ENDOCRINOLOGY & DIABETES UNIT
Diabetes Clinic: 604-875-2868
Toll-free Phone: 1-888-300-3088, x2868
Fax: 604-875-3231
http://endodiab.bcchildrens.ca

SICK DAY MANAGEMENT — CONVENTIONAL INSULIN

Children with diabetes do not get sick more often than other children. But when they do get sick, it can upset glucose control. Glucose levels can be high during illness, even if a child is not eating. Blood glucose can be low if there is vomiting or diarrhea.

There are **three key points** to remember during illness:

1) getting enough fluids
2) regulating blood glucose levels
3) managing ketones

What do I do when my child is sick?

- **Supervise your child during illness**. Even teenagers need adult supervision! Do not leave your child/teen alone. Provide support, and guidance. You may need to take over care.
- **Check blood sugar and ketones every 2-3 hours**. This will help warn you early of possible problems.
  - Check more often if your child is vomiting, as this could be a sign of ketones.
  - Make sure ketone testing strips are not expired. Throw away strips 6 months after you open them.
- **Never skip an insulin dose!** Always give some basal or long-acting insulin, even if your child is not eating. Not enough insulin can cause ketones.
  - You may need to give less insulin than usual if the glucose level is below 6 mmol/L and your child is not able to eat. The usual NPH dose may need to decrease.
  - If you don't know how much insulin to give, call the doctor-on-call before giving the next dose.
- **Give extra rapid-acting insulin every 3 hours as needed**. Use the "5–10–15–20 Rule" (see chart later) to prevent diabetic ketoacidosis (DKA).
- **Make sure your child gets plenty of rest.** Do not exercise during illness or if ketones are present. Exercise will raise glucose levels and cause the body to make more ketones.
- **Treat the illness.** The illness may not be related to diabetes. You may need to see your family doctor for a diagnosis and treatment.
- **If blood glucose is low and your child is vomiting, consider mini-dose glucagon.** Vomiting or diarrhea can result in low glucose levels, especially in younger children. If your

child can't keep food or fluids down, this can help bring up glucose levels. See our handout *Mini-Dose Glucagon for Preventing Serious Hypoglycemia.*

- **Give lots of fluids.** This helps prevent dehydration. Use the following table for suggested amounts of fluids for every hour. It is better to offer small amounts of fluid more often than to give a large amount at one time.
  - If blood glucose is above 10 mmol/L, give sugar-free fluids.
  - If blood glucose is under 10 mmol/L and your child isn't eating, give sweetened fluids.

WEIGHT OF CHILD	SUGGESTED FLUID AMOUNTS
under 10 kg (22 lb)	30–45 mL (1–1.5 oz) per hour
10–20 kg (22–44 lb)	45–60 mL (1.5–2 oz) per hour
20–50 kg (44-110 lb)	60–90 mL (2–3 oz) per hour
50–90 kg (110–198 lb)	90–120 mL (3–4 oz) per hour

What can my child eat? Make sure your child eats some carbohydrates. If you are on a fixed insulin dose and meal plan, try to follow that as closely as possible. If your child has trouble eating, you may need to make substitutions. Your child may either eat or drink carbohydrates to maintain glucose levels.

CARBOHYDRATE-CONTAINING FOODS	
liquids	juice, soft-drinks, milk, broth, popsicles, freezies, Jell-O
semi-solid foods	yogurt, ice cream, pudding, milkshakes, chicken noodle soup
solid food	bread, crackers, rice, noodles, roti

INSULIN DOSE ADJUSTMENTS FOR MANAGING SICK DAYS AND KETONES	
BLOOD GLUCOSE	INSULIN DOSE ADJUSTMENT
less than 4 mmol/L	Do not give extra insulin (even **if** ketones are present). You may need to **decrease** the pre-meal insulin and call the doctor-on-call if vomiting. Consider **mini-dose glucagon:** see our handout *Mini-Dose Glucagon for Preventing Serious Hypoglycemia.* if not tolerating foods or fluids
4 to 15 mmol/L	Take the usual insulin dose. No changes needed
15 mmol/L or more	Check for ketones. Take an extra **5-20% of TDD** of rapid-acting insulin (see table below) **if** ketones are present, otherwise usual dose.

Your child may need more insulin during illness. Ketones can be a sign that extra insulin is needed right away! Give extra insulin every 3 hours as needed when:

- the blood sugar is higher than 15 mmol/L, **and**
- ketones are present in urine or blood **(using a blood ketone meter)**

The extra insulin is always **rapid-acting** insulin. The amount is a percentage of the total daily dose (TDD). The TDD of insulin is the total number of units of all the insulin your child takes in a day.

