Insulin pumps have been shown to be safe and effective for children with diabetes, provided they have adequate supervision (1,2). An increasing number of parents are choosing insulin pumps to manage their young child’s diabetes. Preschool children are usually with their parents or designated caregivers, who manage the pump for them. Older school-aged children and teens can usually manage on their own at school, with some telephone support from parents. However, young school-aged children (kindergarten to grade 3) need assistance with pump management.

In-school support for diabetes care varies widely from province to province, and even between school districts. Therefore, it is not possible to have specific guidelines in place. It is difficult to advise parents about managing insulin pumps at school when support services vary so widely. According to the Kids With Diabetes in Your Care resource kit (3), parents are responsible for the administration of insulin. Programming an insulin bolus via the pump is considered insulin administration. The resource kit also states that school personnel may be involved in supervising dosing if a mutual agreement has been struck and parents provide the training.

Two young people with diabetes demonstrate their approval of the real-time sensor!

For young children using insulin pumps, the same level of supervision should be available as for any child with diabetes. Generally, school personnel are not able to operate the pump at all, or even calculate amounts for boluses. In some cases, the school is willing to have someone supervise the child giving their own bolus based on predetermined amounts that have been calculated by the parent, or communicated to the child by the parent via telephone. In this case, the assistant is simply verifying the number being entered into the pump.

Pre-pump planning is essential. Parents need to consider who is available to help out, especially at the start of insulin pump therapy, when more monitoring and adjustments are required. If there is no one available to assist the child at school, insulin pump therapy may need to be delayed until the child is older and more capable of self-care.

When a child using an insulin pump is sent to school each morning, it is expected that:

- There is enough battery power to last the day, and extra batteries are available at school.
- There is enough insulin in the pump to last the day.
- There is no redness or swelling at the site, and it is working well when the child is dropped off at school.
- Infusion sites are changed every 2 to 3 days.
- The tubing is coiled and not kinked.
- The child does not have ketones in the urine or blood.
- A parent is always available, preferably by cell phone, in case of a problem.
- If the infusion set comes out, BG is >15.0 mmol/L 2 hours after a correction bolus, or the child has ketones, a parent or designate must go to the school as soon as possible.

At school, it is not reasonable to expect that things will be done exactly as at home, e.g. a parent may prefer to check BG every few hours, but at school this is extremely disruptive for the child and the classroom. For the first week on the pump, a BG level taken at recess is needed to check that the morning bolus is adequate. A parent is encouraged to be at the school to do this. Once the morning bolus is determined, and the child has a routine for recess, a BG reading at this time is usually not required daily at school, but can be done periodically and on non-school days.
The same applies for correction boluses. At home, parents may give a correction bolus of supplemental insulin for any BG >10.0 mmol/L. A child who cannot calculate this dose themselves may need to call the parent. At school, it may be more practical to do a correction if the BG is >12.0 or 13.0 mmol/L. An insulin pen with rapid-acting insulin can be packed in the daily kit if the child is able to self-inject. If there is a pump or site problem and parents give instructions over the phone, the child can manage the day at school with correction boluses given by insulin pen or syringe. BG should be checked ~2 hours after a correction bolus.

BG also needs to be checked with any sign of nausea or vomiting. The parent or designate will need to come to the school to check for ketones, give insulin and take the child home if necessary.

Managing recess

For morning recess at school, it is usually quite easy to avoid having to give a bolus. This can be managed in several ways:

- No recess snack, therefore no bolus is required. This is usually not a popular choice with kids!
- Provide snacks with minimal carbohydrate (<10 g) and no bolus (e.g. pepperoni sticks, cheese, peanut butter and celery, goldfish crackers (~20=10 g carbohydrate), yogurt tubes (9 g carbohydrate).
- If the child will be active at recess, a snack with 15 g carbohydrate and some protein can be given with no bolus. The activity level may depend on the weather.

How to handle lunch

For lunch, most young children are able to program in a number, but may not be able to do the math to calculate amounts. School personnel may or may not be supervising this. If the child is unable to do the button-pushing, a parent or designate may have to attend the school daily at lunch to give the bolus. If there is an older sibling attending the same school, they may be able to bolus for the child. In cases where there are several children at the same school parents have taken turns going to the school at lunch to manage the pumps.

The lunch bolus can be managed in the following ways:

- Child eats the same amount of carbohydrate at lunch every day, with a fixed bolus amount. This means that the entire lunch must be eaten, so it is not a good option for picky eaters.
- Parents can itemize lunch by contents and child can bolus separately for each item that they eat.
- After eating lunch, child can phone parent, who tells them how much to bolus. Most pump models have an audio bolus feature that beeps each time a certain amount of insulin is selected (usually for each 0.1 unit). The parent can listen to confirm the correction dose of insulin.
- Most pumps now have a built-in calculating feature, where BG and amount of carbohydrate can be entered and the pump will make a suggestion for the insulin dose (food bolus + correction – active insulin).

Young children often do the initial programming, but get distracted and forget to complete or confirm a bolus. Parents can check the bolus history on the pump if BG is high without an explanation and/or a missed bolus is suspected. Missed boluses are a problem with school-aged kids who are independent enough that they don’t require supervision, but are not yet able to completely self-manage (4). Some families find it helpful to set an alarm on the pump to remind the child to bolus.

A pre-programmed increase in the basal rate to cover snack or lunch is unsafe and not recommended, as the increase would have to be very large. This can lead to low BG and is unsafe in the school environment.

There may be days when extra treats are brought in for birthdays or special occasions. If known in advance, parents can provide a list of ‘treat’ foods and their approximate carbohydrate values.

Planning for physical activity

Increased activity at lunch or during physical education (PE) classes can be managed with an extra snack. Kids of this age are usually not able to set a temporary basal rate on their own. If PE is at the same time every day, a decrease in the basal rate can be programmed 1 to 2 hours before PE on school days. For most elementary schools, the timing of PE class varies throughout the week. If PE class is first thing in the morning, the child can be sent to school with a temporary basal rate already set. Otherwise, they may need to have a small snack with no bolus. Depending on the activity, the child may disconnect the pump during PE class if they wish. There should be a plan for keeping the pump stored safely while disconnected and for ensuring it is reconnected following the activity. For special events, such as sports day or field trips, parents can program in a temporary basal rate at 50% of normal for the duration of the activity to prevent low BG levels.

Low BG is treated with 10 to 15 g fast-acting carbohydrate/glucose, and BG levels need to be checked 15 minutes later. Because there is no long-acting insulin given with the pump, an extra protein and starch snack is not required even if the next meal is more than an hour away. If low BG occurs during or after activity, it could keep dropping, so it is advisable to give a small snack with no bolus.

Some families will be incorporating the use of a continuous glucose sensor to the pump management routine. Some children using this new technology may be wearing it daily, but most will wear it periodically, to provide supplemental glucose information. The pump will be set to alarm for high and low BG values. Alarms need to be confirmed with a meter BG and treated accordingly. It is important that parents set the high glucose alarm high enough that it is not sounding too frequently and disrupting the classroom. It is also important for school personnel to know that if the sensor comes out, the situation is not urgent. The parent can replace the sensor if they wish when the child arrives home from school.

Advance planning and communication between the school and family are needed for insulin pump therapy to be managed safely and effectively. With clear and reasonable expectations, the use of technology can be incorporated into the classroom.

References