



CLINICAL GUIDELINE

Diabetes, Ketone testing in Type 1 Diabetes

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

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Important Note:

The Intranet version of this document is the only version that is maintained. Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

KETONE TESTING IN TYPE 1 DIABETES

Diabetic Ketoacidosis (DKA) is a serious complication of type 1 Diabetes. People develop DKA for a number of reasons such as:

- Serious illness, such as infection, vomiting and diarrhoea
- Stopping or forgetting insulin injections

Testing blood ketones and appropriate early management can help to prevent DKA, avoid admission or ensure that DKA gets treated before it becomes severe. Guidelines are different for those on multiple daily insulin injections versus people using CSII (continuous subcutaneous insulin infusion). In addition there are separate guidelines below for those using urine ketone testing. These guidelines are intended for use in the outpatient setting or with DSN support from diabetes centres.

There is a further guideline below for ketone testing and admission avoidance in IAUs (immediate assessment areas).

In pregnancy the risks and thresholds for ketosis are different. See ketone testing in pregnancy guideline link for more details.

<http://www.staffnet.ggc.scot.nhs.uk/Acute/Women%20and%20Childrens%20Services/Obstetrics/Greater%20Glasgow%20and%20Clyde%20Guidelines/Documents/Diabetes%20Ketone%20Testing.pdf>

Testing Blood Ketones At Home or In The Outpatient Setting for People on Insulin injections for type 1 diabetes: Information for Patients

This advice is intended for patients in the outpatient setting or with DSN support from diabetes centres. This advice is not suitable for those in pregnancy.

Diabetic Ketoacidosis (DKA) is a serious complication of type 1 Diabetes.

People develop DKA for a number of reasons such as:

- Serious illness, such as infection, vomiting and diarrhoea
- Stopping or forgetting insulin injections

Testing your blood ketones helps you to spot the signs and treat the condition before it get too serious or you need to go to hospital.

You should consider testing your blood ketones:

- **When prompted by your Blood glucose meter or if BG is more than 14mmol/l**
- **When you feel ill**, especially if you have an infection and a temperature or if you have been sick.
- **If you are suffering from any of the symptoms of DKA –**
 - ~ Thirst
 - ~ Passing lots of urine
 - ~ Feeling or being sick
 - ~ Difficulty breathing
 - ~ Feeling tired and/or confused

If your home blood sugar readings are above 14mmols please follow the advice in the tables below;

<u>Blood Glucose level</u>	<u>Level when you haven't eaten</u>	<u>What to do</u>
A little bit high	7-10mmols	Continue with your usual insulin and blood glucose testing. Contact your diabetes team to discuss your levels if this often your range.
High	10-14mmols	Check glucose every 2-4 hours until it is below 10mmols.If it goes on rising or you feel ill check ketones
Very high	Over 14mmols	Check Ketones and follow advice below. Continue checking blood glucose as well as Ketone levels.

Using your Ketone strips: Normal levels will vary slightly from person-to-person depending on length of time since eating, what you have had to eat and how long you might have been unwell.

