

**NHS** DIABETES LEEDS:

**Adult Diabetes glycaemic control and monitoring advice; and**

**First choice meter guidance**

## Contents:

PAGE	SECTIONS:
1	<ul style="list-style-type: none"><li>Leeds guidance for self-monitoring of blood glucose (SMBG) in adults</li></ul>
2-3 3 4 4	<ul style="list-style-type: none"><li>Leeds first choice guidance for blood glucose and ketone meters. Includes: (Patient selection criteria for issuing of blood ketone monitoring strips in primary care Special function meters for specialist initiation only, and A summary of how continuous glucose monitoring is commissioned in Leeds)</li></ul>
APPENDICES  5  6  7  8	<ul style="list-style-type: none"><li>A. General glycaemic control and monitoring advice</li><li>B. DVLA guidance for glucose monitoring and driving</li><li>C. NICE / LEEDS adult blood glucose and HbA1c targets</li><li>D. Summary to guide individualisation of HbA1c in patients with Type 2 Diabetes</li></ul>

# LEEDS GUIDANCE FOR SELF MONITORING OF BLOOD GLUCOSE (SMBG) IN ADULTS





	ADULTS WITH TYPE 2 DIABETES ON:			ADULTS WITH TYPE 1 DIABETES	PRE CONCEPTION & PREGNANCY	
				All patients with Type 1 diabetes (Should be offered the option to be under the care of a Diabetologist)	Preconception patients (Should be under secondary care diabetes preconception clinic)	All pregnant women & those with gestational diabetes  (Should be under Secondary care antenatal diabetes clinic)
<b>Treatment</b>	Diet and exercise; Metformin; Pioglitazone,; DPP4 inhibitors; SGLT2 inhibitors; and GLP-1 analogues	Tablets which carry a risk of inducing hypoglycaemia (this includes:  Sulphonylureas (SU); & Glinides.	Insulin for Type 2 Diabetes: Basal; or Twice daily fixed regimens of biphasic insulins  For basal bolus regimens see Table for Type 1 Diabetes	Insulin: basal bolus or delivered by a CSII pump		
Frequency & timing of testing will vary according to individual circumstances & glucose control targets but the following can be used as a guide to support the development of personalised testing regimes. <b>For patients on SUs, glinides &amp; insulin SMBG should be taught along with education about, &amp; monitoring for, hypoglycaemia, &amp; healthcare professionals need to be aware of driving guidance for patients on these</b>						
<b>Usual SMBG monitoring</b>	Monitor diabetes control regularly through HbA1c (see page 8)  SMBG maybe clinically indicated when HbA1c is not reliable eg in situations indicated on page 5	When stable testing could reduce to between four times a week to once a day varying between fasting, pre meals and pre bed	<b>Basal insulin:</b> Monitor at least once a day  <b>Biphasic insulin:</b> Monitor at least twice a day  <b>At varying times eg</b> fasting, pre meals and pre bed	Generally recommended at least 4 times a day including fasting, pre meals and pre bed	<b>Type 2 or gestational diabetes patients who are:</b> Diet controlled, or taking oral therapy, or single-dose intermediate-acting or long-acting insulin : Fasting & 1-hour post-meal blood glucose levels  <b>Type 1, Type 2 or gestational diabetes patients who are on a multiple daily insulin injection regimen</b> Fasting; pre-meal; 1-hour post-meal & pre bed blood glucose levels daily	
<b>Intense SMBG monitoring</b>	**Testing may be more frequent after initiation; when titrating doses; & at times of medication change					
	SMBG maybe indicated short term : -as an educational tool to understand lifestyle interventions / prior to adding in second line agents to help with motivation around diet & exercise, or  -as a guide to the safe use of additional treatments after metformin, or  -If rapid weight loss; evidence of low or high blood glucose / or during periods of rapid change in diabetes control, and in 1 & 2 below	- In **above circumstances increase SMBG testing to twice a day varying times as above* If no hypo problems emerge after 1 to 2 weeks of no medication changes the frequency of testing can reduce.  -Occasional post prandial readings may be useful for patients to see the effects of their diet on BG  - & with 1 to 9 below	- In **above circumstances could increase SMBG testing for: <b>Basal insulin</b> to twice a day & for <b>Biphasic insulin</b> to up to four time a day varying the times as above*  - Occasional post prandial readings may be useful for patients to see the effects of their diet on BG, or if considering / when switching insulins  - & with 1 to 9 below	-Up to 10 times a day if more intensive monitoring requirements apply*** & > 10 times a day may be necessary because of the person's lifestyle (eg, driving for a long period of time, occupation / travel, or with 4,7 or 8 below)	With 1 to 9 below	
<b>Prescribing</b> Initiation of blood glucose testing strips& usual repeats	Prescribe the minimum appropriate number of strips on acute, unless long term SMBG will be necessary	Prescribe on repeat (Approximately 1 to 2 boxes/month)	Prescribe on repeat (Approximately 1 to 3 boxes / month)	Prescribe on repeat (Approximately 3 to 6 boxes/month) Restricting access to strips may destabilise control resulting in severe hypoglycaemia / DKA, & admission to hospital, &/ adversely affect people's quality of life	Approximately 5 to 10 boxes/month	
	Additional supplies maybe necessary for driving / intensive monitoring					
Patients using continuous glucose monitoring (CGM) should have a considerable reduction in the need for blood glucose testing strips. However, most of these patients will still have some clinical need for them, eg: <ul style="list-style-type: none"> <li>• In connection with driving (see page 6" for further information on this);</li> <li>• Patient's using some insulin pumps (eg Roches Accucheck Insight pump) where the pump handset requires a blood glucose measurement (if the handset is on to be used as a bolus advisor) before each meal to give bolus insulin advice</li> <li>• For twice daily calibration of some (eg Medronic) CGM monitoring systems;</li> <li>• If the CGM system gives a reading that is not consistent with the symptoms the patient is experiencing (for example, they feel the symptoms of hypoglycaemia but the reading does not indicate this)</li> </ul>						

