GUIDELINE FOR SELF MONITORING OF BLOOD GLUCOSE IN ADULTS WITH DIABETES

Wandsworth Clinical Commissioning Group

It is recognised that self- monitoring of blood glucose (SMBG) may have an important role to play for ***some*** patients with diabetes. It can allow individuals to see what impact particular behaviours, such as dietary habits or exercise can have on their glycaemic control, thus allowing them to understand results and adjust their behaviour in a beneficial way. There is little value, however, in advocating self-monitoring in patients not considered appropriate for self-care packages, **nor is there any benefit in SMBG if the individual is not empowered to adjust their management according to their results.**

Key Practice Points:

- Self monitoring of blood glucose should only be used as an integral part of self-management, and never as a stand-alone intervention
- There must be an agreed purpose for SMBG between the clinician and patient
- Results should be used to inform diet, lifestyle and treatment changes
- Education and training must be provided to the patient on use of blood glucose meter, and how to interpret and action results

SMBG should be included as part of a patient's annual diabetes review. The aim of a regular review is to identify and support those who find it useful while discouraging those who gain no clinical benefit from continuing to test.

SMBG should be assessed at least annually and in a structured way to check:

- Self-monitoring skills
- The quality and appropriate frequency of testing
- The use made of the results obtained
- The impact on quality of life
- The continued benefit
- The equipment used

HbA1c

In addition to any SMBG, **HbA1c must be measured** to assess long term glycaemic control **every 2 to 6 months** depending on glycaemic stability (tailored to individual need). This should be continued until the blood glucose level is stable on unchanging therapy; use a measurement made at less than 3 months as an indicator of direction of change. HbA1c measurement will give an indication of the overall blood glucose level over the previous 2 to 3 months. Once the blood glucose level and blood glucose lowering therapy are stable, HbA1c needs only to be measured at 6-monthly intervals.

References: NICE, CG87 Management of Type 2 Diabetes, May 2009; NHS Diabetes, Factsheet 32 Glucose Self-Monitoring in Diabetes, December 2010; NHS Diabetes, Self monitoring of blood glucose in non-insulin-treated Type 2 diabetes, March 2010; DVLA

Acknowledgements: Croydon Guidelines for the Management of Diabetes in Primary Care, July 2010, Outer North East London for blood glucose self monitoring guidelines, produced September 2011. Produced by Medicines Management in consultation with diabetes clinical reference group – Wandsworth & St. George's hospital diabetologists.
Produced September 2012, review September 2013

GUIDELINE FOR SELF MONITORING OF BLOOD GLUCOSE IN ADULTS WITH DIABETES

Wandsworth Clinical Commissioning Group

ON INITIATION (AT FIRST PRESCRIPTION)

1. Ensure there is agreed and documented purpose for SMBG which Includes appropriate blood glucose levels for that patient.

2. Check the patient knows;
    a. How to use the meter & the lancet device
    b. How to wash hands before use
    c. When to test & include other relevant information e.g. activity
    d. What to do with the result
    e. How to quality control (QC) the meter
    f. How to safely dispose of sharps

ON REVIEW (AT LEAST ANNUALLY)

1. Frequency of testing;
    - How often does the patient test?
    - Is it in-line with recommendations? If not, is the reason for more frequent testing documented?
    - Does the quantity prescribed correspond to testing frequency?

2. Equipment;
    - Does the patient know how to use their meter accurately? (Observe technique)
    - Is the patient's equipment working correctly (Practice can check patient's meter against their own QC meter)

3. Results;
    - How does the patient interpret and act on the results? (e.g. is diet/physical activity/medication/insulin altered in response to hyperglycaemia or hypoglycaemia)
    - Is there a documented purpose for testing?

