

# Helping children with diabetes to succeed at school

**Elizabeth Warren-Boulton**

Diabetes is one of the most common chronic conditions in school-age children. In the USA, about 154 400 young people aged 20 years or younger have diabetes – about one in every 400 to 500. Type 1 diabetes accounts for about 80% of cases. In certain ethnic groups, however, the proportion of type 2 diabetes in young people is much higher. With the epidemic of overweight and obesity, healthcare professionals are finding increasing numbers of young people with risk factors for type 2 diabetes. Elizabeth Warren-Boulton reports on a school-based initiative to improve the management of diabetes among school-age children.

Major advances have been made in diabetes management during the past decade. Landmark studies such as the Diabetes Control and Complications Trial (DCCT) in the USA<sup>1,2</sup> and the UK Prospective Diabetes Study (UKPDS)<sup>3</sup> proved that intensive, comprehensive management helps to prevent or delay diabetes complications – heart disease and stroke, and eye, kidney, and nerve disease. In addition, a number of management tools and new insulins facilitate improved intensive and effective management of diabetes.

For school-age children with diabetes, these advances promise a brighter and healthier future. Keeping blood glucose levels as close to normal as possible can help young people to be energetic and productive inside and outside school, while preventing the long-term complications of diabetes.

Since children spend an average of seven hours a day at school, it is essential to provide a supportive environment and to handle any diabetes-related challenges that might arise during the school day and at school activities. School personnel, including teachers and the school nurse if the centre has one, should play a key role in helping students to manage their diabetes.

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## **An integrated approach**

Managing type 1 diabetes is complex. It involves taking insulin, testing blood glucose, matching carbohydrate intake



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with insulin dosage, and adjusting medication in anticipation of special circumstances or to manage low or high blood glucose. No single plan fits all children. The family and their healthcare provider, or diabetes care team if they have one, need to individualize blood glucose targets, types and doses of insulin, frequency of blood glucose testing, insulin delivery systems, and details of dietary management. It is most important that the resulting diabetes management plan be conveyed to school personnel.

The plan should reflect the following factors:

- the current insulin and blood glucose testing regimen
- the child's ability to participate in self-care
- typical signs, symptoms, and prescribed treatment for hypoglycaemia and hyperglycaemia
- necessary equipment and supplies
- meals and snacks
- physical activity
- emergency contact information for parents or guardians.

Teachers and other members of staff should work with students and parents to support implementation of a child's diabetes management plan. Students with diabetes should be able to freely access their diabetes management tools – blood glucose testing equipment, insulin delivery systems, snacks

and fast-acting carbohydrate, and glucagon. They also need access to healthy foods and regular physical activity.

**Non-medical staff can be trained to safely assist with diabetes care tasks at school.**

Many students will be able to carry out most, or all, of their own diabetes care tasks; others, depending on age, level of development or experience, will need help from school staff. When a school nurse is not available, non-medical personnel can be trained and supervised to safely assist with diabetes care tasks in the school setting. In countries with existing laws that protect children with diabetes at school, these must be taken into account.

### **Facilitating modern management techniques**

In order to maintain blood glucose levels as close to normal as is safely possible, diabetes care providers in many countries now teach young people to follow flexible eating patterns and engage in the same amount of physical activity as their peers without the condition, adjusting their insulin doses accordingly – rather than asking them to adhere to a rigid meal plan and insulin schedule.

The objective of intensive insulin therapy is to normalize blood glucose levels by combining basal and meal-related doses of insulin in order to simulate normal insulin physiology. Insulin may be injected three or more times a day or given by a pump that provides continuous subcutaneous infusion of insulin. To match the mealtime dose of insulin with carbohydrate intake, it is necessary to count carbohydrates. Children can learn to vary their intake and calculate the appropriate insulin dose by using an insulin/carbohydrate ratio.

### *Daily obstacles*

Many circumstances that are a normal part of the school day will affect a student's blood glucose levels. Common examples include physical activity and changes in the usual meal content or schedule. In order to maintain blood glucose levels within their target ranges during physical activity, students with diabetes should make adjustments in their insulin and food intake. To prevent hypoglycaemia, they will need to check their blood glucose levels before and after physical activity, and during prolonged exercise. It is of the utmost

importance that they have ready access to blood glucose testing supplies and anti-hypoglycaemic snacks.

### Responding to highs and lows

Essential management tasks include recognition of the symptoms of low blood glucose, confirmation by blood glucose testing when possible, and, where necessary, prompt administration of 15 g of glucose – three glucose tablets, 120 ml of orange or apple juice, or two tablespoons of raisins. If a child is unable to test her or himself, treatment of suspected hypoglycaemia should be given immediately. An injection of glucagon will be needed for the rare episode when consciousness or ability to eat is impaired.

Short-term treatment of hyperglycaemia should be outlined in the student's diabetes management plan. If blood glucose rises above 300 mg/dl (16.5 mmol/l), the child or school personnel may need to:

- inject a corrective dose of rapid- or short-acting insulin
- check blood glucose at least every 2 hours
- check urine for ketones with a ketone test strip
- modify food intake
- increase fluid intake with water or sugar-free drinks.

Furthermore, ketones should be tested whenever the blood glucose levels rise above 300 mg/dl (16.5 mmol/l), or if the child has signs of a systemic illness, such as fever, especially vomiting, even if blood glucose is normal.

### Physical activity

Children with diabetes should be able to participate fully in all sports and physical education activities, and attend field trips. Indeed, physical activity is a critical part of diabetes management. Exercise improves general fitness and strength, cardiovascular endurance, and lowers blood pressure and levels of blood fat. Exercise also improves insulin sensitivity and reduces glucose levels. Of particular importance in children with type 2 diabetes, exercise helps to reduce body fat and increase muscle mass, contributing to improved insulin sensitivity. Because childhood obesity places children at risk for type 2 diabetes, physical education should be an important part of the school day for all students.

Understanding the effects of physical activity on diabetes is important for students and their families, and school person-

nel. Awareness of the relationship between food, insulin, blood glucose levels and physical activity can reduce the risk of problems, and enhance the benefits of physical activity for children with either type 1 diabetes or type 2 diabetes. Furthermore, exercise and organized sports allow children with diabetes to improve their social skills and gain self-confidence. This active participation promotes socialization, peer acceptance, and positive self-esteem.

**Physical activity improves cardiovascular endurance, and lowers blood pressure and blood fat.**

### A diabetes guide for schools

Students with diabetes are more likely to succeed in school when school staff, parents, and healthcare providers work together with the young people to ensure optimal diabetes management. The US National Diabetes Education Program (NDEP) provides a free comprehensive guide, *Helping the Student with Diabetes Succeed: A Guide for School Personnel*. The guide offers diabetes education for school personnel, and describes ways in which each member of staff, parents, and students can work together to ensure a safe learning environment and equal access to educational opportunities for all students with diabetes.

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#### References

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- 2 Nathan DM, Cleary PA, Backlund JY, et al. Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. *N Engl J Med* 2005; 25: 2643-53.
- 3 United Kingdom Prospective Diabetes Study Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 1998; 352: 837-53.

A free copy of *Helping the Student with Diabetes Succeed: A Guide for School Personnel* is available from the NDEP website: [www.ndep.nih.gov/diabetes/pubs/Youth\\_NDEPSchoolGuide.pdf](http://www.ndep.nih.gov/diabetes/pubs/Youth_NDEPSchoolGuide.pdf)