- \*\*\*More intensive monitoring may be required in any of these situations**
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|--|---|
| <ol style="list-style-type: none"> <li>1. Osmotic symptoms, or increasing blood glucose levels</li> <li>2. Intermittent steroid therapy (To put the LINK to Leeds Guidance when drafted )</li> <li>3. In situations when required for driving. See page 6</li> <li>4. During intercurrent illness (LINK to TREND patient information leaflets : <a href="#">Type 1</a> and <a href="#">Type 2</a> Diabetes : What to do when you are unwell)</li> <li>5. Exercise</li> </ol> | <ol style="list-style-type: none"> <li>6. The frequency of hypoglycaemic episodes increases</li> <li>7. High risk activities such as working at heights</li> <li>8. Impaired awareness of hypoglycaemia</li> <li>9. If fasting &amp; pre meal capillary blood glucose (CBGs) are on target, but HbA1c remains high &amp; tighter control is needed post prandial CBG readings could be monitored</li> </ol> |
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## LEEDS FIRST CHOICE GUIDANCE FOR BLOOD GLUCOSE AND KETONE METERS

The table below contains a selection of meters, suitable for a wide range of patients, which may be initiated in primary care. All meters chosen use glucose test strips costing < £10 / 50 (Drug tariff Feb 2020), conform to ISO 15197 2015 and are Diasend compatible. Patient specific factors and preferences should be taken into account when selecting a meter: test strips for other meters may be prescribed if a patient has a preference and has purchased their own meter if the cost of the strips is <£10 / 50.