4. Glycaemic control:
    - Is it stable?
    - If poorly controlled and patient experiencing hyperglycaemia or hypoglycaemia or hyperglycaemia, examine cause, e.g. taking medication/insulin and at advised times, depression/anxiety, diet intake, alcohol intake, activity levels, illness/infection, weight loss/gain. If on insulin, also consider injection technique, vision/dexterity, needle length, injection sites, and storage/expiry of insulin.
    - If hypoglycaemia is evident, does the patient know what a hypo is and how to treat this appropriately? Does the patient have any symptoms of hypos?
    - If hyperglycaemia is evident, does the patient have any symptoms or know what may have caused this. Do they need an increase in OHA or insulin, or change of treatment regimen?
    - Does the patient need education on the any of the above?
    - Is specialist advice required? Would the patient benefit from a joint review with Community Diabetes team or referral to other services such as diabetes dietitian.

5. Lifestyle:
    - Is lifestyle fairly consistent routine or variable?
    - Does the patient drive? If so, how often?

6. What are the benefits or drawbacks of SMBG experienced by the patient?

THE TABLE ON THE NEXT PAGE IS INTENDED AS A GENERAL GUIDE FOR FREQUENCY OF TESTING

- It needs to be used ***in conjunction with clinical judgment and in context with individual factors*** such as: changes to diabetic therapy/drug titration; stability of blood glucose levels; frequency of hypoglycaemic episodes; hypoglycaemic awareness; variation in lifestyle, e.g. exercise intensity, meals, alcohol consumption; acute illness; co-prescribed acute steroids; when regular HbA1c is not available

- **Drivers** treated with insulin are required to monitor their blood glucose concentration before driving and at 2-hour intervals on long journeys. This is also necessary for drivers on oral anti-diabetic therapy known to cause hypoglycaemia (i.e. sulfonylureas, glinides). Refer to DVLA for current up-to-date advice, chapter 3 of 'At a glance guide to the current medical standards of fitness to drive', see link – http://www.dft.gov.uk/dvla/medical/ataglance.aspx

- **Increased monitoring and thus quantity of strips may be required depending on these circumstances.**

- Details of an individual's agreed SMBG as discussed within their review should be **documented in consultation notes** and their hand-held patient record where available.

Classes of the different type II antidiabetic agents

Class	**Biguanides**	**Sulfonylureas**	**Glitazones (Thiazoldinediones)**	**Rapid acting insulin secretagogues (Glinides**)	**Gliptins (Dipeptidypeptidase-4)**	**GLP – 1 Mimetics**
Examples	Metformin	Gliclazide Glibenclamide Glipizide Glimepiride Tolbutamide	Pioglitazone	Nateglinide Repaglinide	Sitagliptin Vildagliptin Saxagliptin	Exenatide Liraglutide

GUIDELINE FOR SELF MONITORING OF BLOOD GLUCOSE IN ADULTS WITH DIABETES

Wandsworth Clinical Commissioning Group

	Treatment Group	Type 2 diabetes	Type 2 diabetes	Type 2 diabetes	Type 2 diabetes	Type 1 diabetes or type 2 diabetes	Type 1 diabetes	Gestational diabetes (women who develop diabetes in pregnancy)
		• **Diet and Exercise** • **metformin +/- Pioglitazone** • **DPP4 inhibitor** • **GLP1- mimetic**	**Sulphonylurea alone or in combination with other oral agents or injectable GPL1- mimetic**	**Combined insulin and oral antidiabetic therapy**	**Conventional insulin therapy (once or twice daily insulin)**	**Intensive insulin therapy- (i.e. multiple daily insulin)**	**Insulin Pump Therapy (CSII)**	**Includes Women with pre-existing type 1 or type 2 diabetes**
Recommended frequency of testing	**Patients with stable glycaemic control**	Not routinely required but should be available to assess changes in glucose control resulting from lifestyle change. HbA_{1c} is the outcome measure.	May require monitoring due to increased risk of hypoglycaemia (majority of patients will not need to do this) e.g. Once daily 3 times a week at varying times.	Usually ONCE daily, varying the times of day of testing*	Usually TWICE daily 2-3 times a week at varying times*	Usually at least FOUR times a day	Usually between 4 and 6 times a day	Monitoring is recommended between 4 and 6 times a day to inform treatment changes, activity and food levels and achieve tighter diabetic control to avoid complications during pregnancy
	New patients or those with less stable control	Required only as an integral part of a structured blood glucose management plan. Generally more frequent testing maybe required but this varies according to individual need.			Less stable control: Generally once to twice a day at varying times*	Regular monitoring will be required to prevent hypoglycaemia & treat hyperglycaemia.		
	Suggested usage of strips in stable patients	**Not routinely required**	**Typically about 50 strips (1 box) every 4 months if stable (3 boxes per year)**	**Approximately 50 strips every 2 months (7 boxes a year)**	**Typically about 50 strips every 2 months (6 boxes a year)**	**Typically between 100 and 150 strips per month (2-3 boxes a month)**	**Typically between 150 and 200 strips per month (3-4 boxes a month)**	**Generally between 150 and 200 strips per month (3-4 boxes a month)**

