CGM at school should have a backup BG meter and supplies for use in the event the CGM stops working or falls off. All CGM supplies should be returned home with the student to avoid discarding durable device components such as transmitters. Students should have access to monitoring supplies at all times when at school and at school-sponsored events. Since CGM devices send data to a pump, a proprietary receiver, or a smartphone via Bluetooth®, students need access to these devices during class time. In addition, students should be able to charge BG meters and CGM readers/compatible smartphones as needed at school.

Recent advances in CGM technology include remote monitoring that allows parents to see their child's glucose levels and trends in real time. Studies suggest that when school nurses support CGM use<sup>17,23</sup> and when parents "follow" their children's CGM data parents have improved psychosocial outcomes, children have better glycemic outcomes<sup>24,25</sup>; and school nurses report feeling reassured. However, school nurses also reported concerns about more frequent phone calls, disrupted daily routines, and increased parental anxiety.<sup>23</sup> When students use CGM, parents and school personnel should discuss parental expectations, appropriate communication strategies and determine what is best for the student and feasible in the school setting to support successful diabetes management.<sup>26</sup>

## 4.3 | Nutrition in school

All children need a healthy, balanced diet for optimum growth and development, and education regarding healthy food choices and eating habits is part of diabetes management. For children with diabetes, nutrition is a key component of diabetes management that must be integrated into their treatment regimen and school routine while respecting cultural dietary restrictions and personal dietary choices.<sup>27</sup>

Carbohydrate counting is an essential part of diabetes management. Insulin dosing is based on the carbohydrate content of food so all students require access to reliable information about the carbohydrate content of their food. For “packed” lunches from home (prepared by parent), the carbohydrate content should be predetermined and provided by the parent. School-provided meals require cooperation between the school and the parent to determine the foods available and carbohydrate amounts based on portion size and nutritional content of foods served.

Access to food in schools is an integral part of enabling children to grow normally, exercise, and balance their insulin and food intake.<sup>27</sup> For children living with food insecurity, provision of food in school is essential. The 2020 World Food Program reported that one in two school children worldwide receive school meals daily, due in large part to growth of school-based nutrition programs in low-income countries. Effective school food programs increase children's access to school and improve learning.<sup>27</sup> Meals eaten in school may make up a large proportion of a child's daily nutritional intake<sup>27</sup> and for some children, may include breakfast clubs, snack times, and after-school clubs.

If school staff are not trained to administer insulin, this can create a barrier to accessing food supports like breakfast programs for students with diabetes.<sup>28</sup> Students who do not receive lunchtime insulin will require both a midday meal and snacks to prevent hypoglycemia and match the action profile of insulin injected at the beginning of the day (see Chapter 10, Nutritional Management in Children and Adolescents with Diabetes). Thus, the level of support required at school will vary depending on the student's regimen and level of independence, from ensuring the student consumes their meal on time, to assisting with counting carbohydrates to determine insulin doses.

Food choices in school may also be determined by local and national government policy, and issues such as obesity and dental health are also relevant for young people with diabetes. Where the student has a coexisting medical condition (e.g., celiac disease, cystic fibrosis) that requires additional dietary adjustments, these should be detailed in the DMP. Students with diabetes need access to snacks wherever they are, including in the classroom and during tests or examinations.

## 4.4 | Physical activity

All children and young people with diabetes should be given the same opportunities as their peers to safely participate in sports and physical activities, which offer physical health and social benefits. They should follow the same guidance for daily exercise—with respect to frequency, duration, and type of physical activity—as their peers without diabetes.

**TABLE 1** Actions for the physical education instructor or coach

### General considerations:

- Encourage all students with diabetes to participate in exercise and physical activities/sports.
- Treat the student with diabetes the same as other students, except in meeting his or her medical needs (respect the student's right to privacy and confidentiality).
- Make sure that BG monitoring equipment and an emergency kit for treating hypoglycemia is available at all activity sites and encourage the student to keep personal supplies readily accessible.
- Encourage the student to always measure BG before exercise.
- Know the signs and symptoms of hypoglycemia and hyperglycemia and be prepared to respond appropriately according to the student's DMP.
- Communicate with the school nurse and/or trained diabetes personnel and parent regarding any observations or concerns about the student.

### Management of hypoglycemia:

- Hypoglycemia can occur during and/or after physical activity. A change in the student's behavior could be a symptom of hypoglycemia.
- Treat hypoglycemia immediately. Ensure the student waits until BG is back in target range before resuming activity. The DMP may suggest a snack following hypoglycemia if there is ongoing activity or more than an hour until the next meal or snack.

### Management of hyperglycemia:

- Ketone levels should be checked if the student develops nausea and/or if BG levels are elevated above a given threshold as per DMP
- Exercise is contraindicated if blood ketones are  $\geq 1.5$  mmol/L or urine ketone levels are 2+ or 4 mmol/L or greater. If ketones are between 0.6 and 1.4 mmol/L, the situation should be assessed prior to exercise. Correction with insulin is recommended.

The risk of hypoglycemia during and after exercise can be a barrier to physical activity.<sup>29</sup> The likelihood of hypoglycemia depends on many factors, including BG level prior to activity, when the student last ate or received insulin, individual sensitivity of BG to exercise, and the type, duration and intensity of activity. For instance, anaerobic activities or sprinting may cause the BG to trend upward while prolonged aerobic activities are more likely to cause a downward trend.

Regardless of the insulin regimen and technology used, students with diabetes need thoughtful planning to manage BG during and after physical activity. The DMP should include specific instructions for teachers, instructors, and coaches related to exercise.

Comprehensive recommendations are available in Chapter 14, Exercise in children and adolescents with diabetes. An overview with guidelines for the physical education instructor or coach are provided in Table 1.

## 4.5 | Hypoglycemia and hyperglycemia management in the school setting

Variations in BG levels outside of the target range are common in young people with diabetes and are the result of many different

factors including food intake, insulin, exercise, stress (e.g., caused by educational testing), and hormonal changes. Students with diabetes should wear a medical identification bracelet or necklace indicating the diagnosis to ensure appropriate intervention by emergency personnel if needed.

#### 4.5.1 | Hyperglycemia

Hyperglycemia with a BG level above 10 mmol/L (180 mg/dL), should be avoided as much as possible for optimal health and learning. The ISPAD 2022 guidelines on glycemic targets (see Chapter 8 Glycemic targets and glucose monitoring for children, adolescents, and young people with diabetes) recommends a goal of over 70% of time in range (between 4 and 10 mmol/L [70 mg/dL and 180 mg/dL]). This should also be applied in the school setting. However, it is not uncommon for BG levels to rise above 10 mmol/L (180 mg/dL). This is usually not an emergency and should be evaluated as outlined in Table 2, and in most cases, students may remain in class if they are well.