### Meters for blood glucose monitoring only.

Meters suitable for all patients with diabetes. All meters have diabetes management software available to download to a PC.			
	<p><b>Accu-chek Performa</b> <b>Roche</b></p> <p><a href="#">User Guide</a> Contact: 07885 226133 derek.dooley@roche.com</p>	<p><b>Advantages:</b> Supplied with the FastClix lancing device, which holds 6 lancets in a drum. This may be preferred by some people and has a lower risk of needle stick injury for patients' relatives than most other devices. Memory capacity: 500 results</p>	<p>Test Strips: Performa Cost: £7.50 / 50 <b>Lancing device:</b> Accu-Chek® FastClix <b>Lancets:</b> FastClix 30g</p>
	<p><b>CONTOUR PLUS</b> <b>Ascensia</b></p> <p><a href="#">User Guide</a> Contact: 07721303243 Mandy.white@ascensia.com</p>	<p>Contour / Contour Black users can be switched. Has 'second chance' sampling which may reduce test strip waste. Memory capacity: 480 results</p>	<p><b>Test Strips:</b> Contour Plus Cost: £8.50/50 <b>Lancing device:</b> Microlet® 2 lancing device <b>*Lancets:</b> Omnican Lance Soft 30g (more cost effective than Microlet)</p>
	<p><b>Finetest Lite</b> <b>Neon</b></p> <p><a href="#">User Guide</a> Contact: 0800 009 3378, and info@neondiagnosics.co.uk</p>	<p><b>Advantages:</b> Test strips are some of the cheapest on market. Easy to use, large screen. Memory capacity: 500 results</p>	<p><b>Test Strips:</b> Finetest Lite Cost:£5.95 /50 <b>Lancing device:</b> Generic device supplied with kit <b>Lancets:</b> Greenlan Lancets 28g</p>
 <p>(Phone not included)</p>	<p><b>WaveSense Jazz Wireless</b> <b>AgaMatrix</b></p> <p><a href="#">User Guide</a> Contact: 07771 330129 or 01235 838639 rbackhouse@agamatrix.com</p>	<p><b>Advantages:</b> Bluetooth connection to smartphone allows automatic download of results via the app. Memory capacity: 300 results (more storage if using App)</p> <p>A suitable choice for people where the use of technology is likely to improve control or will be used to share data with primary care team.</p>	<p><b>Test Strips:</b> WaveSense JAZZ (50 ) or Duo (2x25) <b>Cost:</b> £8.74 / 50 <b>Lancing device:</b>Generic device supplied with kit <b>Lancets:</b> Agamatrix Ultra-Thin 33g or 28g</p>

### Meter for patients with dexterity problems only



	<p><b>Accu-Chek Mobile</b> Roche</p> <p><a href="#">User Guide</a> Contact: 07885 226133 derek.dooley@roche.com</p>	<p><b>Advantages:</b> only for a small number of patients where the pre-loaded strip cassette and attached lancing device may be useful.</p>	<p><b>Test Strips:</b> Mobile cassette Cost:£9.99 / 50 <b>Lancing device:</b> Accu-Chek® FastClix <b>Lancets:</b> FastClix 30g</p>
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### Meter for patients with sight problems only

	<p><b>GlucoRx Nexus Voice</b> GlucoRX</p> <p><a href="#">User Guide</a> Contact: avril@glucorx.co.uk 07880031033 orders@glucorx.co.uk 01483 755133/0800 0075892</p>	<p><b>Advantages:</b> only for a small number of patients where voice features useful.</p>	<p><b>Test Strips:</b> GlucoRx Nexus Cost:£8.95 / 100 <b>Lancing device:</b> Generic device supplied in kit <b>Lancets:</b> GlucoRx 30g</p>
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## Meters for blood glucose and ketone monitoring

For guidance on which patients should be supplied with Ketone monitoring equipment and will require blood ketone testing strips see the table below

	<p>Glucomen Areo 2K Menarini</p> <p><a href="#">User Guide</a> Contact: 07887 592390 lpage@menarinidiag.com</p>	<p>NFC connection to smartphone allows automatic download of results via GlucoLog app. Ability to share data with health care professional or carer. Memory Capacity: 750 glucose results</p>	<p><b>Test Strips:</b> GlucoMen Areo Sensor (glucose) and GlucoMen Areo B-ketone Sensor (ketone) Cost: £9.95/50(glucose)or 10 (ketone) <b>Lancing device:</b> Glucoject Dual PLUS <b>Lancets:</b> Glucoject Lancets Plus 33g (200 pack most cost effective)</p>
	<p>Care Sens Dual Spirit Healthcare Ltd</p> <p><a href="#">User Guide</a> Contact: 0800 881 5423 Email: cs@spirit-healthcare.co.uk</p>	<p>Bluetooth connection to smartphone allows automatic download of results via SmartLog app. Ability to share data with health care professional or carer. Memory capacity: 1000 results</p>	<p><b>Test Strips:</b> CareSens PRO glucose and KetoSens ketone Cost: £9.95/50 (glucose) or 10 (ketone) <b>Lancing device:</b> Carelance <b>Lancets:</b> CareSens Lancets 30 and 28g (recommended but any universal lancet is compatible)</p>

**All patients' with Type 1 diabetes should have access to blood ketone monitoring test strips. These will usually have been initiated in secondary care as part of their shared care:**

- For managing episodes of hyperglycaemia, and "Sick-day rules" <https://www.diabetes.org.uk/guide-to-diabetes/life-with-diabetes/illnessEducation> on managing these should be provided by the secondary care diabetes team. St James's Diabetes nurse care line is open Monday - Friday 8.30 - 4.30. Telephone number: 0113 2065068 (For use by patients. Health care professional may access too for advice)

**Other high risk (including some Type 2 diabetes) patients required to test for ketones should generally be identified by the specialist diabetes team who will make the patient & GP aware of this, eg :**

- Patients with Type 2 diabetes with a history of admissions with diabetic ketoacidosis (DKA).

