



A guide to...

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

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**



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Managing High Blood Glucose and Ketones with Illness

Insulin Injection 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** and Part 2 is **managing hypoglycaemia during illness**.

Part 1

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 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 with ketones, and illness and hypoglycaemia.

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 which 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?

Ketones appear:

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

Ketones do not appear from eating too many sugary food 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.

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 2 hourly (including through the night) until ketones are no longer present and blood glucose level is back in target range. If you are using continuous glucose monitoring (CGM), there is potential for inaccurate readings at extremes of glucose levels, confirm CGM results with blood glucose measurements.
3. **Check blood ketone levels** whenever a child is ill, regardless of blood glucose levels. If blood ketone levels are $>0.6\text{mmol/L}$, repeat the test 2 hourly.
4. **Drink lots of water, sugar free/ no added sugar drinks or diet fluids** to wash the ketones away in the urine. Drink water or sugar free drinks if ketones are present with high blood glucose levels ($>14\text{mmol/L}$).
5. **Keep eating carbohydrate foods and/ or carbohydrate containing drinks.**
 - 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.
 - You should give rapid acting insulin for carbohydrates consumed, following **Table 1** or **Table 2**, depending on BG level and ketone level.
6. **Give additional fast acting insulin** if blood glucose level is above target **or** ketones are high (**See Table 1**).
7. **You can give prescribed or over the counter medications as directed**, for example antibiotics and paracetamol (if using continuous glucose monitoring be aware that paracetamol may result in false high readings). Ensure medication taken is sugar free.

Table 1: Management and interpretation of blood glucose levels and blood ketone levels during illness for patients on injections

CHECK BLOOD GLUCOSE & BLOOD KETONE LEVELS			
Blood glucose level	Blood ketone <0.6mmol/L	Blood ketone 0.6 – 1.5mmol/L	Blood ketone >1.5mmol/L
4 – 10mmol/L	No need to give extra insulin.	<p>Give correction dose of fast acting insulin as per bolus advisor diabetes app if correction advised OR</p> <p>Give correction dose as per your Daily Diabetes Routine Chart if correction threshold reached.</p> <p>*Starvation ketones. Extra carbs needed (sugary fluids if not able to eat).</p>	<p>Give correction dose of fast acting insulin as per bolus advisor diabetes app if correction advised OR</p> <p>Give correction dose as per your Daily Diabetes Routine Chart if correction threshold reached.</p> <p>*Starvation ketones. Extra carbs needed (sugary fluids if not able to eat).</p>
Check blood glucose & ketones every 2 hours, repeat additional insulin every 2-4 hours if needed.			
10 – 14mmol/L	<p>Give correction dose of fast acting insulin as per bolus advisor diabetes app if correction advised OR</p> <p>Give correction dose as per your Daily Diabetes Routine Chart if correction threshold reached.</p> <p>*Encourage sugar free fluids – little and often.</p> <p>Give next planned/usual dose as normal.</p>	<p>Give correction dose of fast acting insulin as per bolus advisor diabetes app if correction advised OR</p> <p>Give correction dose as per your Daily Diabetes Routine Chart if correction threshold reached.</p>	<p>Give correction dose of fast acting insulin as per bolus advisor diabetes app, using 10% 'illness function' if correction advised OR</p> <p>Add 10% to correction dose as per your Daily Diabetes Routine Chart if correction threshold reached.</p> <p>*Encourage sugar free fluids - little and often.</p>
Check blood glucose & ketones every 2 hours, repeat additional insulin every 2-4 hours if needed.			
>14mmol/L	<p>Give correction dose of fast acting insulin as per bolus advisor diabetes app OR</p> <p>Give correction dose as per your Daily Diabetes Routine Chart.</p> <p>*Encourage sugar free fluids – little and often.</p> <p>Give next planned/usual dose as normal.</p>	<p>Give correction dose of fast acting insulin as per bolus advisor diabetes app, using 10% 'illness function' OR</p> <p>Add 10% to correction dose as per your Daily Diabetes Routine Chart.</p>	<p>Give correction dose of fast acting insulin as per bolus advisor diabetes app, using 20% 'illness function' OR</p> <p>Add 20% to correction dose as per your Daily Diabetes Routine Chart.</p> <p>*Phone diabetes team for advice.</p>
Check blood glucose and ketones every two hours, repeat additional insulin every 2-4 hours if needed.			
<p>NOTE: If blood ketones ≥ 3.0mmol/L (starvation ketones usually < 3.0mmol/L) there is immediate risk of developing DKA. After extra insulin has been given, the blood ketone level may temporarily increase by 10 – 20% for the first hour but should be expected to decrease thereafter.</p>			

