

Testing for Ketones and Sick Day Rules in Type 1 Diabetes

Introduction

You have been given this leaflet because you have Type 1 Diabetes. If you are ill you will need to test your blood for ketones and follow the sick day rules. This leaflet gives you information about testing for ketones, when and how to test for them and sick day rule guidance.

What are ketones?

Ketones are created when there is a severe lack of insulin, meaning that the body cannot use glucose for energy and starts to break down other body tissues for energy. Ketones are the by-product of this process. Ketones are poisonous chemicals and, if left unchecked and untreated can cause the body to become acidic.

Why is it important to test for ketones?

Ketones are acids which build up if you become unwell or have an infection. This may result in a condition called 'diabetes ketoacidosis'. Higher insulin doses and drinking plenty of fluids will be needed to bring down the level of ketones. Vomiting may limit your intake of carbohydrate, so you must contact a health care professional if you are vomiting. Checking for ketones when you are ill will alert you to what could be a dangerous situation.

Testing blood for ketones

You can test your blood for ketones by using a blood ketone meter. Your nurse will give you a meter if it is needed.

If you have Type 1 Diabetes it is important to test for ketones if your blood glucose levels are over 13.9mmol/L and not dropping over the following 2 hours or when you are ill (regardless of your blood glucose level).

Reference No.

GHPI1766_12_22

Department

Diabetes

Review due

December 2025

Patient
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When should you check for ketones?

You need to check your blood for ketones when you:

- are unwell
- have high blood glucose levels, above 13.9mmol/L
- are vomiting or have diarrhoea

If you have ketones, you are likely to have high blood glucose levels, but sometimes ketones can occur when your blood glucose is in the target range of 4 -10mmol/L.

Do not ignore the presence of ketones.

Please read the section within this leaflet regarding sick day rules. This gives you important information about managing your diabetes during illness.

What do the blood ketone results mean?

< 0.6 mmol/L	Acceptable level
0.6 – 1.5 mmol/L	Drink more fluids and take a higher insulin dose depending on blood glucose level and/or have an insulin correction dose to reduce the blood glucose and ketone levels. It is important that the sick day rules are followed and that you re-check blood ketone levels again in 1 to 2 hours.
> 1.5 mmol/L	This shows a risk of diabetes ketoacidosis. Continue the steps as above, take extra insulin and drink plenty of fluids. Seek medical help straightaway. *NOTE* Diabetes Nurse contact number is not an emergency helpline

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Testing for Ketones in pregnancy

During pregnancy, ketones can develop at a lower blood glucose level than outside of pregnancy. If your blood glucose is more than 10mmol/L and you are not sure why it is high, please test for ketones. If you are unwell, test for ketones **even** if your blood glucose is less than 10mmol/L. Once you have done this look at the table above and follow the appropriate steps.

If you have ketones, you are likely to have high blood glucose levels, but sometimes they can be within the target range. This target will have been given to you by your antenatal diabetes team.

Sick day rules

What happens when you are ill?

People who have diabetes do not get more illnesses than other people. However, if you are ill, your blood glucose levels may be more difficult to control but will return to your usual levels once you are better.

What happens to your diabetes when you are ill?

A rise in your blood glucose levels is part of the body's natural response to illness. Blood glucose levels may rise, even if you are not eating and drinking. This is because your body releases sugars from its energy stores.

What should you do if you are ill?

- **Do not stop taking your insulin.**
- You should stop taking Metformin (if prescribed) if you have diarrhoea, vomiting or you are dehydrated, until you are better.
- Test your blood glucose levels more frequently than normal, even if you are not eating or drinking normally, as your blood glucose levels are likely to be high.
- Test for ketones, as instructed by your diabetes team.
- The presence of ketones suggests that you are lacking in insulin/ carbohydrate and in danger of developing ketoacidosis.

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- If you find ketones greater than 1.5mmol/L, you should seek urgent advice from your GP, practice nurse or the diabetes nurses at the hospital.
- Try to drink at least 2 to 3 litres (4 to 6 pints) of sugar free fluids, throughout the day if your blood glucose levels are normal or high. If your blood glucose levels are low, drinks containing glucose are required.
- Try to eat your normal diet or replace your meals with alternatives such as carbohydrate-containing drinks, for example milk, milk shakes, fruit juices or soup, ice cream, fruit, Complian[®].
- Unless you keep up your intake of carbohydrate, your body will switch over to burning fat stores, which produces the acids called ketones.
- If you are vomiting, you must contact your GP, diabetes nurses or NHS 111 for advice. You may require hospital treatment.

Insulin dose

Illness is one situation when you may need to adjust your insulin dose. This would be based on your blood glucose levels recorded just before you inject your insulin. You do not have to wait for 3 consecutive days of high blood glucose readings, before making changes to the insulin doses.

If your blood glucose levels are:

- less than 13 mmol/L, continue with your normal insulin doses
- between 13 mmol/L and 20 mmol/L, increase your insulin doses by 2 units
- above 20 mmol/L, increase your insulin doses by 4 units

If you are not sure about how much to increase your insulin doses contact your GP, practice nurse or diabetes nurses for advice.

If you have increased your insulin dose in response to illness, you will have to reduce the doses once you feel better to your original dose.

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When to seek medical advice

You should contact your GP, diabetes nurses or NHS 111 if:

- you are vomiting or have diarrhoea
- your blood glucose level is over 20 mmol/L
- your blood glucose level is under 4 mmol/L
- you have ketones on testing above 1.5mmol/L
- you are worried

Vomiting, diarrhoea, rapid breathing or drowsiness can lead to serious problems if not treated quickly. Hospital treatment is essential. Call your GP or NHS 111 for advice.

Contact information

Diabetes Nurses

Cheltenham General Hospital

Tel: 0300 422 4266

Gloucestershire Royal Hospital

Tel: 0300 422 8613

Monday to Friday, 8:00am to 4:00pm, excluding Bank Holidays

These are answer machines. Please leave your name, date of birth and contact number when prompted. Your call will be returned as soon as possible.

Alternatively, you can email the diabetes nurses:

Email: ghn-tr.diabetesnurses@nhs.net

Further information

Diabetes UK

Website: www.diabetes.org.uk

Content reviewed: December 2022