**And individual patients within the following groups, who may also be at increased of DKA:**

- Patients with persistently very high HbA1c, especially if BMI is low; diabetes secondary to pancreatic damage or pancreatectomy; cystic fibrosis related diabetes; high alcohol intake and high HbA1c; significant eating disorder leading to low BMI or repeated self-induced vomiting/fasting.
- Patients with uncertain diagnosis such as those needing rapid progression to insulin, eg within 3 years from diagnosis

In adults blood ketone testing strips should not be added to the repeat prescription template. If a patient does not use blood ketone test strips within about one year then a prescription for replacement strips will need to be issued before their expiry. **NOTE: All patients prescribed SGLT2 inhibitors should be educated about the risk of DKA & be aware of symptoms of DKA, and when to seek healthcare input**

**Special function meters for specialist initiation only. GP will be asked to take over prescribing of test strips (strips may cost > £10/50)**

Name of meter	Reason for use	Test strips
Accu-Chek Aviva Expert (meter being discontinued but still people using it)	For carb counting and insulin bolus dose calculations	Accu-Chek Aviva
FreeStyle Lite	Part of the Omnipod Insulin Management System	FreeStyle Lite
Contour Next link	Connects to Medtronic Insulin Pumps	Contour Next
FreeStyle Optium Neo (dual glucose and ketone meter)	Touch screen function, useful in children	FreeStyle Optium β-Ketone Test Strips and blood glucose strips

**\*Lancet Prescribing**

- Only lancets costing ≤ £3 / 100 should be prescribed.
- Most single use lancets are ‘universal’ and are compatible with a wide range of devices.
- Where the lancets supplied with the meter are priced at >£3 / 100 (DT June 2019) a more cost effective compatible lancet has been recommended in the table above.
- The Accucheck FastClix device holds drum lancets, only FastClix lancets can be used in this device.
- Higher gauge lancets have a smaller diameter needle, which may make them less painful to use but may also produce a smaller sample.
- For information on prescribing safety lancets please refer to the guidance on Leeds Health Pathways: [Prescribing of Safety Needles in Primary Care](#)

**SUMMARY OF HOW CONTINUOUS GLUCOSE MONITORING (CGM) IS COMMISSIONED IN LEEDS:**

These are potential strategies to optimise a person's glucose & HbA1c levels, & reduce the frequency of hypoglycaemic episodes

FLASH GM (iCGM) eg Freestyle Libre	rt-CGM (with alerts / alarms) (Red)
<p>NB: The number of standard blood glucose test strips on repeat should be reviewed when starting flash GM to ensure a reduced number is supplied</p>	<p>There are standalone rtCGM systems that alarm when hypoglycaemia is predicted, &amp; systems that are integrated to link to a patient’s CSII pump that can alarm when a hypo is predicted, &amp; turn the CSII pump off when hypoglycaemic, and back on when not</p>
<p>1. Flash GM (iCGM is approved for monitoring glucose levels in line with the West Yorkshire and Harrogate ICS Policy (<a href="#">link</a>)</p> <p>2. It is <b>Amber 2 in Leeds</b> when used in these patient groups. <a href="#">LINK</a> to <b>Leeds Amber guidance</b></p> <p>3. In Leeds it is also approved for some preconception, and pregnant Type 2 patients who are identified by the Preconception / Antenatal clinic. It remains <b>RED</b> for use in these patients.</p>	<p><b>These are approved for use in line with the following NICE guidance :</b></p> <p><b>Type 1 Diabetes in adults NG17 (last updated July 2016) (<a href="#">LINK</a>) and Diabetes in pregnancy NG3 February 2015) (<a href="#">LINK</a>)</b></p>