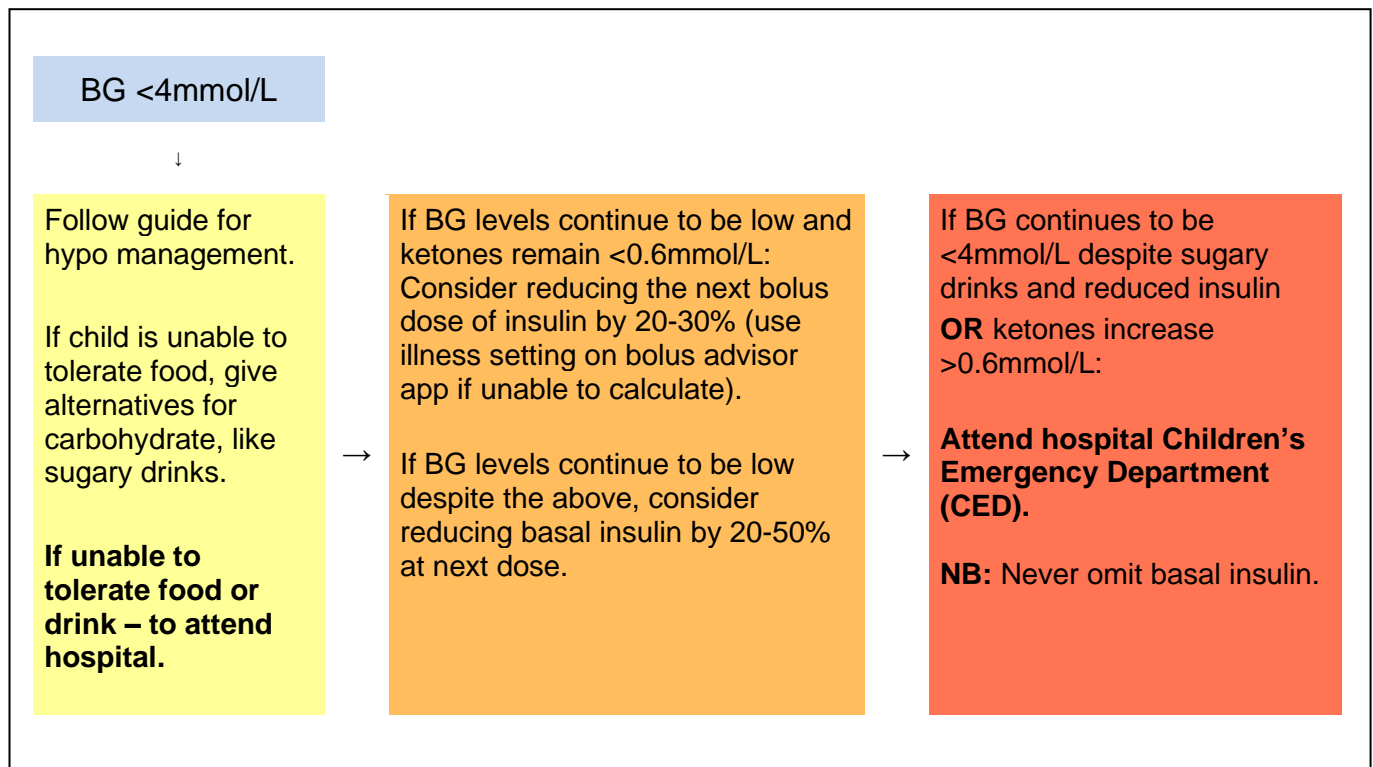
Part 2

Managing Hypoglycaemia and Maintaining BG Levels During Poor Oral Intake (eg Gastroenteritis) Patients on Insulin Injections

- Hypoglycaemia is defined as BG of $<4\text{mmol/L}$. It is mild/ moderate if the child or young person is alert and able to tolerate oral fluids/dextrose gel. It is severe hypoglycaemia if the child or young person is unconscious or fitting.
- Illnesses associated with nausea and vomiting with or without diarrhoea can lead to hypoglycaemia. Replacing meals with frequent small volumes of sugary drinks and monitoring BG carefully helps to avoid hypoglycaemia. Parents can give alternatives for carbohydrate like sugary drinks if child is unable to tolerate food.
- Reduction in boluses with meals may be required if oral intake is reduced. However, if doses are lowered too much, there is a risk of developing insulin deficiency leading to ketosis and ketoacidosis.
- Check ketones regularly to see that your child has sufficient carbohydrate/ sugar intake. Ketones associated with gastrointestinal illness and hypoglycaemia usually reflect inadequate energy supply rather than insulin deficiency (i.e., starvation ketones). Monitor BG 2 hourly and encourage fluids containing sugar.
- If oral fluids cannot be tolerated and BG are $<4\text{mmol/L}$, the child or young person should attend hospital. If they are drowsy or conscious level is reduced, call 999 for an ambulance.
- If drowsy or reduced conscious level, give IM glucagon, if confident to do so, and **call 999**
 - a. If aged under 8 years old give 0.5mg glucagon by injection.
 - b. If aged 8 years old or over, give 1mg glucagon by injection.
- If your blood glucose level is in target range, but your blood ketone level is high and you have a sudden onset of headache, nausea, vomiting, abdominal pain, or difficulty in breathing, go to the Children's Emergency Department.

Hypoglycaemia management at home - Follow HYPO guideline

Hypoglycaemia with Vomiting or Unable to Tolerate Any Oral Fluids During Illness



Who to contact for further help or advice:

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

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

1. You are worried about you/ 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 aged under 8 years old give 0.5mg glucagon by injection

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

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