*Patients should be told to vary the time of testing from day to day (i.e. to use 1 or 2 strips on each day of testing, for example 1st strip before or after breakfast, 2nd strip before/after lunch or dinner or pre-bedtime)

BLOOD GLUCOSE METERS

All blood glucose meters provide plasma glucose levels however features do vary. Aspects to consider include how easy to use it is (method of calibration, time taken to deliver reading, sample volume, display), size, accuracy, number of test readings able to store to memory and ability to provide averages, and what software and support is available. Where a number of meters would be suitable, the model with the most cost effective strips should be recommended.

Note that blood glucose meters are not available on the NHS.

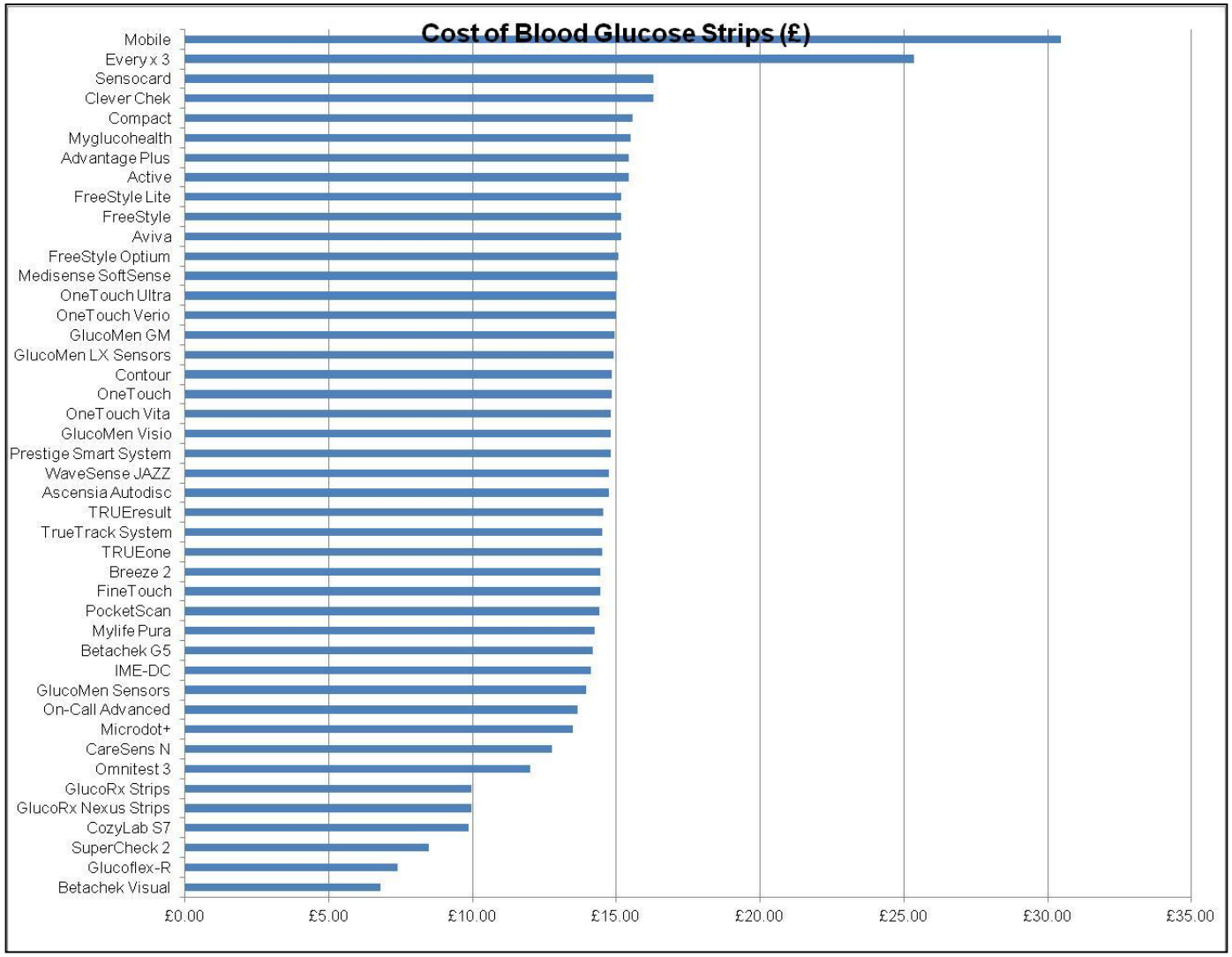
Manufacturer*	Meter	Strip required	Sample volume (microlitre)	Time for test (second)	Blood glucose test range (mmol/L)	Calibration	Battery life (tests)	Number of tests stored with date and time	Size (length x width x depth cm)	Download option
Abbott	FreeStyle Lite	FreeStyle Lite	0.3	5	1.1-27.8	No coding required	1,000	400 (7, 14 & 28-day average	7.4x4x1.7	Yes
	FreeStyle Freedom Lite	FreeStyle Lite	0.3	5	1.1-27.8	No coding required	1,000	400 (7, 14 & 28-day average	8.35x5x1.6	Yes
	Freestyle Optium	Freestyle Optium	0.6	5	1.1-27.8	No coding required	1,000	450 (7, 14 & 28-day average	7.47x5.33x1.63	Yes