# Appendices: A. DIABETES MONITORING: GLYCAEMIC CONTROL

Key principles of practice	Type 2 Diabetes		
<ul style="list-style-type: none"> <li>Most of the care people with Diabetes receive is self-care and all patients should have access to education programmes.</li> </ul> <p><b>In Leeds there is:</b></p> <ul style="list-style-type: none"> <li>The Leeds Programme run by Leeds Community Health to refer patients with Type 2 diabetes to : <a href="#">LINK</a>, and</li> <li>Type 1 patients under LTHT diabetes services can access the Dose Adjustment for Normal Eating (DAFNE) course at St James’s Diabetes centre.</li> <li>The ability to monitor their own glucose levels gives people with Diabetes the feedback they need in order to learn how to manage their condition optimally</li> <li>The frequency of testing will be different for different people and will change with their circumstances. Any guidelines can only be used as a framework and then adapted to meet individuals needs</li> </ul> <p><b>At a patient’s annual review healthcare professionals (HCP) should assess:</b></p> <ul style="list-style-type: none"> <li>The quality, technique, frequency of testing &amp; actioning of results</li> <li>The impact of glucose monitoring on quality of life, and the equipment used</li> <li>Offer of more training on self-monitoring skills and how to interpret and respond to their results if needed</li> </ul> <p>Prescribers should judge whether or not it is necessary to list glucose testing strips to a patient’s repeat prescription. See p 1</p>	<ul style="list-style-type: none"> <li>Routine SMBG is not usually required if patients are well controlled on therapy without the potential to cause hypoglycaemia, as long as the HbA1c level can be relied upon. (See p1 for when SMBG may be indicated)</li> <li>The level of monitoring will vary according to the treatment regimen used and the target level of blood glucose control set for the patient</li> <li><b>Patients planning to become, and those that are, pregnant should be under the appropriate secondary care diabetes clinic</b></li> <li><b>DVLA requirements for testing when driving apply to people with Type 2 diabetes treated with insulin, sulphonylureas &amp; glinides (see p 6)</b></li> </ul>		
	<h3>Type 1 Diabetes</h3>		
	<ul style="list-style-type: none"> <li>Targets should be individualised and agreed in consultation with patients, as part of the care planning process</li> <li>In addition to self-monitoring, HbA1c should be measured every 3-6months</li> <li>People prescribed insulin should be taught how to adjust therapy in line with their blood glucose and recognise patterns in their test results. This facilitates adjustments to their medication / food to achieve targets for fasting and post prandial blood glucose, both of which contribute to HbA1c values</li> <li>All results should be recorded with time and date to provide a cumulative record as a basis for day to day changes in therapy. Most meters will store this information and some will allow download to a computer (eg DIASEND compatible) or smart phone. A summary of how iCGM &amp; rtCGM are commissioned in Leeds is on page 4.</li> </ul>		
	<p><b>In *haemoglobinopathy, anaemia, CKD4 or worse, or recent blood transfusion, HbA1c may be unreliable &amp; SMBG / CGM may be the monitoring method of choice. See page 16 of link for more information. <a href="https://apps.who.int/iris/handle/10665/70523">https://apps.who.int/iris/handle/10665/70523</a></b></p> <p><b>The fructosamine test measures glycated protein, and indicates average diabetes control over the past two or three weeks. Situations where monitoring this may be an option instead of HbA1c include:</b></p> <ol style="list-style-type: none"> <li>Where HbA1c testing will be unreliable e.g. due to haematological conditions</li> <li>(Rarely) in patients where there is a wide discrepancy between the HbA1c level and self-reported home glucose readings.</li> </ol> <p><i>(seek advice from LTHT Diabetes centre if unsure. Helpline number 0113 2065068)</i></p> <p>Fructosamine may be falsely low &amp; is not suitable in the setting of decreased protein levels, such as nephrotic syndrome or hepatic disease</p>		
	<h3>Assessing Diabetes Control: What blood glucose relates to a <i>reliable</i> HbA1c (Not accurate in above *groups, &amp; in pregnancy)</h3>		
	HbA1c % (DCCT aligned)	HbA1c (mmol/mol)	Estimated average capillary blood glucose (mmOLL)
	6	42 (Pre Diabetes 42-47 : Option to refer to National Diabetes Prevention Programme)	7
	6.5	48 (Diabetes ≥ 48)	7.8
	7	53	8.6
	7.5	58	9.4
	8	64	10.2
	8.5	69 (Target for surgery is ≤ 69)	10.9
	9	75	11.8
	10	86	13.4
	11	97	14.9
	12	108	16.5
	13	119	18.1