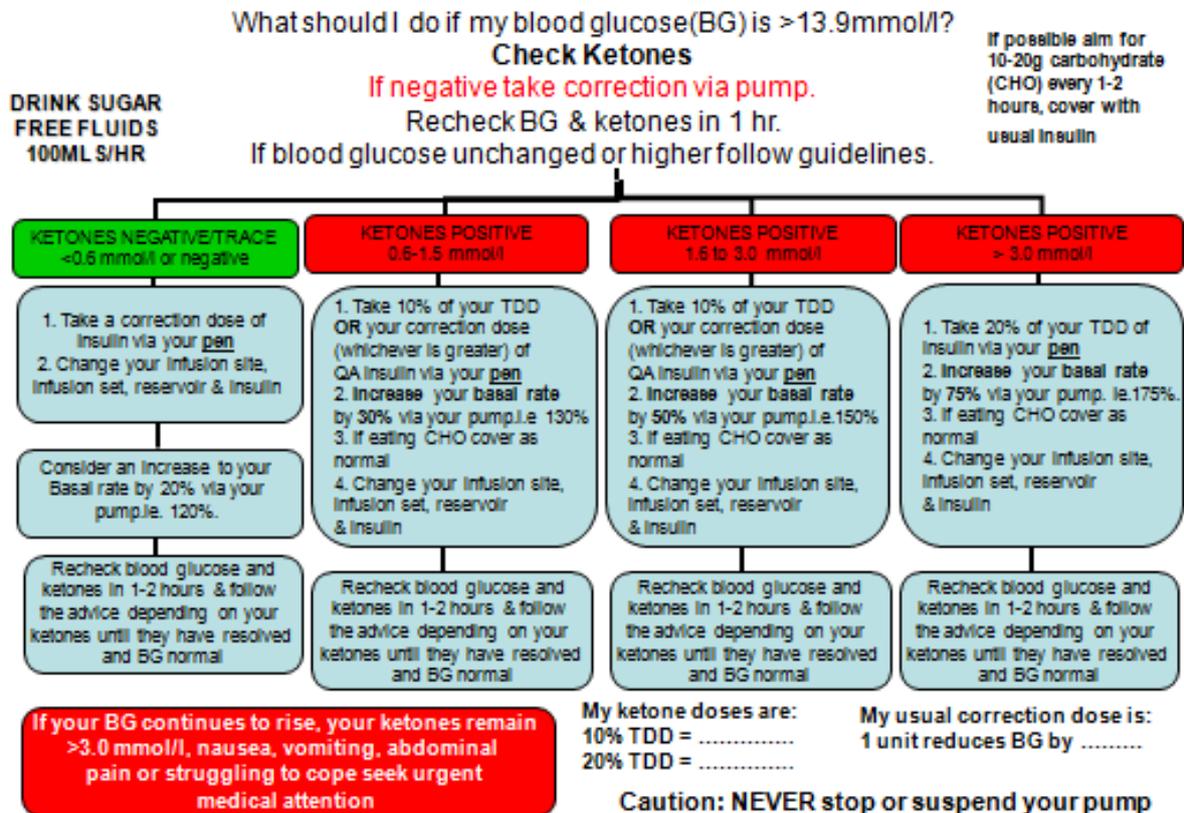
Remember it is better to be to be careful, if in doubt check your ketones contact your diabetes care team or emergency doctor service.

Blood Ketone level	Advice
Below 0.6mmol/l	Normal. Carry on with your usual blood glucose testing
Between 0.6 and 1.5mmols	<p>Continue regular insulin regime. Test your blood glucose and ketones after 2 hours.</p> <p>Consider increasing insulin. If blood glucose and ketones are falling retest 2 hourly till ketones below 1.1mmols</p>
Between 1.5mmols and 3mmols	<p>You need extra fast acting insulin (e.g. novorapid, humalog, apidra). Take 10% of your total daily dose as fast acting insulin. If this is above 10 units only take 10 units.</p> <ul style="list-style-type: none"> Sip sugar free clear liquid (aim for 100mls per hour) Retest your ketones and blood sugar in 2 hours. <p>If your blood ketones are not falling contact your GP, Emergency Department or Diabetes Centre</p>
Above 3mmols	<p>You need extra fast acting insulin (e.g. novorapid, humalog, apidra). Take 20% of your total daily dose as fast acting insulin. If this is above 10 units only take 10 units.</p> <ul style="list-style-type: none"> Drink 1 cup of sugar free clear liquid every 15 minutes (i.e. 500mls per hour) Get specialist advice immediately. Contact your Emergency department.

Total daily dose = Add up the number of units of long acting insulin (lantus or levemir) and fast acting insulin (novorapid or humalog or apidra) taken the previous day. *For example,* novorapid 4 units at breakfast, 6 units at lunch, 10 units at tea and 24 units of lantus at bedtime would be a total daily dose of 44 units.

Testing Blood Ketones at home and in the Outpatient setting for Patients on CSII (insulin pumps) for type 1 diabetes

(guidance not suitable for pregnancy)