**TABLE 2** Hypoglycemia and hyperglycemia management in the school setting

##### Hyperglycemia: (BG above 10 mmol/L or 180 mg/dL)

- If student is *well*, encourage them to drink plenty of water and allow free access to the toilet
- Check ketones according to DMP or if the student develops nausea
- If student is *unwell* (altered mental status, vomiting, increased respiratory effort, or difficulty breathing) emergency services and parents should be immediately contacted

##### Hypoglycemia

###### Preparation/anticipation of hypoglycemia

- All school staff should be aware of the symptoms and signs of hypoglycemia and how to respond
- Emergency Care Plan available (outlines symptoms and management of hypoglycemia)
- Diabetes Emergency Kit should be readily available in the classroom/student's bag, containing a BG meter and fast-acting sugar (i.e., glucose tablets, sugar-containing drink) and a small carbohydrate snack

###### If student has symptoms of mild hypoglycemia

- Check BG immediately. If not possible to check BG and student has symptoms, assume hypoglycemia is present.
- If the BG is  $\leq 3.9$  mmol/L (70 mg/dL) treat immediately.
- Treat with fast-acting carbohydrate (i.e., fruit juice, glucose tablets, hard candy). The amount depends on the BG level, size of the student and the insulin regimen; this should be indicated in the DMP.
- Recheck BG in 15 min and repeat treatment if hypoglycemia persists
- Do not leave the student unattended until hypoglycemia has resolved.

###### If student has severe hypoglycemia (loss of consciousness and/or seizures)

- Place student in a "recovery" position
- Immediately place emergency call for assistance
- Do not administer anything by mouth
- Glucagon is recommended treatment (injectable or intranasal)

#### 4.5.2 | Hypoglycemia

Mild hypoglycemia is the most common acute complication of diabetes, often occurring at least 1–2 times per week in those meeting glycemic targets. Therefore, hypoglycemia will happen at school and school staff need to be informed and prepared. Common symptoms of mild hypoglycemia include hunger, shakiness, sweating, pallor, irritability, dizziness which, if untreated, can progress to moderate hypoglycemia with weakness/fatigue, confusion. Severe hypoglycemia with loss of consciousness should be rare if hypoglycemia is promptly recognized and treated. A glucose value of  $<4$  mmol/L (70 mg/dL) is an alert value that requires attention to prevent more serious hypoglycemia. A glucose value of  $<3.0$  mmol/L (54 mg/dL) indicates serious, clinically important hypoglycemia. Attention to hypoglycemia alerts and the direction of arrows on CGMs should be observed and instructions should be provided in the DMP.

Detailed recommendations regarding hypoglycemia management are provided in Chapter 12 (Assessment and management of hypoglycemia in children and adolescents). Refer to Table 2 for management principles in the school setting. A student experiencing hypoglycemia must never be left unattended and must be monitored until the episode has completely resolved. If a student needs to leave the classroom to treat hypoglycemia, they should be accompanied by someone who can call for assistance if needed.

Once BG levels have been restored to normal, more complex carbohydrates (e.g., fruit, bread, cereal, or milk) can be provided to prevent a recurrence if the BG value was very low, if the student was physically active prior to the hypoglycemia episode or will be active before the next meal or snack. Hypoglycemia that occurs immediately before a meal should be treated first, and the subsequent meal-time insulin dose given only after the BG has normalized. Guidelines should be included in the DMP.

Severe hypoglycemia (loss of consciousness and/or seizures) can lead to injury and, in rare cases, death.<sup>30</sup> School personnel should have clear instructions for managing an episode of severe hypoglycemia. The student should be placed in a "recovery" position; nothing should be administered by mouth, and an emergency telephone call for assistance placed immediately.

Glucagon is the recommended treatment for severe hypoglycemia. Where appropriate/permisible, it is strongly advised that school personnel be trained to administer glucagon.<sup>31,32</sup> The requirement for an IM injection is a barrier to administration in many jurisdictions. Other preparations, more recently introduced, which provide increased ease of administration include nasal glucagon (Baqsimi™) for children  $>4$  years (A), dasiglucagon (ready to use pen for  $\geq 6$  years), analog and Gvoke™ (autoinjector for children  $>2$  years of age). These latter preparations do not need to be mixed and can be successfully administered by untrained individuals making it a safe and feasible option for schools.<sup>29,33</sup> The school should notify parents every time a student has a severe hypoglycemic episode.

Strategies to prevent a hypoglycemia emergency at school include:

**TABLE 3** Recommended content of the diabetes management plan (DMP)

| Identification                          | Student's name, date of birth, parents' names, age of diagnosis, and type of diabetes  |
|---|--|
| Contact information                     | Phone numbers of parents and student, diabetes physician/healthcare professional (HCP), and emergencies contacts   |
| Monitoring                              | Times to measure, target ranges of glucose, preferred locations for measurement, CGM/isCGM information   |
| Insulin treatment                       | Type of insulin and device (pen, syringe, pump), guidance to dose adjustments, and formulas/bolus calculator apps to calculate correction and carbohydrate doses   |
| Hypoglycemia (low blood glucose)        | Individualized symptoms, glucose levels that define need for intervention, and intervention instructions; situations that require emergency assistance; type of glucagon and instructions on its use             |
| Hyperglycemia (increased blood glucose) | Individualized symptoms, glucose levels that define need for intervention, and intervention instructions; ketone monitoring  |
| Food                                    | Instructions for meals during participation in school-sponsored events, celebrations, field trips  |
| Exercise                                | Changes to medication/monitoring/carbohydrate intake when participating in physical education and school-sponsored events  |
| Self-care                               | Level of independence for monitoring and interpretation, insulin administration, carbohydrate counting, adjustments for exercise, technology management (e.g., pump site changes), and so forth.                 |
| Supplies                                | Medications, monitoring, snacks/rapid-acting glucose, glucagon rescue kit, back up supplies (infusion sets, syringes, and so forth). The DMP should clarify what supplies are provided and where they are stored |
| Support                                 | Primary contact (parent, diabetes care team, other) for emergencies or when clarification to the DMP is required   |

- frequent BGM, particularly with activity;
- reacting quickly to signs of low BG; eating meals and snacks on time; and
- communicating with parents if there is a pattern of low BGs.

## 5 | DIABETES MANAGEMENT PLAN

Every student with diabetes will have an individualized treatment regimen and care plan. Some students need support all the time while others may be more independent. Accordingly, each student must have a DMP or medical orders to document a shared understanding between the student/parent and school for how their diabetes will be managed and who supports the student in school and extracurricular settings. Terminology and signing authority will depend on the local context. What is important is that the content exists and there is a mutual understanding of how the necessary supports will be provided for each student with diabetes.