## B. GUIDANCE FOR DRIVING AND GLUCOSE MONITORING

### Diabetes and Driving

- The following DVLA Diabetes & Driving [LINK](#) has information on which patients should inform the DVLA about their diabetes.
- All patients with diabetes who drive should inform their insurance company, and
- Those on insulin or oral hypoglycaemic agents which carry a risk of hypoglycaemia, such as sulphonylureas / glinides should perform SMBG as in the table below \*before / \* when driving
- The following links contain patient information for drivers with diabetes: [TREND : Diabetes:Safe Driving and the DVLA leaflet](#) & <https://www.gov.uk/government/publications/information-for-drivers-with-diabetes>

**A Group 1 driver** who has had more than one episode of hypoglycaemia requiring assistance from another person at any time in waking hours in a year, must inform the DVLA, and be advised not to drive. In these cases the License will be withdrawn for 3 months following the last episode.

**A Group 2 driver** with one or more episode(s) of hypo requiring the assistance of another person in the previous 12 months must inform the DVLA and be advised not to drive. They must also tell the DVLA if they or their medical team feel they are at high risk of developing hypoglycaemia

**Doctors responsibilities** When any doctor is aware that a patient is not fit to drive they should advise the person not to drive and tell the patient to notify the DVLA. If a doctor becomes aware that someone in their care does not notify the DVLA, or refuses to do so, the doctor is allowed under GMC guidelines to notify the DVLA. GMC guidance on this issue and the steps to be taken, can be found at <https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/confidentiality---patients-fitness-to-drive-and-reporting-concerns-to-the-dvla-or-dva>. It would be good practice to confirm this conversation in writing to the person concerned. The doctor may also want to inform the patient that their insurance is unlikely to be valid and that the patient should also inform their insurance company. It is up to the DVLA to revoke / renew a licence. (See [: DVLA guidance : assessing fitness to drive](#))

The table below\* assumes there are no other circumstances that affect the ability of a person with diabetes to drive safely, particularly regarding the risk of, & ability to detect hypoglycaemia

Diabetes Treatment	Group 1 (car / motorcycle) SMBG monitoring	Group 2 (bus / lorry) SMBG monitoring
Diet alone	-	-
Treatment by tablets or injections with no Hypoglycaemia risk eg <b>Metformin, Pioglitazone, DPP4 inhibitors, SGLT2 inhibitors, and GLP-1 analogues</b>	-	-
Tablets carrying a risk of hypoglycaemia (sulphonylureas and glinides)	*If needed, detection of hypoglycaemia is by appropriate SMBG at times relevant to driving and clinical factors including frequency of driving. It is appropriate to offer SMBG at times relevant to driving to enable the detection of hypoglycaemia	*Regular SMBG- at least twice daily and at times relevant to driving (eg no more than 2 hours before start of the journey and every 2 hours while driving)
Insulin	*Test blood glucose no more than 2 hours before the start of the first journey. Test every 2 hours while driving.  More frequent SMBG may be required with any greater risk of hypoglycaemia (eg physical activity, altered meal routine)	*Must use a meter with sufficient memory to store 3 months of readings. Carry out regular SMBG at least twice daily on days when not driving. Test no more than 2 hours before the start of the first journey and every 2 hours while driving. More frequent monitoring may be required with any greater risk of hypoglycaemia (eg physical activity, altered meal routine)
<b>Monitoring using CGM systems on insulin:</b>	"If using flash or continuous glucose monitoring, drivers must still confirm their blood glucose level with a finger prick test if: <ul style="list-style-type: none"> <li>• their glucose level is 4.0 mmol/L or below</li> <li>• they experience symptoms of hypoglycaemia</li> <li>• the glucose monitoring system gives a reading that is not consistent with the symptoms they are experiencing (for example, they feel the symptoms of hypoglycaemia but the reading does not indicate this)</li> </ul>	<b>Because these systems measure interstitial glucose, drivers must also perform finger prick blood glucose testing at times relevant to driving as outlined above</b>

\* Blood glucose should be  $\geq 5$  mmol/L to drive. If readings are between 4 -5 mmol/L patients should eat about a 10-15g carbohydrate snack. Eg a piece of fruit, a bag of crisps If blood glucose is  $< 4$  mmol/L the hypo should be treated and patients should not drive for at least 45 minutes after they have recovered. If hypoglycaemia occurs while driving the person must stop the car, remove keys from the ignition & move into the passenger seat if it is safe to do so. The hypo should be treated & the person should not drive for at least 45 minutes after recovery



## C. NICE / LEEDS ADULT BLOOD GLUCOSE AND HbA1c TARGETS:

Agree individualised glycaemic targets with the patient and where possible in line with guidance. Treatment targets must take into account the clinical needs of the individual as well as co-morbidities, eg in the frail older person tight diabetes control would not be appropriate; or if impaired awareness of hypoglycaemia. Ensure that when aiming for a target it is not accompanied by problematic hypoglycaemia .