Bayer	Breeze 2	Breeze 2	2.5-3.5	5	0.6-33.3	No coding required	1,000	420 (14-day average)	10.6x6.5x2.5	Yes
	Contour	Contour	0.6	5	0.6-33.3	No coding required	1,000	480 (7, 14 & 30-day average)	7.5x5.3x1.7	Yes
Roche	Accu-Chek Aviva	Aviva	0.6	5	0.6-33.3	Code key – no manual coding required	1,000	500 (7 & 14-day average)	9.4x5.3x2.2	Yes
	Accu-Chek Aviva Nano	Aviva	0.6	5	0.6-33.3	Code key – no manual coding required	1,000	500 (7, 14, 30, 90-day & pre-, post-meal average)	6.9x4.3x2	Yes
	Accu-Chek Compact Plus	Compact	1.5	5	0.6-33.3	Each test drum has barcode codes automatic	1,000	500 (7, 14 & 30-day average)	12.5x6.4x3.2	Yes
	Accu-chek Mobile	Mobile	0.3	5	0.3-33.3	No coding required	500	500 (7, 14 & 30-day average)	12.3x6.6x2.8	Yes
Spirit Healthcare	CareSens N	CareSens N	0.5	5	1.1-33.3			250		
Menarini Diagnostics	GlucoMen GM	GlucoMen GM	0.5	7	0.6-33.3	No coding required	2,000	250 (14 & 30-day average)	8.0x6.5x1.3	In development
	GlucoMen LX PLUS (also ketones)	GlucoMen LX	0.3	4	1.1-33.3	No coding required	1,000	400 (1, 7, 14 & 30-day average)	9.8x5.8x1.7	Yes
Simple Diagnostics	Clever Choice Auto-code Voice+	Clever Choice Auto-code Voice+	0.7	7	1.1-33.3	No coding required	500	450 ((7, 14, 21, 28, 60 & 90-day average)	9.4x5.7x2.0	Yes
	Clever Choice Auto-code Voice	Clever Choice Auto-code Voice	0.7	7	1.1-33.3	No coding required	500	450 ((7, 14, 21, 28, 60 & 90-day average)	8.9x4.5x2.0	Yes
	Clever Choice Mini	Clever choice Auto-code Pro	0.5	5	1.1-33.3	No coding required	500	150	0.9x2.7x1.2	Yes