The individual management plan should include the following elements:

**Emergency response plan (ECP)**—A concise action plan outlining how to recognize high and low BG levels and individualized treatment protocols for high and low BG levels and glucagon administration, if prescribed and available. Sample ECPs can be found in Appendix A.

**Diabetes management plan**—A formal and detailed document outlining the medical instructions for the individual student at school and specifying what diabetes responsibilities can or cannot be undertaken by the student based on the child's age, diabetes self-care knowledge, and cognitive maturity. The DMP should be provided by

the student's parents, developed with input from the student (when appropriate), diabetes health care team, and agreed annually with the school principal or designate. The school should make reasonable accommodations to ensure the DMP can be delivered. The plan should be clearly documented and easy to implement and should not be changed without parental agreement. Recommended content is shown in Table 3. Sample DMP's from a variety of countries can be found in Appendix A.

The following additional plans or documents may be necessary and should be developed based on the DMP in partnership with the student, parent, and school personnel or the information can be included within the DMP.

**Prescribed medication plan**—Signed orders for the administration of medication (including insulin and glucagon) by designated school personnel should be provided by the Health Care Team and updated regularly. Given that insulin doses change frequently, and adjustments are often made at home by the parent, it may not be feasible to have updated signed orders from the prescribing practitioner. Signing authority for insulin dosing will be based on the setting and, in some contexts, the parent may be delegated to provide updated dosing guidelines for the school.

**The self-carry form**—This form gives a student permission to carry their diabetes supplies and self-administer insulin when necessary, during the day. This form can be incorporated into the DMP. In the US, this form is required and must be signed by the prescribing physician/HCP in order for a student to self-carry supplies and manage diabetes independently. This is not the case in many countries.

**Accommodations plan**—The accommodations plan is an agreement designed to ensure the student with diabetes has the same

access to education as other students. This is distinct from the content of the DMP which addresses specifics of diabetes management. It may be in the form of an individual health plan which would be developed by the school personnel in partnership with the student and parents. It may include provisions such as: having multiple school staff members trained to check BG; permission to eat whenever and wherever necessary, access to the water fountain and toilet without penalty; extra time during testing to monitor glucose and manage diabetes as needed; where diabetes supplies will be stored at school; contingency plan for school lockdowns and natural disasters.

**Daily schedule**—A single page document containing key information can be used as an in-class resource. This may include the daily schedule for BG checks and insulin, symptoms of and treatment for mild hypoglycemia, location of emergency kit, and thresholds for intervention with hyperglycemia.

## 6 | SCHOOL PERSONNEL—EDUCATION AND TRAINING

It can be difficult for parents of a student with diabetes to be confident that school personnel will know how to deal with all the issues related to the student's diabetes care. Similarly, from the school staff's point of view, supporting a student with diabetes may be daunting, especially if they have no previous diabetes-related experience. Empowering school personnel with knowledge and training about diabetes and the special needs of students with diabetes will help to overcome these challenges.<sup>34</sup> Each school must have a clear plan of how they will implement and maintain this education for school staff.

The following specific issues should be considered:

### 6.1 | Diabetes education and training of school personnel

The education and training of school personnel about diabetes needs to consider the following questions:

#### a. Who provides the information?

Parents of a student with diabetes should inform the principal and/or administration about their child's condition as soon as possible before starting a new school, school entry, or returning to school after a new diagnosis. Together, they should agree on a strategy to inform and educate teachers and other relevant school personnel. Parents are generally the first to deliver this information, but the child's diabetes health care team may also participate in this process.

#### b. What resources should be used?

School personnel should be directed to reliable, trusted, preferably endorsed, sources of information, and education about diabetes,

and should be cautioned about seeking information from other sources. National professional diabetes societies and other affiliated parent associations often provide such resources (see Appendix A). To facilitate worldwide access to trustable information, the International Diabetes Federation (IDF) and ISPAD have developed an internet-based repository of educational materials, which is available in 10 different languages (see Appendix A). While terminology may vary, the fundamental content of the levels of education are recommended according to the level of contact with the student with diabetes, starting with level 1 and up to level 3 as indicated.

- **Level 1:** Introductory education for all school staff: A basic understanding of diabetes and how it impacts students. This includes recognition of low BG symptoms and signs and the urgency of treating hypoglycemia.
- **Level 2:** Intermediate education—for those interacting directly with students with diabetes in the classroom or other school based activities. This includes
  - how and when to initiate treatment for high or low BG levels
  - knowledge of the impact of food and activity on BG levels
  - know and understand when and whom to call for assistance, including emergency responders, parents and medical team
- **Level 3:** Individualized skills training for delegated staff providing direct involvement in diabetes care, including:
  - insulin administration
  - insulin dose calculation
  - insulin delivery devices including insulin pumps
  - basic interpretation of BG monitoring results including CGM trends to support decision-making where applicable
  - ketone monitoring
  - glucagon administration

#### c. How should the information and education be delivered?

Delivery of information and education about diabetes to school personnel can be achieved using a variety of different formats and media. Face-to-face education sessions delivered by the diabetes health care team or the use of web-based “e-learning” education tools and provision of printed reading materials, either used alone or in combination, are the usual approaches. Specific education interventions have been developed and have been shown to be effective. Some national diabetes societies have also developed specific educational materials for schools. (See Appendix A).

Schools are responsible for ensuring that their personnel are adequately educated about diabetes and trained in the application of prescribed treatment for the individual student. The delivery and content of training is the responsibility of those parties responsible and accountable for the health of students: the parent supported by the treating diabetes health care team and the school administration. Training serves as a part of the informed consent process to enable parents to authorize school personnel to deliver medical care to their child on their behalf. It is the responsibility of the education system to facilitate this education for their staff and ensure they are provided

the necessary training. Optimally, there should be mandated/certified education for school personnel interacting with students with diabetes to ensure staff are trained and qualified with the necessary information and skills according to their level of involvement with the student.

#### d. To whom should it be directed?

Basic education (Level 1) of all school personnel is advocated. Anyone working at the school may encounter a student during a hypoglycemic episode and should be trained to recognize and respond. Level 2 education is mainly aimed at teachers, physical educators, other teaching assistants/aides directly supporting the student with diabetes, and nurses (where available). Level 3 training is required for those providing direct involvement in diabetes care. Provision of information to fellow students (and their parents) with consent can be very helpful and will facilitate inclusion and avoid potential discrimination. Students and families can be directed to useful information resources available on the internet. (Appendix A).