Blood glucose targets: *					
CAPILLARY BLOOD GLUCOSE (CBG) TARGETS	TYPE 2 DIABETES	TYPE 1 DIABETES	PRECONCEPTION	PREGNANCY	
			Patients with established Type 1 Diabetes should be offered the option to be under the care of a Diabetologist	Patient should be under secondary care diabetes preconception clinic	Patients should be under secondary care antenatal diabetes clinic
	<b>Leeds recommend aim for:</b>	<b>NICE NG17 guidance recommends aim for CBG in black:</b>	<b>DAFNE targets in green</b>	<b>Leeds recommend to aim for the same targets as in pregnancy*:</b>	*Pregnant women with any form of diabetes should be advised to maintain their CBG below the following target levels, if these are achievable without causing problematic hypoglycaemia (ie CBG <4mmol/L)
<b>Pre breakfast or fasting</b>	5-7 mmol/L	5-7 mmol/L	5 - 7 mmol/L	<5.3mmol/L	
<b>Pre-prandial at other times of day</b>	4-7 mmol/L	4-7 mmol/l before meals	4 - 7 mmol/L	4-7 mmol/l before meals	
<b>Post prandial</b>	5-9 mmol/L - 2 hours post prandial	5-9 mmol/L at least 90 minutes after eating.		<b>1 hour after meals: &lt; 7.8 mmol/L</b>	
	If fasting & pre meal CBGs are on target but HbA1c remains high and tighter control is needed post prandial blood glucose readings can be monitored.  Carbohydrate portions / Glycaemic index of foods, timing of medication, & if on insulin the timing, or time action profile of the mealtime insulin could then be reviewed.		Carbohydrate portions / Glycaemic index of foods, timing of medication, & if on insulin the timing, or time action profile of the mealtime insulin can be reviewed.		
<b>Bedtime</b>	7-9 mmol/L	A bedtime target should be agreed with the person. This should take into account the timing of the last meal and its related insulin dose, and be consistent with the recommended fasting level on waking.  5 - 9 mmol/L	As advised by the specialist clinic		
NICE HbA1c targets & monitoring .					
<b>HbA1 c TARGETS</b>	See page 8	Aim for 48mmol/mol (6.5%) or lower, to minimise the risk of long term vascular complications	Any reduction in HbA1c level towards the target of 48 mmol/mol (6.5%) is likely to reduce the risk of congenital malformations in the baby.  Women with diabetes whose HbA1c level is above 86 mmol/mol (10%) should be strongly advised not to get pregnant because of the associated risks	As advised by the antenatal diabetes clinic	
<b>HbA1c MONITORING</b>	See page 8	<b>Measure HbA1 levels every 3-6 months</b>	<b>Women with diabetes who are planning to become pregnant should be offered monthly HbA1c level checks</b>		

## D. TYPE 2 DIABETES : HbA1c MONITORING AND TARGETS

Check HbA1c 6monthly in patients with stable control who have achieved their target. Consider 3monthly monitoring when adjusting treatment to assess effectiveness.

Consider yearly HbA1c in those patients with stable control and able to monitor their blood glucose levels with home testing

### INDIVIDUALISING HbA1c TARGETS Document the agreed target

#### HbA1c TARGET RECOMMENDATIONS

NICE advise aim for 48mmol/mol following diagnosis [or 53mmol if on a sulphonylurea (SU)], & if HbA1c rises to 58mmol/mol to add a second intervention, & then to aim for 53mmol/mol.

**Target HbA1c should be individualised & informed by a number of factors**

[LINK](#) to NICE decision tool patients can complete to help agree target

**\*Tighter targets** (42-47mmol/mol) may be suitable in younger, healthier individuals with a low risk of hypoglycaemia. Leeds Type 2 Remission Pilot Programme (Based on the DIRECT study) is currently running in Kippax, Garforth and Rothwell.

**Looser targets** (58-75mmol/mol) may be suitable in older individuals (see box below\*) who have co-morbidities, or who have a high risk of hypoglycaemia, etc.

