



## Managing Type 1 Diabetes During Illness

Children with diabetes do not have more illness or infections than children without diabetes. However, illness can make diabetes management difficult and should be taken seriously. There is a release of stress hormones with illness that can lead to high blood sugars even if your child is not eating. However, nausea, vomiting, diarrhea and/or changes in food and fluid intake, can also lead to low blood sugars. These guidelines will help you care for your child during illness and prevent possible diabetic ketoacidosis (DKA), severe low blood sugar and dehydration.

The key measures to managing diabetes during illness are:

1. Getting enough fluids
2. Controlling blood sugars
3. Managing ketones

**Supervise your child during illness, even teenagers need adult supervision.  
Things can change quickly and unexpectedly.**

### Be prepared

Keep a supply of the following available in case of illness:

- Blood sugar meter and strips, especially if your child is on a sensor
- Blood ketone meter (FreeStyle Precision Neo or Libre reader) and blood ketone strips
- Glucagon:
  - Baqsimi™ (nasal glucagon) and
  - Injectable glucagon and syringes for mini-dose glucagon
- Sugar containing fluids such as regular juice (not diet or low calorie), ginger ale, Gatorade™/Powerade™ or Jello™
- Lollipops, freezies and popsicles
- Sugar free fluids such as Gatorade™/Powerade™ zero, sugar free Jello™ or soup broth

### Seek medical attention\* if:

- Blood sugars and ketones remain high even after extra doses of rapid acting insulin
- Blood sugar remains low even after mini-dose glucagon
- Your child vomits more than 2 times or has diarrhea more than 3 times within 4 hours
- Your child shows signs of dehydration (see description below) or becomes drowsy, confused or has a seizure
- Your child is having difficulty breathing, or has abdominal pain and nausea that will not go away
- You feel that you need help

\*Contact the Best Centre during regular hours, call the Emergency number after-hours or go to your nearest hospital emergency department.

Take diabetes supplies with you to the hospital such as a blood glucose meter and strips, ketone meter and ketone strips, and fluids.

## Follow These General Guidelines during illness

### 1. Check blood sugar and blood ketones frequently.

Check blood sugar and blood ketones every 2 to 4 hours, including overnight. Check sensor readings to ensure accuracy. Rapid acting insulin is often required if blood sugars are high and ketones are present.

Some children have "starvation" ketones due to eating poorly and vomiting. Rapid acting insulin may not be needed in this case.

See Appendix 1: **Insulin Dose Adjustments** for when to give insulin

See Appendix 2: **Managing Ketones** for what to do if your child has ketones.

### 2. Take vomiting very seriously.

Do not assume vomiting is just the flu. DKA can look like the stomach flu. Illness can cause vomiting but missing insulin doses or pump site failures can also cause vomiting. Nausea and vomiting with high blood sugar and ketones (at the same time) may be a sign of diabetic ketoacidosis (DKA), which is a serious life-threatening condition. It is very important to always check ketones if your child is vomiting. If your child vomits more than twice in 4 hours, contact the Best Centre or seek medical attention.

Vomiting can also lead to dehydration which is serious.

Vomiting with a normal or low blood sugar can lead to low blood sugars.

### 3. Avoid dehydration.

Vomiting and diarrhea can lead to dehydration. Dehydration is serious and makes managing illness much more difficult. The following signs and symptoms can happen with dehydration:

- thirst, dry mouth and/or tongue, cracked lips
- no tears
- less urine than usual or dark coloured urine. Be aware of how often your child goes to the washroom.
- dark circles under the eyes or "sunken" eyes
- feeling very tired or dizzy
- poor skin turgor: test this by pinching the skin on the back of your child's hand, if it does not spring back to its normal position in a couple of seconds, this is a sign of dehydration

Offer your child clear liquids to prevent vomiting and dehydration. Offer sips of fluids, every 30 minutes at least; avoid large amounts all at once as this may lead to more vomiting.

The goal amount of clear fluids per hour:

0-5 years of age	6-12 years of age	Over 13 years of age
• ½ cup (125mL) fluids	• ¾ cup (187mL) fluids	• 1 cup (250ml) fluid

If blood sugar is less than 10mmol/L offer sugar containing fluids such as regular juice (not diet or low calorie), ginger ale, Gatorade™/Powerade™ or Jello™.

**If your child is having a hard time drinking, have them suck on sugar containing lollipops, candy, freezies or popsicles.**

If blood sugar is above 10mmol/L offer sugar free fluids such as Gatorade™/Powerade™ zero, sugar free Jello™ sugar free kool-aid, crystal light or broth.

4. **Never skip an insulin dose entirely**, even if your child is vomiting or unable to eat. Our bodies need insulin to convert sugar into energy so that it can fight infection. Vomiting or diarrhea can result in lower blood sugars, especially in very young children however insulin is still required, especially the long acting dose. Never omit the long acting insulin as this could result in DKA.

Contact the Best Centre for advice if needed.

5. **Avoid low blood sugars.**

Mini-dose glucagon may be required if:

- your child is unable to keep food or fluids down such as with vomiting
- your child is unwilling to take food or fluids to increase blood sugars
- blood sugars are low and won't come up

See Appendix 3: **Mini Dose Glucagon** for when to use mini dose glucagon.

6. **Treat the illness**

Over the counter medications can be used for treatment of short-term illness such as cold or fever.