### 6.2 | Education regarding storage of supplies and medication administration

All teachers and school personnel must be aware that students with diabetes must have access to their devices, medication, and hypoglycemia treatment whenever needed. Ready access is especially important in situations such as natural disasters, lockdowns, and other emergencies.<sup>35,36</sup> Schools should have a safe place to store medication and supplies. Insulin vials should be stored in a refrigerator or at least in a cool room or insulated container, especially in hot climates. Insulin pens can be stored at room temperature (59–86°F, 15–30°C) for up to a month. Other supplies (e.g., BG meters, CGM sensors) should be kept in an easily accessible place. If school personnel are trained, glucagon should be readily available for treating severe hypoglycemia.

All students with diabetes should be provided with a safe and private place to perform BG checks and insulin administration. Insulin pumps should be with the student all the time, but if disconnected (i.e., during physical activity), insulin delivery should be suspended and the pump should be kept in a safe place that is also readily accessible.

### 6.3 | Nonmedical diabetes emergencies

Natural disasters, lockdowns, and other emergencies do occur in the school setting. As such, disaster preparedness is essential for all school settings. As noted above: storage of medication and supplies, and a disaster plan with contact information should be available for each student. Enough supplies should be available for each student for a minimum of 24 h. Parents should be responsible for providing and replenishing supplies for their child.

### 6.4 | Considerations for virtual school settings

Virtual schools, also known as online or cyber schools, relocate primary and secondary education to either an entirely home-based internet platform or a blended format with in-person schooling.<sup>37</sup>

There is some evidence that children with diabetes who attend school virtually may be at risk for suboptimal health outcomes. In one retrospective study that compared 87 youth with diabetes enrolled in virtual schools to age-, sex-, race-, diabetes type-, and diabetes duration-matched youth enrolled in traditional in-person schools, the virtual school students had higher mean HbA1c levels, lower insulin pump use, and more mental health conditions and were less likely to have recommended vision and dental evaluations.<sup>38</sup> Although prospective studies are needed to understand these associations, possible risk factors for virtual students may include a lack of supervised diabetes care, lack of social support, and lack of daily structure/routine including breaks for physical activity and healthy meals. Alternatively, an Italian study demonstrated an improvement in glycemic management during the COVID-19 pandemic lockdown.<sup>39</sup>

Students with diabetes who attend school virtually have the same legal rights as those who attend in-person. They should have a written DMP regardless of school learning mode. The American Diabetes Association Safe at School Campaign offers considerations to be included in the plan of a student with diabetes enrolled in virtual school. Many of these accommodations are the same as if the student were attending in-person school (e.g., permit breaks to leave the online classroom to use the bathroom without penalty; permit the consumption of food or drink during classroom time; and allow rescheduling of tests for hyper- or hypoglycemia). Others are unique to virtual school (e.g., permit student to turn off their camera to engage privately in diabetes self-care; agree upon a communication method, such as a chat box to alert the teacher of diabetes needs and care; record all online classroom sessions for later viewing). Community resources (e.g., case managers) may be needed to support the virtual student in diabetes care during the day.<sup>40</sup>

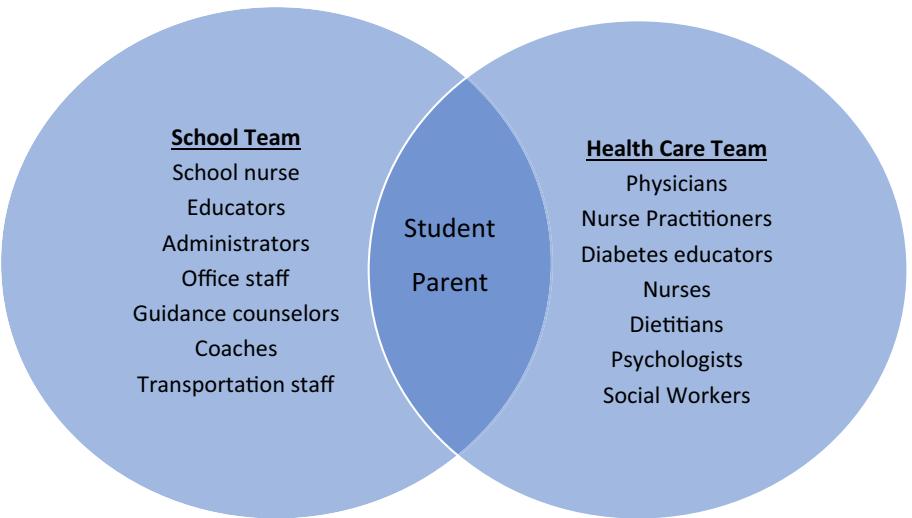
## 7 | SPECIFIC ROLES AND RESPONSIBILITIES

### 7.1 | Parents

Parents must communicate with school personnel shortly after their child's diabetes diagnosis, at the beginning of each school year, and whenever there are significant changes in the student's treatment regimen (e.g., starting a pump, CGM, or automated insulin delivery system).

The DMP should be developed in collaboration between the medical team and parent/student and agreed upon annually with the school to ensure that the student's needs are met. This should be signed by the parent/student and school with oversight from the

**FIGURE 1** General overview of members of the student's diabetes care team. Ideally, the student and their parent should be part of both the school team and the health care team. Additional details regarding roles and responsibilities are provided in the text of the chapter.



medical team. Orders for the administration of medication in school must be signed by the medical team. By signing, the parents are providing consent to allow the school staff to implement the DMP.

Parents must supply all the necessary equipment and medication needed by the student at school. Contact numbers and addresses for emergency situations should be documented in the DMP. Parents are responsible for involving other family members who may assist in decision-making for the student's diabetes care.

A parent should not be expected to "fill the gap" of school resources and attend to their child's medical management during the school day. However, families may need to work with the diabetes care team to make specific individualized arrangements with the school. If school personnel cannot assume responsibility for performing or overseeing insulin administration, parents may believe the only option is to do it themselves. This has significant negative occupational consequences and financial burden, particularly for mothers,<sup>41</sup> and is not possible for many families. In one study, 47% of parents of younger children stated they were unavailable to attend school to administer insulin due to work and/or transportation challenges.<sup>42</sup>

## 7.2 | School team

The school team consists of any or all of the personnel listed in Figure 1, depending on the setting and the student's unique situation. School personnel are responsible for the safety and care of their students during school hours and school-sponsored activities. They should be supportive and attentive, respecting the student's right to participate in all activities and to perform glucose monitoring at any time. School personnel should be trained to help a student in need, for example, during episodes of hypoglycemia and hyperglycemia with illness. They may also need to perform, assist with, or supervise glucose monitoring and insulin administration. School personnel should also be made aware that variations in glycemia can interfere with attention and memory, as well as mood and behavior.<sup>43-46</sup>

## 7.3 | Health care team

The student's treating physician or nurse practitioner is responsible for prescribing medications and providing detailed instructions for glucose monitoring, insulin administration, management of hypoglycemia/hyperglycemia, and other aspects of diabetes care. The health care team (Figure 1) should provide input for the student/parent to develop the recommended DMP. In best practice the health care team will participate in or inform education and training for the school team and, with parental permission, be an accessible resource to provide ongoing support to the school.

