

DIABETES – BLOOD GLUCOSE MONITORING AT HOME (ADULTS)

Clinical Guideline

Type 2 Diabetes

Self-monitoring of blood glucose (SMBG) should be considered but not routinely offered for adults with type 2 diabetes unless:

The person is on insulin or

There is evidence of hypoglycaemic episodes or

The person is on oral medication that may increase their risk of hypoglycaemia or

The person is pregnant, or is planning to become pregnant.

The DVLA "[At a glance guide to the current medical standards of fitness to drive](#)" should be taken into account when offering SMBG for adults with type 2 diabetes.

The following criteria should be followed for patients with type 2 diabetes:

- 1 SMBG should be considered for appropriate newly diagnosed patients as some may need to monitor frequently initially in order to provide them with information in relation to their activities and the effect of dietary measures and treatment prescribed. The need for continued SMBG should be reviewed regularly.
- 2 Patients taking sulfonylureas, or other agents that may increase the risk of hypoglycaemia should have their monitoring frequency discussed with the clinician. Testing frequency should be determined on an individual patient basis. This applies particularly to patients on longer acting agents.
- 3 Patients should monitor their blood glucose levels more frequently in the following circumstances:
 - Inter-current illnesses
 - Change in oral hypoglycaemic treatment
 - Exercise
 - Carbohydrate counting
 - If there are difficulties in venesection or if glycosylated haemoglobin is unreliable*.
- 4 Consider short term SMBG in adults with type 2 diabetes (and review treatment as necessary):
 - When starting treatment with oral or IV corticosteroids or
 - To confirm suspected hypoglycaemia.

***Glycosylated haemoglobin may be unreliable in the following situations:**

- (i) Patients with anaemia;
- (ii) Patients with polycythaemia;
- (iii) Patients with haemoglobinopathies;
- (iv) Patients in whom venesection is not possible

If adults with type 2 diabetes are self-monitoring their blood glucose levels, then a structured assessment needs to be undertaken at least annually. The assessment should include:

- The person's self-monitoring skills
- The quality and frequency of testing
- Checking the person knows how to interpret the blood glucose results and what action to take
- The impact on the person's quality of life
- The continued benefit to the person
- The equipment used.

Type 1 Diabetes (and type 2 diabetes using insulin therapy)

Recommend SMBG for all adults with type 1 diabetes.

For patients who are stable, blood glucose should be tested at least four times a day (pre-meals and pre-bed) on two days per week.

Patients may need to adapt the frequency of their blood glucose testing due to numerous factors and should be supported to test at least 4 times a day, and up to 10 times a day if any of the following apply:

1. Desired target HbA1c level is not achieved.
2. Frequency of hypoglycaemic episodes increases
3. There is a legal requirement to do so (such as in line with DVLA guidance)
4. Inter-current illnesses
2. Carbohydrate counting
3. Pregnancy (including planning pregnancy, during pregnancy and while breastfeeding)
4. Before and during driving
5. Before during and after exercise
6. Those using insulin pumps.
7. If there is a need to know blood glucose levels >4 times a day for other reasons (e.g. impaired awareness of hypoglycaemia, high risk activities)

Consider ketone monitoring as part of sick day rules for adults with type 1 diabetes, to facilitate self-management of an episode of hyperglycaemia.

Access to testing strips MUST NOT be restricted for patients using insulin or for paediatric patients (who are excluded from this guideline)

DVLA Guidance

When reviewing SMBG please be aware of the DVLA [“At a glance guide to the current medical standards of fitness to drive”](#). All detail regarding any legal requirements can be found on the DVLA website.

Blood Glucose Meter Expenditure

A wide variety of blood glucose meters are currently available with test strips ranging in price from less than £10 up to £15 per pack of 50. **The aim is to move to a position where 80% of prescriptions are for the lower cost test strips, thus reserving more specialist meters for those situations in which they are clearly clinically indicated.**

ISO Quality Standards

ISO (International Organisation for Standardisation) 15197:2013 (E) describes the requirements for blood glucose monitoring systems using capillary blood (ISO, 2013). All capillary blood glucose monitoring strips must meet the ISO standards by 2016.

