

South East London Integrated Medicines Optimisation Committee

Self-monitoring of Blood Glucose (SMBG) in Adults and Young People - Frequency of Monitoring Guidance

This guidance does NOT override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Developed by the South East London Diabetes Medicines Working Group on behalf of the South East London Integrated Medicines Optimisation Committee.

If you have any queries or comments on this guideline please contact: LAMCCG.medicinesoptimisation@nhs.net

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Introduction

Self-Monitoring of Blood Glucose (SMBG) is an integral part of diabetes management for a number of individuals. SMBG is particularly useful for those on medication that requires dose adjustments (such as insulin), those who have fluctuations in blood glucose levels or those at increased risk of hypoglycaemia either due to medication, co-morbidities or other factors. This guideline aims to provide guidance to support the optimal use of SMBG.

Guidance

- Individuals with diabetes (and/or their carers) should be provided with the knowledge and skills to support them to incorporate SMBG and therapy adjustments into their diabetes care plan in order to attain agreed goals:
 - On initiation all people performing SMBG should receive adequate training, skills and support from appropriately trained and competent healthcare professionals
 - People with T1DM (and/or their carers) should have their skills and knowledge reviewed at least annually
 - People with T2DM (and/or their carers) should have a structured follow-up assessment on SMBG at least annually, which includes:
 - self-monitoring skills
 - the equipment used and conformity to international standards ([ISO 15197: 2013](#))
 - the quality and frequency of testing
 - checking that the individual knows how to interpret the blood glucose results and what action to take
 - the impact on the persons quality of life
 - the continued benefit to the individual
 - advice on when to seek help or advice
- All people using SMBG should be encouraged to use the minimum number of test strips to help manage diabetes appropriately and advised when to seek help or advice.

The suggested testing frequency below is only a GUIDE; there may be situations where people may require testing more or less frequently depending on their individual needs and guidance from their specialist team. For example, more frequent testing would be required if hypoglycaemia is a concern or if the individual is experiencing hypoglycaemia.

- [Freestyle Libre flash glucose monitoring](#), use of continuous glucose monitoring and [fasting \(Ramadan\)](#) are not within the scope of this guideline. For further information on this, please see additional [South East London guidance](#).

Box 1

- SMBG is indicated for all patients with T1DM¹.
- SMBG is an integral part of treatment of T1DM. Routine SMBG for adults with T1DM should be carried out at least four times a day (before each meal and before bed) to help manage diabetes appropriately (control hyperglycaemia and prevent hypoglycaemia). For young people with T1DM, routine SMBG should be undertaken at least 5 times per day.

Box 2

- Support adults with T1DM to test at least 4 times a day, and up to 10 times a day if any of the following apply¹:
 - the desired target for blood glucose control, measured by HbA1c level is not achieved
 - the frequency of hypoglycaemic episodes increases
 - there is a legal requirement to do so (such as before driving, in line with the Driver and Vehicle Licensing Agency [DVLA] [At a glance guide to the current medical standards of fitness to drive](#))
 - during periods of illness
 - before, during and after sport
 - when planning pregnancy, during pregnancy and while breastfeeding (see the NICE guideline on [diabetes in pregnancy](#))
 - if there is a need to know blood glucose levels more than 4 times a day for other reasons (for example, impaired awareness of hypoglycaemia, high-risk activities)
- Enable additional blood glucose testing (more than 10 times a day) for adults with T1DM if this is necessary because of the patient's lifestyle (for example, driving for a long period of time, undertaking high-risk activity or occupation, travel) or if the patient has impaired awareness of hypoglycaemia

TREATMENT GROUP	RECOMMENDATIONS FOR SMBG REGIMENS	RECOMMENDED TESTING FREQUENCY
T1DM	<ul style="list-style-type: none"> ▪ SMBG is recommended for all patients with T1DM ▪ Testing should be at least 4 times a day in adults, including before each meal and before bed. ▪ If patient is testing 8 or more times daily, then alternatives testing systems may be appropriate. ▪ Some people may need to test ≥ 10 times daily as detailed in Box 2 above - please see NICE T1DM (NG17) guidelines for further information 	<p>Usual range: 4 – 10 times daily</p> <p>More frequent testing may be recommended by the specialist team</p>

For T2DM, the preferred glucose test strips for SMBG are test strips <£9/50 (based on [the Drug Tariff](#)). Where individuals with T2DM require additional functionality of a glucose test strip and/or meter (e.g. for carbohydrate counting, those needing dialysis, in pregnancy), additional glucose test strips/meters can be considered.