Health professionals can also use clinical encounters to address diabetes management at school. Specifically:

- Ask about school challenges, especially related to diabetes, and the number of school days missed. Discussing these issues can help identify experiences of discrimination, stigma, or suboptimal care.
- Empower families to know their rights and to find policies or guidelines relevant to their jurisdiction.
- Keep a list of recommended tools and resources to educate and empower school staff about how to support students with diabetes and make these available to families with school-aged children (Appendix A).
- Provide support of a team member to assist families and to help educate school staff if needed or required.

## 7.4 | Student with diabetes

As children gain autonomy for their diabetes management, they can also assume some responsibility in the school setting. Specific responsibilities will vary based on the student's level of independence, desire, and motivation. There should be a gradual transfer of responsibility from adult supporters to the student, with the timing of these decisions at the discretion of the parent and health care

team and in partnership with the student. Regardless of the student's level of responsibility, parents should remain involved and engaged as part of the school and health care teams. Adolescents are less likely than primary (elementary) students to have a designated staff member and emergency treatment plan, to use pump therapy, and more likely to miss boluses at school.<sup>42,47</sup> Even students who are independent may need help with diabetes management when they are sick or experiencing hypoglycemia.

## 7.5 | Communication

Parents, students, and members of the school and health care teams should work together at the beginning of and throughout the school year to negotiate and coordinate communication expectations. Schools should identify a key member of the school team who will be primarily responsible for communicating with parents, ensuring that the DMP is carried out accurately and that other school personnel receive adequate training. Students should be involved in informing and educating their teachers and coaches about their diabetes. Typically, parents are the liaison between the school and health care teams. However, these teams may communicate directly when parents cannot be reached or if there are concerns about the health and safety of the student.

## 7.6 | Policymakers

Policymakers (e.g., on school boards or regional/national governments, depending on the jurisdiction) are responsible for ensuring that policies related to managing diabetes in school exist, are followed, and are kept current. They should also ensure that students with diabetes and their families have clear pathways to follow if schools or school boards are not providing the required support, or if the health/safety of a student is compromised in any way.

# 8 | PSYCHOSOCIAL AND NEUROCOGNITIVE CONSIDERATIONS

## 8.1 | Glycemic excursions and learning

Both hypo- and hyperglycemia may acutely impact children's cognitive abilities and these effects may persist once the BG level is back in the target range.<sup>43</sup> Hypoglycemia may impede learning and the ability to sustain attention, think critically and solve problems, and be associated with feelings of anxiety, restlessness, or low energy.<sup>43,48,49</sup> Children may also experience hypoglycemia unawareness, preventing them from treating the low glucose level in a timely fashion or making their needs known to others. Children experiencing mild to moderate hypoglycemia may be reluctant to report their symptoms to a teacher due to fear of embarrassment or social stigma. When any of these situations occurs, the student's cognitive acuity may be impacted and

they may not be able complete tasks or retain information that is being taught.

While there is no firm evidence that acute hyperglycemia adversely affects cognition during school, related symptoms such as reduced energy and general malaise, plus frequent trips to the bathroom may make it difficult for children with diabetes to achieve optimal academic performance.

Every effort should be made to reduce and mitigate hypo- and hyperglycemia so that students with diabetes are not removed from their learning environment.

School personnel must allow students to monitor their glucose levels (via CGM or BGM) frequently and to take action to return BG to the target range.

## 8.2 | Neurocognitive complications

There is considerable evidence that some children with diabetes may experience lasting impairments in their skills and abilities linked to how their brains function.<sup>44</sup> Frequent episodes of severe hypoglycemia, prolonged hyperglycemia, and diabetic ketoacidosis (DKA) at diagnosis may be causes of these effects, and children diagnosed with diabetes at a very young age may be at higher risk.<sup>50</sup> Few studies have included measures of academic performance to determine how neurocognitive impairments affect school functioning in students with diabetes. However, a recent study found that an increasing HbA1c trajectory during high school was associated with a lower grade point average.<sup>45</sup> Maintaining children's glucose levels within the target range of 4–10 mmol/L (70–180 mg/dL) as much as possible will help avoid long-term complications, minimize diabetes burden, enhance quality of life, and enable the student to achieve their potential. Children with diabetes who experience frequent or pronounced glycemic variability may benefit from periodic neuropsychological evaluations if appropriate referral sources are available. Cognition may be impacted for 30–60 min following an episode of hypoglycemia and accommodations during exams or assessments may need to be made on a case-by-case basis.

## 8.3 | Psychological adjustment

There is evidence to suggest that young people with diabetes have a greater incidence of mental health disorders compared with their peers without diabetes.<sup>46</sup> Some studies show that the rates of depression and anxiety are two times higher for adolescents with type 1 diabetes.<sup>51</sup> Adolescents with type 2 diabetes (T2D) are also at increased risk for psychological problems, including self-esteem and body image concerns, depression, anxiety, and behavioral problems.<sup>52,53</sup> Disordered eating and behaviors to control weight (e.g., insulin omission) are common in young people with type 1 and type 2 diabetes.<sup>54</sup> Although few studies have examined the link between psychological problems in children with type 1 diabetes and academic outcomes, a small, cross-sectional study found higher depression scores were associated with poorer academic performance.<sup>55</sup>

Both parents and students report concern about hypoglycemia at school, especially during physical activity,<sup>56</sup> and fear of hypoglycemia is common.<sup>57-59</sup> Children and/or their parents may engage in potentially negative health behaviors to prevent hypoglycemia, such as taking less insulin than needed or overeating.<sup>52</sup> The connection between fear of hypoglycemia and school performance has not been studied. However, symptoms of acute hyperglycemia (diminished energy, general malaise) that may result from trying to prevent hypoglycemia may affect school performance. Since fear of hypoglycemia is more common in young people with anxiety,<sup>60,61</sup> school avoidance behaviors such as attempting to stay home, leave school, or go to the nurse's office may be especially common. Fear of hypoglycemia in school personnel has not been formally studied, but clinical experience suggests that teachers may also have concerns about hypoglycemia when they are the only adult in the room capable of treating it. Teachers should be encouraged to discuss their concerns with the student's parent, and be trained to recognize and treat hypoglycemia.

