

KETONE TESTING AND SICK DAY RULES GUIDELINE

This ketone testing guidance is for adults with type 1 diabetes, but may also be applicable to a very small group of high risk patients with type 2 diabetes. The Sick Day Rules information is for people with both type 1 and 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 people with Diabetes, particularly concerning what to do in cases of illness (see 'Sick Day Rules', page 3).

Ketone Testing

Blood ketone strips are the most effective at detecting ketonaemia as they provide 'real time' results. Urine ketone changes often lag behind blood ketone changes by 2-4 hours and the urine strips do not test for the main type of ketones. Therefore, only blood ketone testing strips should be provided, along with education and training.

The first line choices for blood ketone strips in Oxfordshire are **GlucoRx HCT** Ketone Strips and **Glucomen Areo** ketone strips, as these are the most cost effective. The blood glucose strips for this device are also cost effective, therefore the patient can use the GlucoRx HCT and Glucomen Areo 2k devices for both glucose and ketone testing. Any ketone meters with strips of equivalent price with cost effective blood glucose test strips, could be considered as a first line option as well.

BNF Name	Ketone Strips (10)*	Blood Glucose Strips (50)*
FreeStyle Optium B-Ketone Reagent Strips	£21.14	£15.97
GlucoMen LX Ketone Reagent Strips	£21.06	£15.76
GlucoMen areo Ketone Sensors Strips (Glucomen Areo 2K meter)	£9.95	£9.95
GlucoRx HCT Ketone Strips	£9.95	£9.95
KetoSens ketone strips (Caresens Dual Meter)	£9.95	£9.95

*Drug Tariff March 2017

Patients who develop ketosis will need to test every 2-4 hours, depending on ketone levels, 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.

Ketone Testing and Sick Day Rules Guidance. Final approved APCO March 2017. Due for review in March 2019. Jointly agreed by the OCCG medicines' management team, community diabetes team and OCDEM. Please contact ailsa.whyte@oxfordshireccg.nhs.uk if you have comments

KETONE TESTING STRIPS FOR ADULTS

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

- Insulin pump users (2 boxes)
- Patients with a history of admissions with ketoacidosis within last 5 years (2 boxes)
- HbA1c >11% (97 mmol/mol) or blood glucose often > 20 mmol/l (2 boxes)
- Pregnant patients with type 1 diabetes (2 boxes)
- Newly diagnosed type 1 diabetes (1 box)

OCDEM* will identify high risk patients through admissions and out-patient appointments. For those identified as needing testing strips:

*Oxford Centre for Diabetes, Endocrinology and Metabolism

OCDEM* 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

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

SICK DAY RULES

All diabetes patients should be educated on how to manage their condition when they are ill. To complement the education, the appropriate TREND Sick Day Rules leaflet should be printed and handed to the patient.

- **Diabetes: What to do when you are ill** (suitable for people with type 1 Diabetes and some people with type 2 Diabetes)

<http://trend-uk.org/wp-content/uploads/2017/02/131216-TREND-sick-rules-leaflet-FINAL.pdf>

As well as general advice on what to do when patients are unwell, this leaflet covers how to manage insulin for people with type 1 and 2 Diabetes, and metformin.

- **Type 2 Diabetes: What to do when you are unwell**

As well as general advice on what to do when patients are unwell, this leaflet covers how to manage insulin, metformin, SGLT inhibitors, GLP1 agonists and sulphonylureas for people with type 2 diabetes.

<http://trend-uk.org/wp-content/uploads/2017/02/161212-TREND-unwell-v4.pdf>

The leaflets are also available on the OCCG intranet page under diabetes guidelines.

Additional Counselling Points

When handing the leaflet to patients the following points should be discussed;

- If ketone levels are 3mmol/l or higher, the patients should always contact an appropriate healthcare professional for additional advice and support
- Urine strips should only be used if there is no option of blood ketone testing
- If the patient is vomiting, unable to keep fluids down, or is unable to control their blood glucose or ketone levels they **must seek urgent medical advice**.
- It may be more appropriate for some people with type 2 diabetes (ketosis prone Diabetes) to follow the advice for type 1 diabetes patients. The specialist will have made the patient and GP aware if this is the case, and the correct route on the patient information leaflet must be indicated to the patient.