Example: If your child's insulin dose is: 10 units of NPH and 5 units of rapid in the morning, 3 units of rapid at suppertime, and 4 units of NPH at bedtime, then the total daily dose (TDD) is (10 + 5 + 3 + 4) = 22 units of insulin per day.

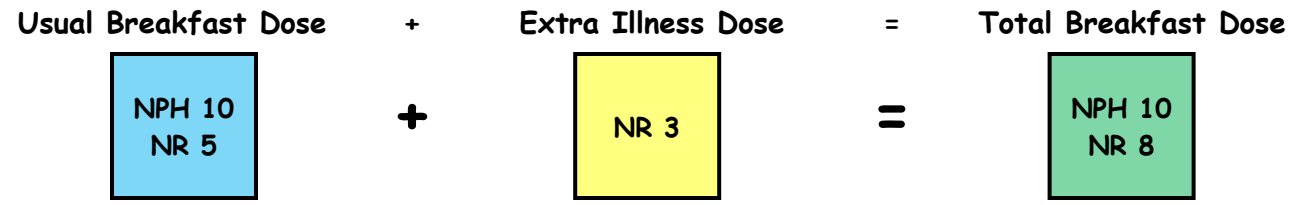
Use the "5–10–15–20 Rule" chart below to figure out the percentage of extra insulin needed based on the urine or blood ketones and the blood glucose (BG).

"5–10–15–20 RULE" FOR HIGH BLOOD GLUCOSE*				
IF THE KETONES ARE:		GIVE THIS MUCH EXTRA INSULIN:		
urine ketones:	blood ketones:	BG 10.1–14.9**	BG 15.0–20	BG over 20
negative (–)	less than 0.6 mmol/L	no extra insulin	give 5% of TDD	give 10% of TDD
trace (±)	0.6–0.9 mmol/L	give 5% of TDD	give 5% of TDD	give 10% of TDD
small (+)	1.0–1.4 mmol/L	give 5% of TDD	give 10% of TDD	give 15% of TDD
moderate (++)	1.5–2.9 mmol/L	give 10% of TDD	give 15% of TDD	give 20% of TDD
large (+++/++++)	3.0 mmol/L or more	give 15% of TDD	give 20% of TDD	give 20% of TDD

****Check BG 3 hours after first dose of extra insulin. If BG remains over 10 mmol/L and ketones are present, then give the second dose based on above chart.**

CALCULATIONS FOR EXTRA ILLNESS DOSE USING "5–10–15–20 RULE"				
TOTAL DAILY DOSE (TDD)	5% OF TDD	10% OF TDD	15% OF TDD	20% OF TDD
less than 4 units	—	—	½ unit	½ unit
4–6 units	—	½ unit	1 unit	1 unit
5–15 units	½ unit	1 unit	1½ units	2 units
16–25 units	1 unit	2 units	3 units	4 units
26–35 units	1½ units	3 units	4½ units	6 units
36–45 units	2 units	4 units	6 units	8 units
46–55 units	2½ units	5 units	7½ units	10 units
56–65 units	3 units	6 units	9 units	12 units
66-75 units	3½ units	7 units	10½ units	14 units
76–85 units	4 units	8 units	12 units	16 units
86–95 units	4½ units	9 units	13½ units	18 units
96–105 units	5 units	10 units	15 units	20 units

Example: TDD = 22 units, BG 17.5 at breakfast, moderate ketones = 15% TDD extra or 3 units



Medications: Please see BCCH's *Medications for Children with Diabetes* handout.

Signs and symptoms of DKA:

- feeling very tired and other signs of high BG
- dry mouth
- flushed face (reddish colour)
- difficulty breathing
- breath that smells fruity or like nail polish remover
- stomach pain
- vomiting
- shortness of breath

Call the Diabetes Doctor-on-call in these situations:

- You cannot get blood glucose or ketones down with 1–2 doses of extra insulin.
- You need advice on how much insulin to give when your child is vomiting and can't keep down fluids.
- You have treated a severe low blood glucose.

Go to the hospital in these situations:

- You have used mini-dose glucagon and cannot keep the blood glucose above 4 mmol/L.
- Your child shows signs of dehydration OR becomes drowsy or confused.
- Your child has signs of DKA.

NUMBERS TO CALL

Diabetes Clinic Phone (non-urgent): 604-875-2868 or toll-free 1-888-300-3088, x2868, Monday to Friday 8:00 AM to 3:00 PM. If you need to leave a message, please state that your child is sick.

Diabetes Clinic Fax: 604-875-3231.

24-hour Emergency Paging: 604-875-2161, evenings and weekends. Ask the operator for the doctor-on-call for pediatric diabetes.

*Laffel M, et al. ISPAD Clinical Practice Consensus Guidelines 2018: Sick day management in children and adolescents with diabetes. *Pediatric Diabetes* 2018;19 (Suppl. 27):193-204.