Manufacturer*	Meter	Strip required	Sample volume (microlitre)	Time for test (second)	Blood glucose test range (mmol/L)	Calibration	Battery life (tests)	Number of tests stored with date and time	Size (length x width x depth cm)	Download option
Simple Diagnostics	Clever Choice Auto-code Pro	Clever Choice Auto-code Pro	0.5	5	1.1-33.3	No coding required	500	450 ((7, 14, 21, 28, 60 & 90-day average)	8.5x5.2x1.5	Yes
	Clever Choice Auto-code	Clever Choice Auto-code	0.7	7	1.1-33.3	No coding required	500	450 ((7, 14, 21, 28, 60 & 90-day average)	7.5x5.2x1.5	Yes
LifeScan	OneTouch Verio Pro	OneTouch Verio	0.4	5	1.1-33.3	No coding required	~1 year	750 (7, 14, 30 & 90-day average)	9.1x5.6x2	Yes
	OneTouch UltraEasy	OneTouch Ultra	1.0	5	1.1-33.3	Each vial has a code number	~1 year	500	10.8x3.2x1.7	Yes
	OneTouch Vita	OneTouch Vita	1.4	5	1.1-33.3	No coding required	~1 year	350 (7, 14 & 30-day average)	9.5x6.5x2.25	Yes
	OneTouch Ultra 2	OneTouch Ultra	1.0	5	1.1-33.3	Each vial has a code number	~1 year	500 (7, 14 & 30-day average)	7.9x5.7x2.3	Yes
	OneTouch UltraSmart	OneTouch Ultra	1.0	5	1.1-33.3	Each vial has a code number	~1 year	Over 3,000 (7, 14, 21, 30, 60 & 90-day average)	9.4x5.8x2.1	Yes
Nipro Diagnostics	TrueOne	All-in-one test strips & meter	1.0	5	1.1-33.3	No coding required	New meter every 50 tests	50	6x3 diameter	No
	TrueResult	TrueResult	0.5	4	1.1-33.3	No coding required	1,000	500 (7, 14 & 30-day average)	8.7x5.5x1.8	Yes
	TrueResult twist	TrueResult	?	?	1.1-33.3	No coding required	1,000	99	4.75x3.5 diameter	No
	TrueTrack	TrueTrack	1.0	10	1.1-33.3	Each pot has coding chip	1,000	365	10x5.5x1.7	Yes
B Braun	Omnitest 3	Omnitest 3	0.3	3	0.6-33.3	No coding required	3,000	365 (3 averages in the range of 1-99 days)	8.3x5.6x1.8	Yes

*All manufacturers offer life-time warranty (except Simple Diagnostics and Roche: 3 year warrantee) and free battery replacement

Discontinued Models (strips still available but manufacturers recommend upgrading):
Abbott: Freestyle (Freestyle strips), Freestyle Freedom (Freestyle strips), Freestyle Mini (Freestyle strips), Optium (Freestyle Optium), Freestyle Optium was formerly Optium Xceed
Bayer: Ascensia Breeze (Ascensia Autodisc), Ascensia Espirit 2 (Ascensia Autodisc)
Menarini: GlucoMen Glyco (GlucoMen Sensors), GlucoMen LX (GlucoMen LX Sensors), GlucoMen PC (GlucoMen Sensors), GlucoMen Visio (GlucoMen Visio Sensors)
Roche: Accu-Chek Active (Active), Accu-Chek Advantage (Advantage Plus), Accu-Chek Compact (Compact), Accutrend (BM-Accutest)
Simple Diagnostics: Clever Chek rebranded as Clever Choice (Clever Choice strips compatible)
LifeScan: OneTouch 2 (OneTouch), OneTouch Basic (OneTouch), OneTouch Profile (OneTouch), OneTouch Ultra (OneTouch Ultra), PocketScan (PocketScan)
Nipro Diagnotics: Prestige (Prestige), Prestige QX Smart System (Prestige Smart System)

BLOOD GLUCOSE STRIPS COST COMPARISON



*per 50 strips (except 90 & 100 for Every and Mobile respectively)