

INSULIN PUMPER'S GUIDE TO MANAGING HIGH BLOOD SUGARS AND PREVENTING DKA

Insulin pump therapy uses only rapid-acting insulin. There is no 'deposit' of long-acting insulin under the skin, waiting to work. If you are not receiving insulin from the pump or are not absorbing it properly, soon there will be no insulin in your body. Blood sugars will rise very quickly, and your body will make ketones. **This is a sign that your body needs insulin!** If left untreated, a very serious condition called diabetic ketoacidosis (DKA) can develop in 4-8 hours. Blood sugars can also rise during illness, infection, or emotional stress. To prevent ketoacidosis, follow these guidelines for managing high blood sugars and ketones.

- Check blood sugar **at least** 6 times per day (including at 3 AM, twice a month).
- Pump users and parents need to know their target blood sugar (usually 6 or 7 mmol/L) and insulin sensitivity factor (ISF). The ISF is the number of mmol/L that 1 unit of rapid-acting insulin will lower the blood sugar.
- Give a correction bolus if blood sugar is above target.

The correction formula for high blood sugars is:

$$\frac{\text{current blood glucose} - \text{target blood glucose}}{\text{insulin sensitivity factor}}$$

Example: if blood sugar is 12, target is 6, and ISF is 2:

$$\left[\frac{12 - 6}{2} \right] = 3 \text{ units of rapid-acting insulin as a correction bolus}$$

- The pump will subtract active, unused insulin from previous corrections. Correction boluses should be at least 2 hours apart.
- Check blood sugar within 2 hours of a correction bolus to make sure it is working.
- If you have corrected a high blood sugar, and it is not coming down 1-2 hours later, give a correction bolus of rapid-acting insulin (Humalog®, NovoRapid® or Apidra®) by insulin pen or syringe. **Do not use the pump!** Then change the infusion set. You may have to change insulin as well **Do not try to find the cause until you have given the insulin.**
- Make sure to change the insulin cartridge in your rapid-acting insulin pen once a month.
- Check for ketones when blood sugar is over 15 mmol/L and any time there is nausea or vomiting. Nausea and vomiting can be signs of ketones!

If you have a high blood sugar AND ketones:

- Give a correction bolus by **insulin pen or syringe** only. This can be given every 2-3 hours until the ketones have cleared or your blood sugar is less than 10 mmol/L.

The correction formula for high blood sugars with ketones is:

$$\frac{\text{current blood glucose} - \text{target blood glucose}}{\text{insulin sensitivity factor}} \times 1.5$$

- When you have ketones, the correction formula is larger than the usual one. Extra insulin is needed to clear the ketones.
- This means you are getting $1\frac{1}{2}$ times the usual correction (50 % more insulin). Teens with large insulin doses may need to give twice the usual amount.
- If the meter reads "HI", use 30 mmol/L as the current blood glucose in the formula. It will probably take more than one correction bolus to bring the blood sugar into target range.
- Drink lots of sugar-free fluid. This will help to clear the ketones and prevent your body from getting dehydrated (losing water and salt).
- Check blood sugar every hour if you have ketones.
- Do not exercise because it will make your body produce more ketones.
- Once the ketones have cleared, go back to your usual correction formula.

Here are some examples:

If blood sugar is 20.4 with ++ ketones, your ISF is 4, and target blood sugar is 6:

$$\frac{20.4 - 6}{4} \times 1.5 = 5.4 \quad \text{Give 5.4 units of extra insulin. Check sugar and ketones again in 1-2 hours.}$$

If blood sugar is "HI" with +++ ketones, your ISF is 3, and target blood sugar is 6:

$$\frac{30 - 6}{3} \times 1.5 = 12 \quad \text{Give 12 units of extra insulin. Check sugar and ketones again in 1-2 hours}$$

When you are sick:

- Do not disconnect the pump unless you are taking enough insulin by pen or syringe. Check blood sugar and ketones every 2-4 hours, including overnight.

If you have used the correction formula for ketones 2 times in a row and the blood sugar is still more than 15 mmol/L AND/OR if you still have ketones, please call the Diabetes Clinic (604-875-2868) or the Pediatric Endocrinologist on call (604-875-2161).

For pump problems or questions, call the 24-hour phone number, found on the back of your pump. See also our handout [*Insulin Pump Temporary Removal Guidelines*](#).