

Thames Valley Priorities Committee Commissioning Policy and Care Pathway

Policy No. TVPC 13 **Ketone Testing**

**Recommendation made by
the Priorities Committee:** **March 2015**

Date of issue: **November 2015**

This guidance is for adults with type 1 diabetes but may also be applicable to a very small number of high risk patients with type 2 diabetes.

Why does Diabetic Keto Acidosis (DKA) happen?

DKA is due to a profound reduction of circulating insulin relative to the body's requirements. It is characterised by hyperglycaemia, acidosis and ketonaemia. It is a medical emergency with a significant morbidity and mortality and should be diagnosed promptly and managed intensively. Precipitating conditions include infection/acute illness and inadequate insulin or non-compliance.

Prevention

Education programmes are key for diabetic patients, particularly concerning what to do in cases of illness ('sick day rules'); see below

Ketone Testing

Blood ketone strips with education and training are more effective at detecting ketonaemia as they provide 'real time' results, urine ketone changes often lag behind blood ketone changes by 2-4 hours.

Optium β -Ketone strips (£21.04 for 10 strips*) are commonly prescribed blood ketone test strips. There are 10 strips in each pack, with a shelf life of approximately 12-14months. An alternative choice is Glucomen LX strips (£20.75 for 10 strips*).

Patients who develop ketosis will need to test on an hourly basis until blood ketones return to a satisfactory level. It is recommended that strips are prescribed in quantities to allow patients to maintain a supply of two boxes in the home. If a patient does not use blood ketone test strips within approximately one year then a prescription for replacement strips will need to be issued before their expiry.

* NHS Business Services Authority, Drug Tariff, April 2015

Ketone Testing Strips for Adults - Who should Have Them and Why

THE FOLLOWING HIGH RISK ADULT PATIENTS SHOULD RECEIVE KETONE TESTING STRIPS TO SELF-MONITOR WHEN REQUIRED

- Insulin pump users
- Patients with a history of admissions with ketoacidosis within last 5 years
- HbA1c >11% (97 mmol/mol) or blood glucose often > 20 mmol/l
- Pregnant patients with type 1 diabetes
- Newly diagnosed type 1 diabetes



The local specialist diabetes centre will identify high risk patients through admissions and out-patient appointments.
For those identified as needing testing strips:



Specialist diabetes care team responsibilities are to

- Initiate ketone monitoring
 - Provide training and education
 - Provide meter and initial strips
- how to use strips
→ when to use strips
→ what to do with result



If patient is not receiving care at a specialist centre then GP responsibilities are to

- Provide on-going strips to patients initiated in secondary care
- Reinforce training on meter use
- Reinforce education on dealing with high ketone levels so that patients knows what to do if reading is high

Advice for Patients to Manage their Type 1 Diabetes During illness such as Flu or Diarrhoea or Vomiting

Sick Day Rules

What	How	Why
Insulin	DON'T stop your insulin. Take all doses.	Unwell patients with diabetes often have greater insulin requirements to maintain normal glucose levels even if they are not eating.
Fluids	Drink plenty of sugar-free fluids	It is easy to become dehydrated due to the illness and also if your blood glucose rises.
Food	Try to eat normally. Sugar free fluids are recommended BUT if you have no appetite or cannot eat then substitute your usual food for palatable sources of carbohydrate e.g. sips of Lucozade/fizzy drinks (not diet), cereals.	This will enable you to manage your diabetes.
Blood glucose testing	Test every 2 to 4 hours.	This will enable you to manage your diabetes.

Action for Patients

- If your blood glucose remains above 20mmol/l after 4hours then check your ketone levels.
- Check blood ketones if you have blood test strips
- Otherwise use urine test strips. Urine ketones 3+ or above seek medical advice
- If your blood glucose falls rapidly or is less than 4mmol/l take frequent sips of Lucozade/fizzy drinks (not diet)

NOTES:

- Potentially exceptional circumstances may be considered by a patient's CCG where there is evidence of significant health status impairment (e.g. inability to perform activities of daily living) and there is evidence that the intervention sought would improve the individual's health status.
- This policy will be reviewed in the light of new evidence or new national guidance, e.g., from NICE.
- Thames Valley clinical policies can be viewed at <http://www.fundingrequests.cscsu.nhs.uk/>

Self-Management of Ketoacidosis: This leaflet is designed for adults who have Type 1 diabetes who are taking meal-time and background insulins. Patients should follow their own specific written instructions supplied during structured education programme if different from below. If seriously unwell or drowsy seek medical advice immediately

TESTING FOR KETONES IN THE BLOOD?

If blood glucose is over 20 mmol/l for 4 hours or longer check your blood ketone levels

<p>Ketones less than 1 mmol/l</p>	<p>This is not worrying; treat raised glucose as usual</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Drink at least a mug of sugar-free fluid every hour Do not stop any long acting insulin* injections</p> </div>
<p>Ketones between 1 and 3 mmol/l</p>	<p>Take action to bring level of ketones down with extra insulin:</p> <ul style="list-style-type: none"> • Take an extra dose of the type of insulin you use at meal-times (short acting). • Give 10% of your average total daily insulin dose e.g. if you take 60 units of insulin in a day (total dose of both types of insulin added together), give an extra dose of 6 units. • If you are due a meal-time injection, take the meal time dose as well as the extra insulin dose. • Check blood ketone and glucose levels after 1 hour. • If the ketone level is still over 1, give the same extra insulin dose again • If there is no improvement in your ketone levels, contact your doctor <p>(tel:) _____ or on-call diabetes registrar at the Churchill Hospital on 01865 741841</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Drink at least a mug of sugar free fluid every hour Do not stop any long acting insulin* injections</p> </div>
<p>Ketones 3 mmol/l or higher</p>	<p>This is a dangerous level:</p> <ul style="list-style-type: none"> • Go to the nearest casualty department without delay In the meantime: Take an extra dose of the type of insulin you use at meal-times (short acting). • Give 10% of your average total daily insulin dose e.g. if you take 60 units of insulin in a day (total dose of both types of insulin added together), give an extra dose of 6 units. <p>If there is a delay in getting to casualty: Check ketone and glucose levels after 1 hour. If the ketone level is still over 1, give the same extra insulin dose again</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Drink at least a mug of sugar free fluid every hour Do not stop any long acting insulin* injections</p> </div>

* Long acting insulins: Insulatard, Humulin I, Insuman Basal, Lantus/Glargine, Levemire/Detemir and Tresiba/Degludec