West Hertfordshire Hospitals NHS Trust

A guide to...

Sick Day Rules Guideline (Insulin Pump)

Patient Information

How to contact us

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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**

Language | Large Print | Braille | Audio

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Ratified / Review Date	Oct 2022 / Oct 2025
ID Number	40/2048/V4

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 **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 & 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 1 - 2 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 14 mmol/L and blood ketones are 0.6mmol/L or more, rule out possible causes of hyperglycaemia and **change insulin reservoir, tubing and cannula**.

Possible causes of hyperglycaemia	
Insufficient Insulin Delivery • Miscalculation of a bolus dose • Omission of a bolus dose • Excessive intake of carbohydrate for hypoglycaemia • Insufficient basal rate • Insufficient insulin 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** • 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 • Inflamed insertion site • Blocked or kinked cannula • Dislodged cannula • Cannula in site for longer than recommended • Lumpy site	**Increased Insulin Demands** • Illness/ Infection • Being less active than normal • Stress • Hormonal changes • Growth • Other medications

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 raised with high blood glucose levels (>14mmmol/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.

Table 1: Managing high blood glucose and ketones

<table>
<tr><td colspan="2">Blood glucose (BG) level greater than 14mmol/L
Check blood for ketones</td></tr>
<tr><td>Blood ketones
Less than 0.6mmol/L</td><td>Blood ketones
Greater than 0.6mmol/L</td></tr>
<tr><td>• Give Fast acting Insulin dose as per pump advice.

Re-check BG level in 1 hour.</td><td>• Give Fast acting Insulin correction dose via an insulin pen injection

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 and cannula)

• Drink plenty of sugar free fluids.

• Re-check BG and blood ketone level in 1 hour.</td></tr>
<tr><td><u>After 1 hour</u>

• Continue to monitor BG and ketone level 2 hourly and administer correction doses two-hourly until blood glucose level is in target range.

If glucose is greater than 14mmol/L and ketones greater than 0.6mmol/L follow the red column advice</td><td><u>After 1 hour</u>

• Blood ketone level ≥ 0.6mmol/L and/or BG ≥ 14mmol/L give a correction dose via the pump

AND

• Start temporary basal rate of + 25% (this will be displayed as 125% on Medtronic pumps) for 2 hours.

• If ketone level is less than 0.6mmol/l follow green column.

• Re-check BG level in 1 hour.</td></tr>
<tr><td>Continue with plan as above until BG level is back into target range (4-10mmol/l).</td><td><u>After 1 hour</u>

If BG level is reducing but still above target range:

• Give a correction dose via the pump.

• Continue with + 25% (this will be displayed as 125% on Medtronic pumps) until blood glucose level is between 4-10mmol/l.

If BG level is rising:

• Give a correction dose via the pump

• Increase temporary basal rate to + 50% (this will be displayed as 150% on Medtronic pumps) until blood glucose level is between 4-10mmol/l.

• Re-check after 1 hour and contact the diabetes team for further management if blood ketone level remains greater than 0.6mmol/L.

• If BK are ≥ 3.0mmol/L there is immediate risk of developing DKA.

• See red box below for guidance around keeping you/ your child safe during this period.</td></tr>
</table>

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, dry mouth, sunken eyes, rapid heavy 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.**

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

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).

Blood glucose level less than 4 mmol/L	**Blood glucose level between 4 and 10 mmol/L**	**Blood Glucose Level between 10 and 14mmol/L**
• Treat hypoglycaemia as per hypoglycaemia advice sheet • Subtract 20% calculated Fast acting insulin dose or by using the illness setting of your pump	Give Fast acting Insulin • Subtract 10% from calculated Fast acting insulin dose or by using the illness setting of your pump	Give Fast acting Insulin dose • As per your insulin pump advise
• If hypoglycaemia persists despite dose reduction as above, consider further reduction of Fast acting insulin bolus doses of up to 50%. Rarely, you may not require fast acting insulin bolus for carbohydrates during illness. • Consider giving insulin immediately post meal if unsure child will tolerate food during illness • If no carbohydrate is eaten Fast acting insulin boluses may be omitted but <u>NEVER</u> omit basal insulin. • Once oral intake is tolerated again, give normal doses of insulin		

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

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 <4mmol/L, attend hospital. If drowsy or reduced conscious level, give IM glucagon and dial **999**

If age under 8 give 0.5 mg glucagon by injection

If age 8 or over, give 1mg glucagon by injection

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