The standards cover the following areas:

- Ease of operation, maintenance, cleaning. Ensuring the visual display is clear and there is no likelihood of misinterpretation of the result.
- Safety and reliability (e.g. no risk of electric shocks to the user, resistance to shock, vibration and heat).
- Precision, accuracy and influence by abnormalities in haematocrit and other interferences.
- User performance evaluation, including ease of understanding instructions.

All meters featured on these guidelines comply with the ISO standards 2013 (independent or manufacturer's data).

Selection Criteria

The low cost blood glucose meters were evaluated by the Diabetic Specialist Nurses at Wirral University Teaching Hospital (WUTH). The guidelines were consulted on by Medicines Management QIPP, GPs through Prescribing Group Meetings, Practice Nurses, Diabetes QIPP and WUTH pharmacy. The lists below are not exhaustive as other meters which use low cost (<£10 per 50) strips are available (see Drug Tariff or BNF), however Practice Nurses should familiarise themselves with a selection of meters (that are ISO compliant) and make them available for demonstration and supply to patients.

Patients who have been provided with one of the meters listed (or another meter using low cost strips) who subsequently choose to purchase or request a different meter in excess of their individual clinical need, should be advised that the CCG does not support provision of higher cost

Diabetes – blood glucose monitoring at home (adults) – clinical guideline, v5.0 Principal author: Prof D Bowen-Jones & Dr KS Leong (WUTH), Mrs V Vincent (MLCSU)
Checked by L Sahlman, Practice Pharmacist (MLCSU)

Acknowledgements: Greater East Midlands Commissioning Support Unit and Eastern Cheshire, South Cheshire & Vale Royal Clinical Commissioning Group

Approved by Wirral Clinical Guidelines Team: June 2016 (updated March 2017 and September 2017) Review by: 3 years

test strips (in these instances).

Expiry dates of test strips

The minimum expiry date for these lower cost blood glucose test strips is three months from the time the pot of test strips is opened. For those testing on average of twice a day this means that the supply of test strips will be exhausted before the three month period is over. For those that test infrequently (for example once or twice a week) then test strips with an expiry date of at least six months from the time the pot is opened might be a more cost effective option.

To extend the expiry date of useable strips, a number of manufacturers have divided their strips in smaller pack sizes (e.g. 2 x 25 strips). Therefore if the pots of strips are opened consecutively this extends the total time the supply of 50 strips can be used. For example, 2 x 25 strips with an expiry date of 3 months at the time of opening if used consecutively can last in total a maximum of 6 months.

Recommendations

80% of diabetic patients should use low cost blood glucose meters. The formulary choices for low cost meters are listed below:

Meter Name	Accu-chek Active	Accu-chek Performa Nano	Glucomen Areo	GlucorX Nexus	GlucorX Nexus Mini
					
Testing Strips	Active testing strips £9.95/ 50	Accu-chek Performa £9.95/50	Glucomen Areo sensor £9.95/50	GlucorX Nexus £9.95 / 50	
Range and Test Time	0.6-33.3mmol/l 5 seconds	0.6-33.3mmol/l 5 seconds	1.1-33.3mmol/l 5 seconds	1.1-33.3mmol/l 5 seconds	
Shelf life once opened	Date on container	Date on container	12 months	6 months (but comes as 2x25 strips)	
Special features	Strip date expiry warning	Hypoglycaemia indicator	Glow in the dark Display. NB First line for existing or gestational diabetes during pregnancy	Ketone warning	
Memory	500	500	730	1000	
Compatible Lancets and Lancing Device	Accu-Chek softclix finger pricker with softclix lancet	Accu-Chek fastclix finger pricker	Glucoject dual plus device and lancets	GlucorX Lancing Device and Lancets	
Company / Customer Care Line	Roche Careline 0800 701 000	Roche Careline 0800 701 000	Glucomen 0800 243667	Dime 01483 755 133	
Quality Control solution shelf life once open	3 months	3 months	3 months	3 months	

Consumables (e.g. batteries, Quality Control solution, USB cables etc.) are available free of charge from the Company Customer Care lines. Software download is Available for all listed meters. When changing a patient's meter, please help reduce waste where possible by ensuring test strips for the previous meter are used before ordering the new strips.