Schools provide an opportunity to identify and treat psychological challenges in young people with diabetes. Educational interventions for school personnel should include the mental and physical burden of diabetes self-care on young people and their increased risk for mental health disorders. Once educated, school nurses, guidance counselors, and other personnel can serve as a bridge to community mental health resources.

## 8.4 | Family influences

When younger children are not in school, the burden of diabetes management falls almost exclusively on parents. In early adolescence, the transfer of responsibility from parent to child begins, but requires a delicate balance of fostering the young person's growing independence while maintaining engagement in diabetes care. Longitudinal studies suggest that when parents give up responsibility too early, adolescents are less engaged in diabetes self-care and glycemic levels become suboptimal.<sup>62</sup> Thus, regardless of the age of the child, diabetes management depends heavily on family communication, problem-solving, and supportive parental involvement.

In general, studies suggest that both parents and school personnel perceive a lack of communication about diabetes care in the school setting. Parents have varying preferences for communication frequency and format, with some requesting daily (or more frequent) phone/text interaction and others simply requesting copies of weekly or monthly BG logs. Schools should work with families at the beginning of each school year and as needed to negotiate and coordinate communication expectations. School personnel should be aware of "red flags" related to a lack of parental involvement in diabetes care, such as minimal communication, running out of diabetes supplies in the school setting, chronic hyperglycemia, as well as frequent school absences and hospitalizations. If these concerns are noted, school personnel should notify the child's diabetes health care team so they can follow-up with the family.

## 8.5 | Peer influences

Research indicates that adolescents with T1D have difficulty engaging in diabetes self-management tasks around peers due to fear of judgment and concern about social acceptance.<sup>63</sup> Peer relationships may also affect diabetes outcomes.<sup>64-66</sup> A recent systematic review revealed a scarcity of literature on peer victimization and bullying in children with diabetes, but in the few available studies, children with T1D report greater levels of peer victimization than their peers without T1D, and bullying was associated with higher HbA1c levels.<sup>63</sup> School personnel should be aware of peer influences and facilitate referrals to guidance counselors or outside mental health providers as needed.

## 8.6 | Socioeconomic influences and health disparities

Children from underserved communities face competing priorities related to socioeconomic status and social environment, putting them at risk for adverse health, psychosocial, and academic outcomes. Challenges may include food insecurity, lower parental educational levels, diminished self-efficacy for school success, more frequent absences, more frequent changes of schools during the academic year, and reduced access to materials such as paper, pens, pencils, computers, and internet access. When these students have diabetes, the daily demands of managing the condition are an additional stressor and can result in higher HbA1c levels, more frequent episodes of DKA, and earlier onset of complications.<sup>67</sup> Youth from racialized communities also experience decreased access to diabetes devices.<sup>68,69</sup>

When a student with diabetes faces socioeconomic obstacles on multiple levels, timely, appropriate, and concerted interventions are critical to prevent health and academic disparities. Health care providers, teachers, and school personnel should be even more attuned to the academic needs and circumstances of children with diabetes from lower resourced groups.

## 9 | LEGAL ISSUES, PUBLIC POLICY, AND RIGHTS OF STUDENTS WITH DIABETES

Diabetes is recognized in common law as a disability.<sup>70-73</sup> The United Nations Convention on the Rights of Persons with Disabilities recommends that "effective individualized support measures are provided in environments that maximize academic and social development, consistent with the goal of full inclusion."<sup>74</sup> Legal frameworks exist to protect children and adolescents with diabetes to ensure the student has an equal opportunity to participate in all aspects of school life. Other legislation that is not specific to diabetes care in school can also be referenced to secure care for students.<sup>75-78</sup>

Discrimination occurs when a person with a disability is treated less favorably than a person without the disability in the same or

**TABLE 4** Key messages for less resourced countries

- Children with diabetes should not be limited in what they can do, and should be able to attend school, participate in activities, receive an education, and live happy, fulfilled lives.
- Most schools are supportive; however, a student's nurse or doctor can visit the school to explain diabetes and its management in a clear and concise manner, or a parent might feel confident enough to do this themselves with support from the local health care team. Such visits and contact with the school and the health professional can be extremely encouraging to parents and students.
- A simple individualized diabetes management plan for the student with diabetes is a good guide for the teacher to follow day-to-day at school. This should include step by step instructions for management of emergencies and contact details of parents.
- Students with diabetes should be allowed to monitor their BG level as necessary depending on the availability of glucose strips.
- It is always preferable for the child to receive prelunch insulin; a safe, private place is required for them to give their injection at school.
- A refrigerator or cool place/container (e.g., clay pot) is required for storage of insulin particularly in hot climates.
- School personnel should be educated on the management of hypoglycemia, and parents should ensure that appropriate treatment and retreatment is available at the school. Emergency assistance should be called if the student is unable to eat or drink to treat the hypoglycemia.
- School personnel need to be aware that prior to and during physical activity the student with diabetes may need to eat or drink carbohydrate containing foods to avoid hypoglycemia.
- When BG levels are high, students should be allowed to drink water and use the toilet as necessary.
- Teachers should be aware that other children may tease the student with diabetes. A simple explanation to classmates is encouraged (IDF).
- Teachers should also understand the classic symptoms of T1D, so they can identify undiagnosed children in the future. It is not uncommon for T1D to be mistaken for malaria, appendicitis, gastroenteritis, or pneumonia.

similar circumstances.<sup>70–73</sup> Discrimination is unlawful in many countries when it occurs in an area of public life such as in school. Children with diabetes have a significantly increased risk of being exposed to discrimination. This can have an impact on self-esteem and cause feelings of stigmatization and fear of being different from their peers.<sup>7</sup> Schools in most countries are obliged by law to make “reasonable adjustments” to facilitate prescribed medical care to allow for students with diabetes to participate in education on the same basis as their peers. This should become the standard in every country despite challenges in less-resourced countries. In countries where legislative protections to support students with diabetes are not expressly defined, ISPAD advocates that those students be allowed to attend school in a safe and supportive environment that enables best practice of the management of diabetes.

Schools have a nondelegable duty of care to their students and staff to take reasonable care to protect them from harm which is reasonably foreseeable. There are obvious foreseeable risks associated with not providing appropriate management of diabetes. School personnel have a duty of care to the child with diabetes to appropriately

manage the effects of low and high BG levels according to parent and health care team instructions. Staff require training in administration of glucagon as a rescue medication when prescribed and included in the DMP. Duty of care does not extend to automatically having authorization to administer medication including insulin or injectable glucagon or to undertake invasive procedures.

Informed consent is a person's voluntary decision about medical care, including diabetes self-care, that is made with knowledge and understanding of the benefits and risks involved. Only the parent or legal guardian in the case of a minor can provide informed consent. The child's DMP requires the informed consent of the parent and must be signed by the parent. All information, risks and associated circumstances must be disclosed to the parent to ensure that their consent is valid.

