



A guide to...

Sick Day Rules for Children and Young People with Diabetes on Insulin Pump Therapy during illness

Patient Information

How to contact us

Children and Young People's Diabetes (CYPD) Team
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If you need this leaflet in another language, large print, Braille or audio version,
please call **01923 217 198** or email westherts.pals@nhs.net



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Part 1

Managing high blood glucose and ketones with illness with Insulin Pump Therapy

Sickness is an unavoidable part of everyday life. Children and teenagers whose diabetes is under optimal control should not experience more illness or infections than children without diabetes. For a child or young person with diabetes it can be a difficult time. With experience and support from the diabetes team, your knowledge and confidence in managing these times will grow.

This information sheet is in two parts.

- Part 1 is to help you manage **high blood glucose levels with ketones**.
- Part 2 is **managing hypoglycaemia during illness**.

High blood glucose levels and ketones

Some illnesses, especially those associated with fever, raise blood glucose (BG) levels as your body tries to fight the infection resulting in the temporary need for more insulin. With temporary insufficient insulin, the glucose is unable to enter the cells. Body fat will be broken down to supply the necessary energy. This breakdown of fat causes a build-up of blood ketones.

Sometimes there are increased insulin requirements for a few days before the onset of the illness. The increased need for insulin may persist for a few days after the illness. Responses can be variable from one person to another and even from one illness to another. This information leaflet will help guide you through managing high blood glucose levels and ketones.

What are ketones?

When the body is not getting enough food or cannot use glucose because there is not enough insulin, it uses fat for energy. This produces ketones which are acids that can make you/ your child feel very sick. Unless something is done to stop the ketones being produced, a child or young person with diabetes can become very dehydrated and eventually develop a condition called Diabetic Ketoacidosis (DKA). **This is dangerous and will need hospital admission.**

When do ketones appear?

- during sick days/ during stress
- following a long period without food (starvation ketones*)
- when there is not enough insulin in the body

NOTE: Ketones do not appear from just eating too many sugary foods or sweets.

* Rarely, ketone levels may be elevated even if BG levels are normal, for example in gastroenteritis. If ketones are present when blood glucose is low, they are called '**starvation ketones**' and respond to drinking extra fluids. Monitor blood glucose very closely and extra insulin may be required when blood glucose starts rising.

Sick day rules and getting rid of ketones:

1. **Never stop insulin**, even if you are eating less than normal. When you are ill the body needs insulin to use glucose and to get rid of ketones.
2. **Do more blood tests** to see what is happening to the blood glucose levels. It may be necessary to measure the blood glucose levels one to two hourly (including through the night) until ketones are no longer present and blood glucose level is back in target range.
3. **Measure blood ketones** when
 - the blood glucose level is greater than 14mmol/L.
 - If you/ your child is unwell and blood glucose level is greater than 14mmol/L.

4. If the blood glucose is more than 14mmol/L and blood ketones are 0.6mmol/L or more, rule out possible causes of hyperglycaemia and **change insulin reservoir, tubing, and cannula.**
5. **Follow “sick day” guide, please see Table 1.**
6. **Drink lots of water, sugar free/ no added sugar drinks or diet fluids** to wash the ketones away in the urine.
 - When you are unwell, and blood glucose level is in normal range with ketones, drink sugar containing drinks.
 - When unwell and if ketones are raised, with high blood glucose levels (>14mmol/L), drink water or sugar free drinks.
7. **Keep eating carbohydrate foods**
 - When you are unwell you still need food for energy. It is important you get enough carbohydrates for the body to use for energy, to prevent starvation ketones.
 - It is important for you to have carbohydrate foods. If you are unable to manage your usual meals and snacks you should replace these with sugar containing food and drink which is easy to consume. Examples of carbohydrate food and drinks to have when you are unwell are: flat Lucozade or other glucose drinks, ordinary cola or lemonade, sugar containing drinks e.g., Ribena, sports drinks, ordinary squash, soups, toast, ordinary jelly, and ice cream.
8. **You can give prescribed or over the counter medications as directed** for example antibiotics and paracetamol (**NOTE:** If using continuous glucose monitoring, paracetamol can result in falsely high readings). Ensure medication taken is sugar free.
9. **It is always helpful to consider causes of hyperglycaemia:**