Box 3
People should be advised when to seek advice. Be aware that there are increased risks of blood glucose variation in some patients and they may require increased testing frequency e.g. during:

- acute inter-current illness
- pregnancy/pre-conception
- any changes in therapy that may alter blood glucose results
- changes in lifestyle/routine
- at any times where erratic results may be dangerous e.g. driving
- to identify possible hypoglycaemia

TREATMENT GROUP	RECOMMENDATIONS FOR SMBG REGIMENS										
Newly diagnosed T2DM + diet controlled Managed by medication, including non-insulin injectable <i>e.g. Metformin, pioglitazone, DPP4 Inhibitors, GLP-1 Analogues or SGLT-2 Inhibitors</i>	<p>HbA1C provides a reliable and sufficient means of monitoring glycaemic control.</p> <p>Do not routinely offer SMBG for adults with T2DM unless²:</p> <ul style="list-style-type: none"> 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 while driving/operating machinery (please follow DVLA guidance), or the person is pregnant, or is planning to become pregnant, or the person is starting treatment with oral or intravenous corticosteroids², or to confirm suspected hypoglycaemia <p>Box 3 provides advice on when additional testing may be required. Please see NICE T2DM (NG28) guidelines. for further information.</p> <p>If SMBG is necessary, the healthcare professional should tailor the monitoring regimen to the persons individual circumstances and review regularly e.g. 3 monthly</p>										
Managed by medication carrying a hypoglycaemic risk <i>e.g. Insulin secretagogues: sulfonylureas and meglitinides (glinides)</i>	<p>Do not routinely offer SMBG for adults with T2DM unless²:</p> <ul style="list-style-type: none"> 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 while driving/operating machinery (please follow DVLA guidance), or the person is pregnant, or is planning to become pregnant, or the person is starting treatment with oral or intravenous corticosteroids², or to confirm suspected hypoglycaemia <p>Box 3 provides advice on when additional testing may be required. Please see NICE T2DM (NG28) guidelines. for further information.</p> <p>Specialist teams may advise additional testing for individuals with certain co-morbidities including chronic kidney disease, frailty, foot ulceration and those who have had cardiac intervention. Frequency of testing will be advised by the specialist team</p>										
Insulin treated T2DM	<p>SMBG should be routinely offered and tailored to the persons individual needs depending on diabetes control and treatment plan:</p> <table border="1"> <thead> <tr> <th>Insulin regimen</th><th>Suggested SMBG testing frequency</th></tr> </thead> <tbody> <tr> <td>Once daily basal insulin</td><td>Once a day</td></tr> <tr> <td>Twice daily basal insulin</td><td>Twice a day</td></tr> <tr> <td>Basal bolus regimen</td><td>See Insulin-treated T1DM above</td></tr> <tr> <td>TWICE daily mixed insulin</td><td>Two/Three times a day</td></tr> </tbody> </table> <p>Box 3 provides advice on when additional testing may be required. Please see NICE T2DM (NG28) guidelines. for further information.</p> <p>Specialist teams may advise additional testing for individuals with certain co-morbidities including chronic kidney disease, frailty, foot ulceration and those who have had cardiac intervention. Frequency of testing will be advised by the specialist team</p>	Insulin regimen	Suggested SMBG testing frequency	Once daily basal insulin	Once a day	Twice daily basal insulin	Twice a day	Basal bolus regimen	See Insulin-treated T1DM above	TWICE daily mixed insulin	Two/Three times a day
Insulin regimen	Suggested SMBG testing frequency										
Once daily basal insulin	Once a day										
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Box 4

- All pre-conception and pregnant women with pre-existing diabetes or gestational diabetes should be offered SMBG⁴.
- Women with diabetes are more likely to have adverse outcomes including foetal anomaly, macrosomia and neonatal death. Foetal anomaly and still-birth are related to the quality of glucose control in early pregnancy.⁷
- If a woman with diabetes who is planning to become pregnant needs intensification of blood glucose-lowering therapy, advise her to increase the frequency of SMBG to include fasting levels and a mixture of pre-meal and post-meal levels. (See 'Recommendations for SMBG Regimens' below)⁴.
- *After birth: Refer women with pre-existing diabetes back to their routine diabetes care arrangements⁴*
- See [NICE guideline on diabetes in pregnancy](#) for further advice.