Policies, whether at a national, regional or school-board level, should be developed in collaboration with diabetes health professionals, families of students with diabetes, educators, and school administrators. These policies must support the training of school staff to meet their duty of care and ensure the student's safety and ability to fully participate in school and school activities. This training needs to be specifically resourced by the education and healthcare sectors.

Despite the availability of guidelines and training resources addressing diabetes management at school,<sup>13,14,79–84</sup> many families continue to report experiences of inadequate support leading to suboptimal care (e.g., lack of access to insulin during the school day), stigma and discrimination, exclusion from school activities such as field trips, or other negative events.<sup>9,10</sup> Documented barriers to achieving effective diabetes management at school include lack of formal education or training for school staff, lack of clarity about roles and responsibilities, and misconceptions or fears about supporting students with diabetes.<sup>10,85</sup>

An example of a legislative approach is the 2009 Swedish law that secured the rights of students with special needs, including diabetes.<sup>6</sup> The Swedish law required a detailed agreement on how school personnel will support the student's needs during the school day, with training provided by the student's diabetes team. National surveys conducted before<sup>7</sup> and after<sup>8</sup> this legislation showed improvement in glycemic outcomes and an increase in the proportion of children receiving support from a designated school employee.<sup>6</sup> A recent survey in British Columbia, Canada, a province with a legislated school policy, demonstrated strong agreement from families and program coordinators alike that the care plan is meeting both safety and diabetes management needs.<sup>86</sup> The formal obligation to support diabetes care at school in these jurisdictions goes beyond the many recommendations, policies, and guidance documents that exist in other countries and demonstrates potential benefits to students with diabetes in adopting a national or regional policy approach.<sup>87</sup>

Measures to evaluate and/or improve compliance with legislation or public policy are not well described in the literature but are critical to ensuring equity for students with diabetes. This is especially true in lower resource areas, with limited opportunities to know if guidelines are followed, given basic challenges faced by students with diabetes in these settings. Evidence suggests that students with diabetes can be safely cared for in schools by a variety of trained personnel,

including licensed (e.g., registered nurse) and unlicensed staff (e.g., teachers, education and special needs assistants, administrative staff, and so forth).<sup>18,88</sup>

An effective diabetes-in-school policy starts with the requirement for a DMP that describes the student's daily care needs and instructions for handling nonstandard situations. Recognizing the wide variability globally in access to technologies and to school-based medical and nonmedical support staff, at a minimum, policies should address three essential components of diabetes care at school and related training needs of school staff or others who will provide support to students:

- Access to insulin
- Glucose monitoring
- Emergency management

It is also recommended that, given the ongoing new developments in diabetes technology and management, policies on diabetes-in-school should be revisited and updated regularly.

In all countries, parents and health care teams should seek to establish a supportive, collaborative, relationship with the child's school team and tailor the training to the child's individual needs, thus enabling school personnel to understand why certain medical interventions are important for the individual child. It is critical that all school personnel who will interact with the child with diabetes receive the necessary training. The person(s) acting as the parent's agent for insulin administration should be named in the students' DMP.

Through advocacy, diabetes health professionals can help bring about policy change. National or regional diabetes associations (e.g., Diabetes UK, Diabetes Canada, American Diabetes Association, Diabetes Australia, Swedish Diabetes Association [Svenska Diabetesförbundet], IDF, ISPAD, JDRF, and so forth) are natural partners for this work (Appendix A). Diabetes care team members, parents, students, and school personnel are encouraged to become involved in efforts to establish policy where none exists, improve policy that is inadequate, and enforce policy where implementation is not universal and equitable.

## 10 | DIABETES IN SCHOOLS IN LOW AND MINIMALLY RESOURCED COUNTRIES

In less-resourced settings sending children to school may be compounded by other issues such as lack of insulin, diabetes supplies, food insecurity, transport challenges, and local conflict and war. School is a time of learning, making friends, having fun, and finding peer groups. However, for children with diabetes, this can instead be a time when they are excluded, isolated or stigmatized. As health and school professionals, we must advocate that children and youth with diabetes receive the same educational and extracurricular opportunities as other children in their community, and equal opportunities for ongoing education and fruitful employment (Table 4). The limitations

in less resourced countries are recognized but should not be an excuse to limit or exclude students with diabetes from full participation in school activities.

The International Diabetes Federation (IDF e-Library) "Life for a Child" initiative has developed an education website that includes multilingual resources for schools.<sup>73</sup> In addition, the IDF "Kids and Diabetes in School" project tackles diabetes (including types 1 and 2 diabetes, and healthy food choices and lifestyle advice) management in school with visual materials, coupled with an education program for school personnel, parents, and students.<sup>89</sup> This project was successfully trialed in Brazil<sup>34</sup> and India<sup>90</sup> and is now available in 18 languages (see Appendix A).

## 11 | CONCLUSION

Students with diabetes must have the same access to education as other students, in a safe and supportive environment that enables them to successfully manage diabetes, while empowering the school system and staff with the knowledge and tools to assist them. Legislation has been passed in some countries and is important to ensure equitable access to supports. Several excellent resources have been developed to educate school staff and are freely available (see Appendix A). There are differences between countries regarding legislation and the availability of personnel and diabetes supplies and technology.

At the most fundamental level, each student with diabetes requires access to insulin, glucose monitoring, and emergency treatment of hypoglycemia. All staff need to be aware of the symptoms and initial management of hypoglycemia. Each school should identify actively involved school personnel to provide age and developmentally appropriate support for diabetes self-care during school hours. Students living with diabetes should have ready access to advanced treatment strategies for diabetes including intensive insulin therapy and glucose monitoring technology and the school should not be a barrier to these treatments. Both hypo- and hyperglycemia affect not only the long-term risk of diabetes complications, but also affect learning, behavior, and cognitive functioning. Striving for normoglycemia is a cornerstone of modern diabetes care and schools are an essential partner in achieving this goal.

These guidelines emphasize the importance of communication and collaboration between the multiple stakeholders with a common goal of support, safety, and inclusion at school for students living with diabetes.

## AUTHOR CONTRIBUTIONS

All authors contributed to literature review, writing designated sections of the guidelines, consensus discussions, review and revision of the manuscript. SL prepared first draft. Final revision by SL and FM.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## PEER REVIEW

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## APPENDIX A

### A.1 | LINKS TO ONLINE RESOURCES RELATED TO DIABETES IN SCHOOLS

The goal is for this to be a live document that can be updated over time as resources are created or updated.