Possible causes of hyperglycaemia	
Insufficient Insulin delivery <ul style="list-style-type: none"> • Miscalculation of a bolus dose • Omission of a bolus dose • Excessive intake of carbohydrate for hypoglycaemia • Insufficient basal rate • Insufficient insulin to carbohydrate ratio • Long periods of time spent off the pump • Pump in stop mode • Incorrect operation of pump • Out of date or incorrectly stored insulin 	Problem with the Infusion set <ul style="list-style-type: none"> • Air in the infusion line • Blockage in the infusion set • Leakage of insulin • Infusion set has not been screwed securely to the adaptor or cartridge
Cannula <ul style="list-style-type: none"> • Inflamed insertion site • Blocked or kinked cannula • Dislodged cannula • Cannula in site for longer than recommended • Lumpy site 	Increased Insulin demands <ul style="list-style-type: none"> • Illness/ infection • Being less active than normal • Stress • Hormonal changes • Growth • Other medications

Table 1: Managing high blood glucose and ketones

Blood glucose (BG) level greater than 14mmol/L Check blood for ketones	
Blood ketones Less than 0.6mmol/L	Blood ketones Greater than 0.6mmol/L
<ul style="list-style-type: none"> • Give fast acting insulin dose as per pump advice. • Re-check BG level in two hours. 	<ul style="list-style-type: none"> • Give fast acting insulin as correction dose via an insulin pen. Calculate this dose using the bolus advisor in your pump or by using your insulin sensitivity factor/ correction factor and administering it via pen injection. • Change entire set system (new reservoir, infusion set, cannula/ pod). • Start a temporary basal rate of +50% for two hours (displayed as 150% for Medtronic and Tandem T: Slim). If on a hybrid closed loop insulin pump: go to manual mode to start temporary basal rate as advice above. • Drink plenty of sugar free fluids. • Check glucose level and ketone level in two hours.
<p><u>After two hours</u></p> <ul style="list-style-type: none"> • Continue to monitor BG and ketone level two-hourly and administer correction doses two-hourly until blood glucose level is in target range. • If on a hybrid closed loop insulin pump; return to automated mode if not in automated mode. <p>If glucose is greater than 14mmol/L and ketones greater than 0.6mmol/L follow the red column advice.</p>	<p><u>After two hours</u></p> <ul style="list-style-type: none"> • If blood ketone level $\geq 0.6\text{mmol/L}$ and/ or BG $\geq 14\text{mmol/L}$ continue increased temporary basal rate, give a correction dose via the pump and contact the diabetes team for more advice.

Telephone the diabetes team for advice or go to the Children's Emergency Department if:

1. You are worried about your/ your child's diabetes or illness.
2. You have followed the above guidance and you/ your child continues to have blood glucose level of more than 14mmol/L and ketones of 0.6mmol/L or more.
3. You/ your child has vomited more than twice.
4. If you/ your child looks unwell, for example is drowsy, has a dry mouth, sunken eyes, rapid heavy breathing and/ or feels nauseous, is vomiting, has abdominal pain, is unable to eat or drink, **attend Children's Emergency Department.**
5. **If you or your child has altered level of consciousness or laboured breathing or there are immediate concerns for safety, DIAL 999.**

Part 2

Managing hypoglycaemia during illness – Insulin Pump Therapy

Illness associated with vomiting and diarrhoea (e.g., viral gastroenteritis) may lower blood glucose levels with the increased possibility of hypoglycaemia. Decreased food intake, poorer absorption of nutrients, and a slower emptying of the stomach or diarrhoea may contribute to hypoglycaemia. It may be necessary to adjust your/ your child's insulin dose to prevent hypoglycaemia episodes (see below).

