

Coping with illness – sick day rules



Children whose diabetes is well controlled should not experience more illness or infections than children without diabetes. However those with poor diabetes control will be more at risk of a variety of different infections.

Any illness may upset the control of your/your child's diabetes and it is important to know how to manage 'Sick Days':

- ❖ Most illnesses will cause high blood glucose levels. Fever tends to raise blood glucose levels.
- ❖ Some illnesses, especially vomiting illnesses, can cause low blood glucose levels.
- ❖ If high blood glucose levels are not treated, ketones will develop due to a shortage of insulin, and you/your child could become very unwell with diabetic ketoacidosis (DKA).

Never stop taking insulin. Generally, more insulin is required during periods of illness.

What do I do if I am/my child is unwell?

- ❖ Check sensor or fingerprick glucose readings more frequently – at least every 3-4 hours, including overnight. Your sensor will have alarms set for high or low readings.
- ❖ If how you're feeling does not match the sensor reading, check a fingerprick glucose.
- ❖ If glucose levels are 14 mmol/L or more, **you must check for ketones.**

High BG + High blood ketones

What are ketones?

Ketones are produced when fat is broken down in the body.

Ketones are acid chemicals. If these ketones are allowed to build up in the body, they can make you/your child very unwell.

The normal reading on the blood ketone meter is '**less than 0.6 mmol/L**'. If it rises to **more than 0.6 mmol/L** this signals that the body does not have enough insulin on board. Extra insulin will be required to avoid becoming unwell.

Why do ketones appear in the blood?

Anyone can produce ketones, even if they do not have diabetes. However, in people with diabetes, a lack of insulin in the body causes a high level of glucose in the blood. The body is not able to use this glucose for energy. Instead the body uses fat as an alternative energy source: fat is broken down producing ketones.

This can occur:

- ❖ At diagnosis of type 1 diabetes.
- ❖ If a person with type 1 diabetes forgets to take insulin.
- ❖ During 'Sick Days' - when the body has an increased requirement for insulin.

Additional insulin will be required if the blood ketone level is $\geq 0.6\text{mmol/L}$.

If ketones continue to rise, you/your child may develop a condition called **diabetic ketoacidosis** (DKA). Management of DKA requires hospital admission.

What is DKA and what are the symptoms?

- ❖ DKA is a serious and potentially life-threatening condition and requires urgent treatment.
- ❖ Rising glucose levels lead to increased passing of urine and dehydration.
- ❖ The build up of ketones makes the blood acidic. Breathing rate increases to try and counteract the acid level in the blood.
- ❖ Abdominal/tummy pain and vomiting are also caused by the ketoacidosis.

If you/your child have high glucose and ketone levels and are unwell, follow the sick day advice and contact the diabetes team and/or Children's Ward as soon as possible.

If your child looks very unwell and is poorly responsive, phone an ambulance.

DKA Treatment in Hospital

How is DKA treated?

- ❖ Fluids and salts are given at a carefully calculated rate via a 'drip' (infusion).
- ❖ Insulin is given via a 'drip' (infusion). This will allow the body to use glucose appropriately and importantly will 'switch off' the production of ketones, which will clear from the body.
- ❖ Drinks and food are not allowed until the ketones clear from the blood. This is because the high blood ketones and the high blood glucose levels stop the stomach and gut from 'moving'/contracting as usual. Therefore any fluids or food entering the stomach will pool in the stomach and make the person vomit: vomiting can worsen the DKA and it can take longer to recover

What to expect on Children's ward.

- ❖ Very close attention from the nursing and medical staff.
- ❖ Hourly finger prick blood testing to monitor the blood glucose levels and the blood ketone levels.
- ❖ 4 hourly blood samples to measure the ketone acids in the blood and the salts and fluids in the blood.
- ❖ Monitors will be attached to you/your child to check heart rate, blood pressure and the amount of oxygen circulating in the blood.
- ❖ Fluids and insulin will be given via a drip until the ketones clear. You/your child will then return to your normal insulin regimen.

How do I work out the insulin dose to give if I am/my child is unwell?

If glucose ≥ 14 mmol/L, but ketones remain <0.6 mmol/L

Your pump, meter or calculation app should give you suggested correction doses for high readings. If you are on a hybrid closed loop system, your pump will work to bring your glucose levels down by increasing your background insulin – some pumps also give automatic corrections.

If your glucose level is not coming down with normal correction, your body needs a higher dose of insulin.