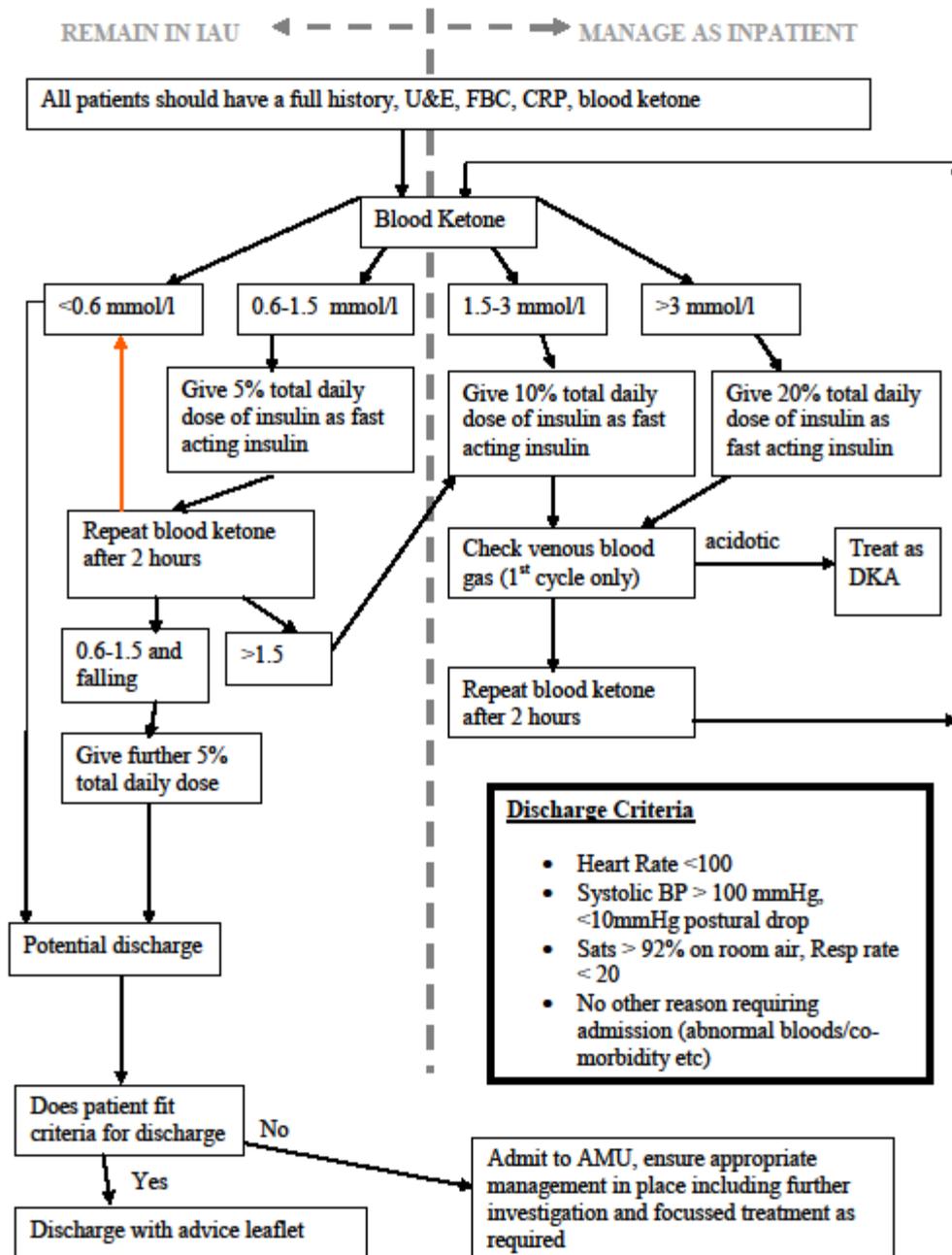
Urine ketone testing in type 1 diabetes

(guidance not suitable for pregnancy)

For some patients blood ketone testing may not be suitable. In this situation urine ketone testing may be performed. If BG is 14.0 or greater or feeling unwell testing for ketones is recommended. If urine test shows ++ urine ketones or more then further assessment in emergency department (ED) or immediate assessment unit (IAU) is recommended. If not feeling unwell and urine test shows ++ urine ketones or more then assessment in diabetes centre is recommended (during normal diabetes centre opening hours). If unable to be assessed at diabetes centre, ED or IAU assessment is recommended. This advice is not suitable for those in pregnancy.

Testing Blood Ketones and avoiding admission in People on Insulin injections for type 1 diabetes in assessment units (e.g. IAU or AAU) or emergency departments (not for use in pregnancy)

DKA/Hyperglycaemia in Type 1 diabetes (can be used in insulin deficient diabetes secondary to pancreatitis)



NB total daily insulin is the sum total units of ALL types of pts daily insulin regimen