Acetaminophen (e.g. Tylenol®) and/or Ibuprofen (e.g. Motrin® or Advil®) may be used for pain or fever, as directed. These medications do not have a significant effect on blood sugar if taken in prescribed amounts.

Zofran® (prescription required) may be used for nausea and/or vomiting. Gravol™ by tablets or suppositories can be used with caution as it can lead to drowsiness, which may make your child less able to sense a low blood sugar. Do not give Gravol™ to children less than 2 years of age.

Many cold medications (such as Benylin™, Robitussin™, or Sudafed™) contain decongestants which may increase blood sugars. Also, drowsiness is a side effect of many cold medications. Health Canada advises against the use of cough and cold medications in children younger than 6 years of age, with caution when these medications are used in children older than six years of age. Consult your child's diabetes doctor for more information.

7. **Rest:** Ensure your child gets plenty of rest and avoids all physical activity.

#### **What can your child eat?**

Eating and drinking during illness can be difficult. Offer small amounts of food every 2 to 3 hours and fluids every 30 to 60 minutes. Aim for bland foods which are easier to digest such as: soup, crackers, rice, plain pasta or applesauce. Avoid higher fat foods and dairy which may be harder to tolerate.

AVOID coffee, tea or colas as the caffeine may cause dehydration.

Appendix 1: **Insulin Dose Adjustments**

Blood sugar	What to do
Less than 4.0 mmol/L	Consider mini-dose glucagon if your child is not tolerating food or fluids Do not give extra insulin (even if there are ketones) Your child may not need mealtime insulin
4.0 -10.0 mmol/L	Give half the mealtime insulin dose
Greater than 10.1 mmol/L	Give the usual mealtime insulin dose and correction Give a correction even if your child is not eating. Give correction doses every 3-4 hours as needed.  Blood sugar greater than 15mmol/L: Give extra insulin if ketones are present

Appendix 2: **Managing Ketones**

Your child may need more insulin during illness. If there is not enough insulin, our bodies burn fat and muscle for energy instead of sugar. This creates ketones, ketones are a type of acid. A build-up of ketones can be toxic and can cause a serious problem called Diabetic Ketoacidosis (DKA). With DKA your child may be nauseous, have stomach pains, vomit, become dehydrated or have difficulty breathing. If left untreated, DKA can become life threatening. To prevent this your child needs extra insulin and plenty of fluids.

The body does not make ketones from eating too much. It will make small amounts of ketones during periods of starvation. Both of these do not normally lead to DKA.

*Follow these steps to manage ketones:*

**Step 1:** Calculate TDD (total daily dose). Add up the units of all the insulin your child takes in a usual day, both long acting ( \_\_\_\_\_ ) and fast acting ( \_\_\_\_\_ ). TDD: \_\_\_\_\_ units

**Step 2:** Calculate:

5% \_\_\_\_\_ of TDD      10% \_\_\_\_\_ of TDD      15% \_\_\_\_\_ of TDD      20% \_\_\_\_\_ of TDD

**Step 3:** Use the chart to determine how much **EXTRA** insulin (Humalog, Novorapid, Apidra or Fiasp) to give to get rid of the ketones. Give the extra insulin in addition to the correction dose for a high blood sugar.

Blood ketones	UNDER 10 YEARS OF AGE		OVER 10 YEARS OF AGE
	Blood sugar 15-20	Blood sugar greater than 20	Blood sugar greater than 14
Less than 0.6 mmol/L	No extra	Give 5% of TDD	Give 10% of TDD
0.6-1.4 mmol/L	Give 5% of TDD	Give 10% of TDD	Give 15% of TDD
1.5-3.0 mmol/L	Give 10% of TDD	Give 15% of TDD	Give 20% of TDD
>3.0 mmol/L	Give 15% of TDD	Give 20% of TDD	n/a

Ketones should come down within a 2-3 hours. Give extra insulin every 3-4 hours as needed.

**If your child is on a pump, give the insulin by pen or syringe, then change the pump site.**

**Step 4:** Offer plenty of fluids

Contact the centre if your child has blood ketones above **0.6mmol/L**.

### **Appendix 3: Mini Dose Glucagon**

Use mini dose injectable glucagon when your child's blood sugar is **under 4.0mmol/L** and they are unable or unwilling to take food or fluids to increase blood sugar.

1. Follow instructions on the package to mix the injectable glucagon.
2. Draw up mixed glucagon into an insulin syringe. Inject glucagon using the insulin syringe.
3. To calculate your child's mini dose of glucagon:

<b>Age</b>	<b>Glucagon units</b>
Less than 2	2 units
2-14 years	1 unit per year of age
15 and older	15 units

4. Check blood sugar every 30 minutes. If it is less than 5mmol/L, give another mini dose of glucagon but this time double the dose. To calculate this dose:

<b>Age</b>	<b>Glucagon units</b>
Less than 2	4 units
2-14 years	2 units per year of age
15 and older	30 units

5. You may repeat the glucagon dose that works every hour (as needed) to keep the blood sugar greater than 5mmol/L.
6. Encourage your child to have some carb containing fluids and/or a snack, if and when they can tolerate it.
7. Once mixed, glucagon is stable for 24 hours in the fridge.

**Do not use mini dose glucagon if your child is experiencing severe low blood sugar symptoms such as confusion, unconsciousness or seizure. Give the full dose of injectable glucagon (using the syringe it comes with) or Baqsimi™ (nasal glucagon).**