- Encourage regular small sips of sugar containing drinks (NOT diet drinks).
- Monitor blood glucose (BG) at least two-hourly.
- If oral intake is reduced and BG are in normal/ low range, DECREASE usual fast acting insulin whilst illness persists, see Table 2.
- If BG are $>10\text{mmol/L}$, but $<14\text{mmol/L}$, give usual fast acting dose of insulin.
- If BG are $>14\text{mmol/L}$, see **Managing high blood glucose and ketones** for extra insulin doses, see Table 1.

Table 2

<p>Blood glucose level less than 4mmol/L</p>	<p>Blood glucose level between 4 and 10mmol/L</p>	<p>Blood glucose level between 10 and 14mmol/L</p>
<p>Treat hypoglycaemia as per hypoglycaemia advice sheet</p> <p>For manual pumps:</p> <ul style="list-style-type: none"> Start temporary basal rate of -20% (this will be displayed as 80% on Medtronic and Tandem T:slim pumps) until glucose level are higher than 10mmol/l (follow that column for further advice) <p>For hybrid closed loop pumps:</p> <ul style="list-style-type: none"> Medtronic 780g, Omnipod 5 and Dana with CamAPS FX stay in automated mode OR go to manual mode and follow advice as above Tandem T:slim change to the pre-set -20% basal rate profile or follow advice as above 	<p>Give usual bolus insulin dose for carbohydrates tolerated (food and drinks)</p> <p>For manual pumps:</p> <ul style="list-style-type: none"> Start temporary basal rate of -10% (this will be displayed as 90% on Medtronic and Tandem T:slim pumps) until glucose level are higher than 10mmol/l (follow that column for further advice) <p>For hybrid closed loop pumps:</p> <ul style="list-style-type: none"> Medtronic 780g, Omnipod 5 and Dana with CamAPS FX stay in automated mode OR go to manual mode and follow advice as above Tandem T:slim change to the pre-set -10% basal rate profile or follow advice as above 	<p>Give usual bolus insulin dose for carbohydrates tolerated (food and drinks)</p> <p>For manual pumps:</p> <ul style="list-style-type: none"> Stop temporary basal rate and resume usual basal profile <p>For hybrid closed loop pumps:</p> <ul style="list-style-type: none"> Medtronic 780g, Omnipod 5, Tandem T:slim and Dana with CamAPS FX return to automated mode
<ul style="list-style-type: none"> If hypoglycaemia persists despite dose reduction as above, consider further reduction of fast acting insulin bolus doses or temp basal rates of up to 50%. Rarely, you may not require fast acting insulin boluses for carbohydrates during illness. Consider giving insulin immediately post meal if unsure you/ your child will tolerate food during illness. If no carbohydrate is eaten, fast acting insulin boluses may be omitted but <u>NEVER</u> suspend basal insulin unless you/ your child has a prolonged hypoglycaemia (45 mins to one hour). You must seek advice immediately if basal insulin is suspended. Once oral intake is tolerated again, give normal doses of insulin. See red box over page for guidance around keeping you/ your child safe during this period. 		

Telephone the diabetes team for advice or go to the Children's Emergency Department if:

1. You are worried about your/ your child's diabetes or illness.
2. If not tolerating anything orally and BG are $<4\text{mmol/L}$, attend hospital. If drowsy or reduced conscious level, give IM glucagon, and dial **999**.

If aged under 8 years old give 0.5mg glucagon by injection

If aged 8 years old or over, give 1mg glucagon by injection

Who to contact for further help or advice:

If you have any concerns, please contact the diabetes team for advice or support as needed.

Monday - Friday 8 am - 5 pm Tel: 01442 287442

Out-of-hours: Tel: 01438 285000

You can also email the diabetes team westherts.paediatricdiabetes@nhs.net