Patients should be encouraged to maintain their individual target unless the resulting side effects (including hypoglycaemia), or their efforts to achieve this impair their quality of life or impact their occupation eg Class 2 licence holders

Inform a person with a higher HbA1c that any reduction in HbA1c towards the agreed target is advantageous to future health.

**\*\*See box for QOF HbA1c targets.** Where the patients target conflicts with QOF targets for HbA1c, it may appropriate to exception report these patients

**\*Summary of targets from Leeds Guidance on glycaemic control in older people (eg >80 years) with Type 2 diabetes and frailty and/or multi-morbidity [LINK](#)**

Functional capacity	General HbA1c target
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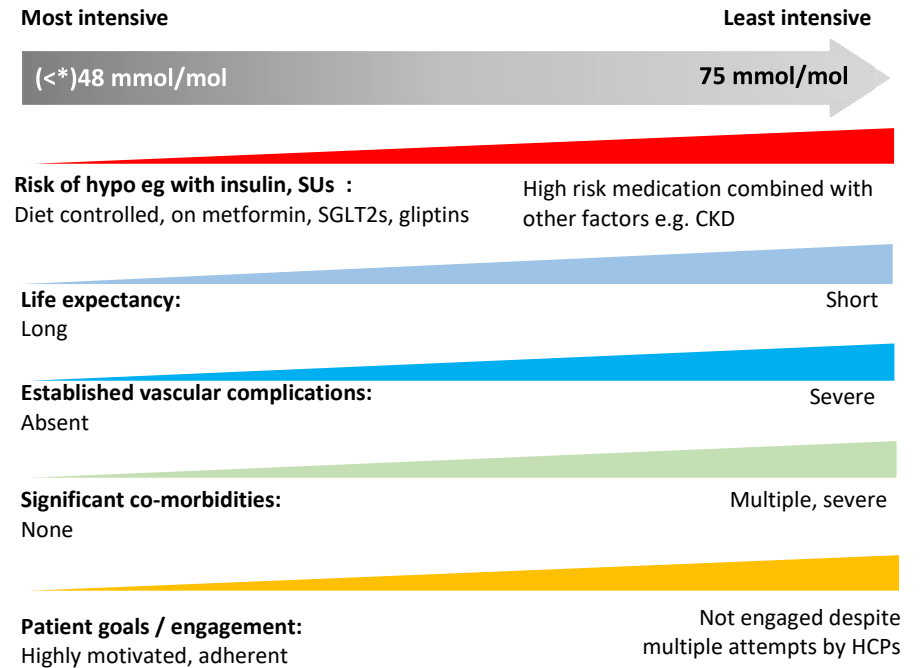
Healthy, few significant comorbidities, not frail, intact cognition and functional status. Life expectancy of > 10years	53-58 mmol/mol
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<b>Mild-moderate frailty/multiple co-morbidities</b> Multiple coexisting chronic illnesses or impairments of >2 activities of daily living or mild-moderate cognitive impairment. Life expectancy < 10 years	58-64 mmol/mol
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<b>Severe frailty/advanced illness</b> In long term care or with end-stage chronic illnesses or moderate to severe cognitive impairment. Short life expectancy	58-75 mmol/mol or higher
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<b>End of life</b>	Avoid symptomatic hyperglycaemia 8
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#### Depiction of elements of decision making used to determine appropriate HbA1c targets



#### \*\*QOF diabetes changes relevant to glycaemic control in 2019/20 5 year GP contract:

- DM020 (NICE ID NM157)** The percentage of patients with diabetes without moderate or severe frailty, on the register, in whom the IFCC-HbA1c is 58 mmol/mol or less in the preceding 12 months
- DM021 (NICE ID NM158)** The percentage of patients with diabetes with moderate or severe frailty, on the register, in whom the IFCC-HbA1c is 75 mmol/mol or less in the preceding 12 months

Adapted from Ismail-Beigi et al. Individualising glycaemia targets in type 2 diabetes mellitus: implications of recent clinical trials. *Ann Intern Med.* 2011 Apr 19; 154 (8): 554-9

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NICE Type 2 diabetes in adults : management. NICE guideline [NG28] Published : December 2015. Last updated August 2019

NICE Diabetes in pregnancy : management from preconception to the postnatal period. NICE guideline [NG3] Published : February 2015. Last updated : August 2015

World Health Organisation, Use of Glycated Haemoglobin (HbA1c) in the diagnosis of Diabetes Mellitus (Abbreviated Report of a WHO Consultation) 2011