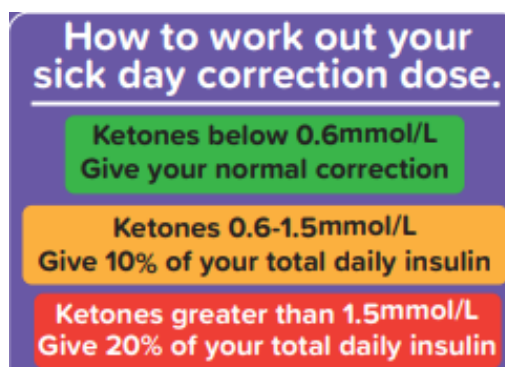
- ❖ Add 20% to the suggested bolus of insulin for a correction.
- ❖ Another correction dose can be given 2 hours after a meal if glucose levels remain high

If glucose ≥ 14 mmol/L and ketones are >0.6 mmol/L – URGENT ACTION

If you are using an insulin pump, you must change your cannula and giving set (or change the pod) and **GIVE A CORRECTION VIA INSULIN PEN**. Make sure your pump is working.

Calculate total daily dose (TDD) of insulin:

- ❖ If you are on injections - add all insulin doses over a 24 hour period (long acting plus average doses of short acting for mealtimes)
- ❖ If you are on a pump – your pump menu has an option of viewing the total daily dose – use the average TDD over the last 7 days



Expect the blood ketone levels to fall within two hours after the sick day dose. This sick day dose can be repeated four hourly as required.

Remember the 'Sick Day dose' is given **in addition** to the insulin required to cover carbohydrate intake.

Sick Day Rules



There are 5 steps to managing illness at home :

- 1** Never stop insulin!
You may need to increase and sometimes decrease the amount you take.
- 2** Check blood glucose and ketone levels every 2 hours.
- 3** Consider giving a sick day correction dose using fast acting insulin every 2 hours if blood glucose is above 14mmol/L and ketones above 0.6mmol/L.
- 4** Maintain hydration & glucose levels by drinking plenty of sugar free drinks.
If unable to eat, replace meals and snacks with sugary drinks or hypo remedies.
- 5** Contact your healthcare professional team for further advice & support if blood glucose and ketones do not come down.



Seek urgent medical advice if ketones are greater than 3mmol/L and if your child is vomiting.



Sick day correction doses are given when blood glucose is Above 14mmol/L and ketones are above 0.6mmol/L.

How to work out your sick day correction dose.

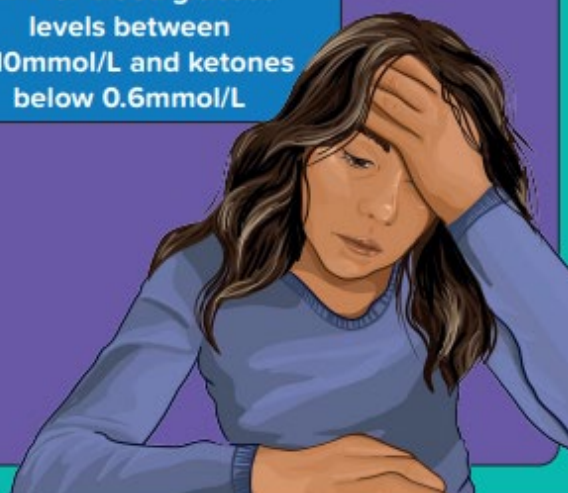
Ketones below 0.6mmol/L
Give your normal correction

Ketones 0.6-1.5mmol/L
Give 10% of your total daily insulin

Ketones greater than 1.5mmol/L
Give 20% of your total daily insulin

- * When ketones are greater than 0.6mmol/L correction doses should always be given via an insulin pen.
- ** Total daily insulin includes basal and bolus insulin.

Aim for blood glucose levels between 4-10mmol/L and ketones below 0.6mmol/L



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Dealing with Hypoglycaemia due to illness such as vomiting and diarrhoea

What should I/my child eat and/or drink when unwell?

High blood glucose readings lead to dehydration so it is important to drink more fluids.

If you are/your child is not managing to eat, aim to replace the mealtime carbohydrate with fluid containing carbohydrate. Cover this CHO with bolus insulin (Novorapid).

There may be occasions where additional carbohydrate-containing fluids are required to maintain BG levels (and therefore energy supplies) without covering with bolus insulin – These fluids can be sipped/drunk over a few hours.

Fluids containing 10g carbohydrate

Carbohydrate containing fluids	10g equivalents
Glucose powders	2 teaspoons in 20mls water/sugar-free juice
Original lucozade	50 - 55mls
Original coca-cola	90mls
Milk	200mls
Apple juice	100mls

Ketones can appear in the blood during periods of poor intake and with a normal or low blood glucose. These ketones are sometimes called “starvation ketones” and do **NOT** require additional insulin. They will resolve with drinking extra CHO containing fluids and eating small amounts of food.

When to contact the Diabetes Team or Children’s ward (if out of hours)

- ❖ Continued vomiting and/or unable to tolerate CHO-containing drinks.
- ❖ Unable to keep BG level above 4mmol/L.
- ❖ BG is more than 14mmol/L and/or blood ketones are more than 0.6 mmol/L despite following above sick day rules advice.
- ❖ You are worried or exhausted or don’t know what to do next.

Diabetes Team 01324 618325

Children’s Ward 01324 567203