Diabetes – blood glucose monitoring at home (adults) – clinical guideline, v5.0 Principal author: Prof D Bowen-Jones & Dr KS Leong (WUTH), Mrs V Vincent (MLCSU)
Checked by L Sahlman, Practice Pharmacist (MLCSU)

Acknowledgements: Greater East Midlands Commissioning Support Unit and Eastern Cheshire, South Cheshire & Vale Royal Clinical Commissioning Group

Approved by Wirral Clinical Guidelines Team: June 2016 (updated March 2017 and September 2017) Review by: 3 years

The following patient groups may be less suitable for a low cost meter. However, consideration must be given to trying a low cost meter first line, before using the meters below. It is expected that only 20% of diabetic patients would be suitable for a higher cost meter/strips.

Patient group	Reason for exclusion or special consideration
Children/adolescents aged less than 18 years	Meter choice should be agreed on an individual patient basis with the paediatric specialist nurse. These patients are excluded from this guideline.
Those with existing or gestational diabetes during pregnancy who are unable to use first choice meter (Glucomen Areo)	If the first line meter (Glucomen Areo) is unable to be used then the Contour Next meter is a second choice. This is for exceptional cases only.
Those using insulin pumps or carbohydrate counting	May be using specific meters that provide dosing advice on insulin requirements. For Bolus Advisor Systems, Insulin Calculators and/or Carbohydrate Counting. The Aviva strip is used for the Accu-Chek Aviva Expert System or the FreeStyle Lite test strip used for the FreeStyle InsuLinx.
Those patients who need to test their blood glucose as they hold a group 2 driving licence	Meters with a sufficient memory are required. However, these can include the lower cost meters, as detailed in the table above and consideration should be given to using these first.
Those patients, mainly type 1 diabetics, who need the facility to test for ketones	The recommended meters are the Glucomen Areo 2K (Glucomen Areo sensors with Glucomen Areo β Ketone sensors) and the FreeStyle Optium Neo (FreeStyle Optium with FreeStyle Optium β Ketone test strips). NB: Glucomen Areo 2K is the most cost effective for both blood glucose and ketone testing. The FreeStyle Optium Neo should only be used when a patient is unable to use the Glucomen Areo 2K.
Those who are registered blind or partially sighted	Will use meters with large displays or with voice guidance. The recommended meter is GlucoRx Nexus Voice meter.
Those on insulin that require discreet testing and /or those that have problems with manual dexterity. Those patients on insulin who require support to encourage adherence with suggested monitoring regimen.	The Accu-chek Mobile can be used for those patients that need to test discreetly, have problems with their manual dexterity or need support to encourage compliance with suggested monitoring regimen. This meter is only intended for insulin patients.
Any patient for whom the GP or specialist considers it appropriate that they remain on a specific meter	Meter expected to be chosen from the following formulary choices, in the table below.

Diabetes – blood glucose monitoring at home (adults) – clinical guideline, v5.0 Principal author: Prof D Bowen-Jones & Dr KS Leong (WUTH), Mrs V Vincent (MLCSU)

Checked by L Sahlman, Practice Pharmacist (MLCSU)

Acknowledgements: Greater East Midlands Commissioning Support Unit and Eastern Cheshire, South Cheshire & Vale Royal Clinical Commissioning Group

Approved by Wirral Clinical Guidelines Team: June 2016 (updated March 2017 and September 2017) Review by: 3 years

The formulary choices for the 20% of patients that are not recommended to use the first line meters are listed below.