### A.2 | NATIONAL WEBSITES RELATED TO DIABETES IN SCHOOLS

IDF Kids and Diabetes in Schools 2019 (Multilingual resource available from: [kids.idf.org](https://kids.idf.org)) <https://www.idf.org/e-library/education/73-kids-diabetes-information-pack.html>.

American Diabetes Association <https://www.diabetes.org/tools-support/know-your-rights/safe-at-school-state-laws/training-resources-school-staff>

Canadian Pediatric Society: Diabetes at School <https://diabetesatschool.ca/>

Diabetes Australia: Diabetes in Schools. <https://www.diabetesinschools.com.au/>

Diabetes UK: Diabetes in Schools <https://www.diabetes.org.uk/guide-to-diabetes/your-child-and-diabetes/schools>.

Turkey: <https://okuldadiyabet.com/>

### A.3 | EDUCATIONAL TRAINING MODULES FOR SCHOOL STAFF

JDRF Educational Video A short video narrated by students with diabetes that explains life with type 1 diabetes (T1D) to extended family, parents, teachers, coaches and fellow students. <https://www.jdrf.org/t1d-resources/living-with-t1d/school/>

Life for a Child: Education and Training Resources <https://lifeforachild.org/education/>

American Diabetes Association Training Resources for School Staff <https://www.diabetes.org/tools-support/know-your-rights/safe-at-school-state-laws/training-resources-school-staff>

Canadian Pediatric Society: Managing type 1 diabetes at school: An online course for educators and school staff. <https://diabetesatschool.ca/schools/managing-type-1-diabetes>

Diabetes Australia: Training and Support - Diabetes in Schools <https://www.diabetesinschools.com.au/training-and-support/>

Diabetes Committee of the Australian Pediatric Society e-learning module for schools: <https://www.t1d.org.au/>

Diabetes UK: Diabetes in School Resources <https://www.diabetes.org.uk/guide-to-diabetes/your-child-and-diabetes/schools/diabetes-in-schools-resources>

#### A.4 | SAMPLE DIABETES MANAGEMENT PLANS

Australia:

Diabetes Australia (state specific plans) <https://www.diabetesinschools.com.au/resources/diabetes-management-plan-principal/>

Diabetes Committee of the Australian Pediatric Society Diabetes Action and Management Plans: <https://www.t1d.org.au/>

Canada: <https://diabetesatschool.ca/tools/individual-care-plan>

UK: <https://www.diabetes.org.uk/guide-to-diabetes/your-child-and-diabetes/schools/diabetes-in-schools-resources>

USA: ADA Diabetes Medical Management Plan <https://www.diabetes.org/dmmp>

#### A.5 | OTHER MANAGEMENT PLANS

ADA

Section 504 Plan The 504 Plan sets out an agreement to make sure the student with diabetes has the same access to education as other children.

<https://www.diabetes.org/tools-support/know-your-rights/safe-at-school-state-laws/written-care-plans/section-504-plan>

Hyperglycemia Emergency Care Plan <https://www.diabetes.org/sites/default/files/2019-06/hyperglycemia%20emergency%20care%20plan.pdf>

Hypoglycemia Emergency Care Plan <https://www.diabetes.org/sites/default/files/2019-06/hypoglycemia%20emergency%20care%20plan%20for%20low%20blood%20glucose.pdf>

Guidelines for Continuous Glucose Monitors (ADA Safe at School): <https://diabetes.org/sites/default/files/2022-03/CGM-3-15-22.pdf>

Diabetes Disaster Preparedness Plan 2018 (Available from: [www.DiabetesDisasterResponse.org](http://www.DiabetesDisasterResponse.org))

ADA. Safe at School: Recommendations for Virtual Learning 2020 (Available from: <https://www.diabetes.org/sites/default/files/2020-09/Covid19virtuallearningrecs09.29.2020.pdf>)

#### A.6 | POLICIES/POSITION STATEMENTS

ISPAD Position Statement on Type 1 Diabetes in Schools (2018) <https://www.ispad.org/news/news.asp?id=420540>

Canadian Pediatric Society: Managing type 1 diabetes in school: Recommendations for policy and practice (2015) <https://cps.ca/documents/position/type-1-diabetes-in-school>

UK Education UDF. Supporting pupils at school with medical conditions 2014 (Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/803956/supporting-pupils-at-school-with-medical-conditions.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/803956/supporting-pupils-at-school-with-medical-conditions.pdf)).

USA American Association of Diabetes Educators: Management of Children with Diabetes in the School Setting - AADE Position Statement [https://www.diabeteseducator.org/docs/default-source/practice/practice-resources/position-statements/diabetes-in-the-school-setting-position-statement\\_final.pdf](https://www.diabeteseducator.org/docs/default-source/practice/practice-resources/position-statements/diabetes-in-the-school-setting-position-statement_final.pdf)

UK Sample Medical Conditions Policy for School: Type 1 Diabetes (2018) [https://www.diabetes.org.uk/resources-s3/2018-11/1201BD\\_Sample%20medical%20conditions%20policy\\_DIGITAL.pdf](https://www.diabetes.org.uk/resources-s3/2018-11/1201BD_Sample%20medical%20conditions%20policy_DIGITAL.pdf)

#### A.7 | OTHER ADVOCACY TOOLS

Life for a Child. DKA Prevention Posters 2018 (Available from: <https://lifeforachild.org/education/dka/>).

Type 1 diabetes at school: Rights and responsibilities from the Canadian Pediatric Society (video 2:58) <https://youtu.be/JWGapJ2ymLo>

Starting Secondary School with Type 1 Diabetes (video 3:42) <https://www.youtube.com/watch?v=kcwGo54tzbo>

From US NIH/NIDDK Tools for diabetes in school. <https://www.niddk.nih.gov/health-information/professionals/clinical-tools-patient-management/diabetes/helping-student-diabetes-succeed-guide-school-personnel>

US laws and diabetes in school. <https://www.diabetes.org/tools-support/know-your-rights/safe-at-school-state-laws>

Sanofi Turkey: Creating Awareness on Diabetes at School <https://www.youtube.com/watch?v=9Xd4-IQUXHU>

#### A.8 | FOOD STANDARDS

KiDS Educational Guide on Diabetes and Nutrition in School <https://idf.org/e-library/education/148-educational-guide-on-nutrition-and-diabetes-in-schools.html>

United Kingdom: Education Df. School Food Standards Guidance UK (2015, updated 26 August 2021). <http://www.schoolfoodplan.com/wp-content/uploads/2015/01/School-Food-Standards-Guidance-FINAL-V3.pdf>.

USA: There are state and federal requirements in the US to provide nutrition information for food prepared at school. Here is an example of nutrition content for a county's school district in Florida. You can zero in on School, day, meal, exact content. This is widely used by school staff and families. <https://sbac.nutrislice.com/menu/menus-eula>