TREATMENT GROUP	RECOMMENDATIONS FOR SMBG REGIMENS	RECOMMENDED TESTING FREQUENCY	ADDITIONAL INFORMATION
Pre- conception, pregnancy & gestational diabetes	Type 1: PRE-CONCEPTION & PREGNANCY	Usually 7 – 15 times a day	Please note, specialist teams may advise additional testing dependent on individual circumstances
	Type 2: PRE-CONCEPTION & PREGNANCY	Usually 4 – 12 times a day	
	Gestational DIABETES	Usually 4 - 8 times a day	

OTHER CONSIDERATIONS

TREATMENT GROUP	RECOMMENDATIONS FOR SMBG REGIMENS
Driving with insulin or insulin secretagogues <i>[Sulfonylureas and meglitinides (glinides)]</i>	Check DVLA website for the most up-to-date information on SMBG requirements for individuals with diabetes. Healthcare professionals offering SMBG to people who drive and are at risk of hypoglycaemia must consult the mandatory Driver and Vehicle Licensing Agency (DVLA) guidance ³ , boxes 1-3, and advise the individual. ➤ Resources include: At a glance guide to the current medical standards of fitness to drive . And Diabetes mellitus: assessing fitness to drive
Ketosis Prone T2DM	If on insulin, follow guidance on insulin treated T2DM. If not on insulin, SMBG should be made available regardless of therapy. More frequent testing may be required for example in scenarios outlined in box 3. Blood or urine ketone testing may also be required. Please follow recommendations from the specialist team
People with T2DM: Those taking oral steroids Post bariatric surgery Post organ transplant Pancreatic insufficiency Haemoglobinopathies (i.e. sickle cell, thalassaemia)	Recommendations on SMBG frequency will be made by the specialist teams

REFERENCES

1. National Institute for Health and Care Excellence (NICE) Clinical guideline NG17 – Type 1 diabetes in adults: diagnosis and management. Initial Publication: August 2015. Accessed September 2021.
2. National Institute for Health and Care Excellence (NICE) Clinical guideline NG28 – Type 2 diabetes in adults: management. Initial Publication: December 2015. Accessed September 2021.
3. Driver & Vehicle Licensing Agency (DVLA) Assessing fitness to drive a guide for medical professionals. Initial Publication: March 2016. Accessed September 2021
4. National Institute for Health and Care Excellence (NICE) Clinical guideline NG3 –Diabetes in pregnancy: management from preconception to the postnatal period. Initial Publication: February 2015. Accessed September 2021.
5. National Institute for Health and Care Excellence (NICE) Clinical guideline NG18 –Diabetes (type 1and type 2) in children and young people: diagnosis and management. Initial Publication: August 2015. Accessed September 2021.
6. National Institute for Health and Care Excellence (NICE) Clinical Knowledge Summary (CKS) Diabetes – type 2. Accessed September 2021.
7. Nick Lewis-Barnard et.al; 2014; The National Pregnancy in Diabetes Audit: What does it tell us and what should we be doing?; Diabetes Update. Accessed October 2020

GLOSSARY OF TERMS

- **BG** – Blood Glucose
- **SMBG** - Self Monitoring of Blood Glucose
- **T1DM** - Type 1 Diabetes Mellitus
- **T2DM** - Type 2 Diabetes Mellitus
- **Young person** - A person between the ages of 16 -18 years old. *NB. This age range varies dependent on the definition source. No definitive legal classification exists.*
- **Specialist** - A person who concentrates primarily on a particular subject or activity; a person highly skilled in a specific and restricted field (i.e. Secondary Care Medical Specialists in diabetes, GPwSI (GP with Special Interest), Advanced Practice Nurses or Consultant Pharmacists in diabetes)
- **GSTFT** – Guy’s and St Thomas’ NHS Foundation Trust
- **KCH** – King’s College Hospital NHS Foundation Trust
- **SLAM** – South London and Maudsley NHS Foundation Trust
- **NICE** - National Institute for Health and Care Excellence
- **SEL APC** – South East London Area Prescribing Committee
- **DPP4i** – dipeptidyl peptidase 4 inhibitor
- **SGLT-2** – sodium/glucose cotransporter 2
- **GLP-1** - Glucagon-like peptide-1 receptor agonists

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University Hospitals of Leicester NHS Trust. (2016). Type 2 Diabetes Management Guidelines. Leicestershire Diabetes Guidelines.

Greater Manchester Medicines Management Group. (2015). Prescribing guidance in the self-monitoring of blood glucose (SMBG). GMMMG.

BGL Primary Care Guidelines for the Management of Type 2 Diabetes Mellitus (2017). Bexley CCG, Lewisham CCG, Greenwich CCG.

South East London Integrated Medicines Optimisation Committee (SEL IMOC). A partnership between NHS organisations in South East London: South East London Clinical Commissioning Group (covering the boroughs of Bexley/Bromley/Greenwich/ Lambeth/Lewisham and Southwark) and GSTFT/KCH/SLaM/ Oxleas NHS Foundation Trusts and Lewisham & Greenwich NHS Trust

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