Please note green colour coding are preferred second line choices (where appropriate):

Meter Name							
Testing Strips	Accu-chek Mobile £9.99/50 Please note that this is the most cost effective second line meter (also no sharps bin required).	Glucomen Areo £9.95/50 Glucomen Areo β ketone £9.95/10 First line Glucose/Ketone meter.	GlucoRx Nexus £9.95/50	Accu-chek Aviva £16.09/50	Contour Next £15.04/50 Intended for use as second line for existing or gestational diabetes during pregnancy, only in exceptional circumstances.	FreeStyle Optium £16.00/50 FreeStyle Optium β Ketone £21.53/10 Intended for use as second line, only in exceptional circumstances.	FreeStyle Lite £16.10/50
Range and Test Time	0.6-33.3 mmol/l 5 seconds	1.1- 33.3 mmol/l 5 seconds	1.1-33.3mmol/l 7 seconds	0.6-33.3 mmol/l 5 seconds	0.6-33.3 mmol/l 5 seconds	Optium strips: 1.1-27.8 mmol/l 5 secs	1.1-27.8mmol/l 5 secs
Shelf life once opened	90 days	Ketones: Until printed expiry date as individually wrapped Glucose: 12 months	6 months (but comes as 2x25 strips)	Until printed expiry date even if pot opened	Until printed expiry date even if pot opened	Ketones: Until printed expiry date as individually wrapped	Until printed expiry date even if pot opened
Special features	50 continuous strips and 6 lancets in a drum so no single lancets to touch. No clinical waste.	Blood glucose testing with the added function of ketone testing	Small and portable device	To provide dosing advice on insulin requirements	No coding, quality test control sensitive	Blood glucose testing with the added function of ketone testing	Bolus Adviser System
Memory	2000	730 – glucose 100 - ketones	450	1000	480	450	Up to 165 days

Diabetes – blood glucose monitoring at home (adults) – clinical guideline, v5.0 Principal author: Prof D Bowen-Jones & Dr KS Leong (WUTH), Mrs V Vincent (MLCSU)

Checked by L Sahlman, Practice Pharmacist (MLCSU)

Acknowledgements: Greater East Midlands Commissioning Support Unit and Eastern Cheshire, South Cheshire & Vale Royal Clinical Commissioning Group

Approved by Wirral Clinical Guidelines Team: June 2016 (updated March 2017 and September 2017) Review by: 3 years

Compatible Lancets and Lancing Device	Accu-Chek FastClix finger pricker. All in one system	Glucosject dual plus device and lancets	Glucorx Lancing Device and Lancets	Accu-chek FastClix Finger Pricker and FastClix Lancet Drum	Microlet 2 Device and Microlet Lancets	Easy Touch Lancing Device and Lancets	Easy Touch Lancing Device and Lancets
Company/Customer Care Line	Roche Diagnostics 0800 701 000	Glucomen 0800 243667	Dime 01483 755 133	Roche Diagnostics 0800 701 000	Ascensia Diabetes Care 0345 600 6030	Abbott Diabetes Care 0500 467 466	Abbott Diabetes Care 0500 467 466
Quality Control solution shelf life once opened	Single use	3 months	3 months	3 months	6 months	90 days	90 days

Consumables (e.g. batteries, Quality Control solution, USB cables etc.) are available free of charge from the Company Customer Care lines. Software download is available for all the meters listed. When changing a patient’s meter please help reduce waste where possible by ensuring test strips for the previous meter are used before ordering the new strips.

Cost Effective Lancets – there are a range of lancets available at varying prices (please see BNF/Drug Tariff). A recommended cost effective lancet is the GlucoRx Lancets, which cost £5.50 per 200. These fit most lancing devices, but do not fit any Roche products. GlucoRx will provide their lancing device free of charge to practices if they wish to prescribe the GlucoRx Lancets.

Prices – correct as of October 2017 (Drug Tariff October 2017)