

Guideline for glucose & ketone monitoring for adults with diabetes

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Document control

Date	Version	Amendments
Oct 2017	1.0	New guideline
Feb 2018	1.1	Changes to DVLA guidance
Nov 2018	1.2	Remove Freestyle InsuLinx device and link to NCL/LPP/LDCN guidance for Freestyle Libre
Jul 2021	2.0	New meter choices, reviewed and updated throughout
Feb 2022	2.1	Alignment with dm+d dictionary; 'Accu-Chek Instant Strips' now 'Instant', 'Accu-Chek FastClix' now 'FastClix'. Updated price for Glucomen Areo Sensor.
Nov 2022	2.2	Updated lancet recommendation for GlucoFix Tech reflecting a change to the lancet device which comes with the meter; was ' <i>Suggest</i> GlucoRx Lancets (30G)' now 'Glucoject Lancets PLUS (33G)'

Document management

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Abbreviations

CGM	Continuous glucose monitoring
DVLA	Driver and Vehicle Licensing Agency
SMBG	Self-monitoring of blood glucose ('finger prick testing')
T1DM	Type 1 diabetes mellitus
T2DM	Type 2 diabetes mellitus

Type 2 diabetes: Blood glucose meter recommendations

	Preferred meters			Legacy meters (no longer preferred for new patients)	
	GlucoFix Tech	Palmdoc II Optional multilanguage talking meter & patient information leaflets	Accu-Chek Instant Usually for people on basal-bolus who are carb counting (via MySugr® app)	GlucoRX Nexus	WaveSense Jazz
					
Compatible strips	Glucofix Tech Sensor	Palmdoc	Instant	GlucoRx Nexus Strips	WaveSense JAZZ
Cost per 50 strips (£)	£5.95 per 1x50	£5.90 per 2x25	£7.50 for 1x50	£8.95 per 1x50	£8.74 per 1x50
Compatible lancets	Glucoject Lancets PLUS (33G) [†]	palmdoc Lancets (30G) [†]	FastClix [†]	GlucoRx Lancets (30G) [†]	Agamatrix Ultra-Thin [†]
Cost of lancets (£)	£5.50 per 200	£2.85 for 100	£5.90 for 204	£4.50 per 200	(28G) £5.43 per 200
Kit contents	10 lancets 10 test strips	10 lancets 10 test strips	2 Fastclix drums (12 lancets) 10 test strips	10 lancets 10 test strips	30 lancets 25 test strips
Connectivity	NFC; Bluetooth (via external dongle); USB	USB only	USB; Bluetooth	USB only	USB only
Software compatibility	Diasend (Transmitter; Uploader; Mobile App), GlucoLog	Diasend (Transmitter; Uploader)	Diasend (Transmitter; Uploader; Mobile App), MySugr, RocheDiabetes Care Platform	Diasend (Transmitter; Uploader), Diabetes Complete	Diasend (Transmitter; Uploader), GDM-Health
Company contact	myglucomen@menarinidiag.co.uk 0118 9444128	hello@palmdoc.co.uk 0800 9949995	burgesshill.dccountmanagers@roche.com 0800 040 7221	info@glucorx.co.uk 01483 755133	customercare@agamatrx.co.uk 0800 0931812 / 07825613033
Training video	https://www.glucomen.co.uk/glucofix-tech/	https://www.youtube.com/watch?v=1GuH14W18Is	https://www.youtube.com/c/RocheDiabetesCareUKandIreland	https://www.glucorx.co.uk/nexus-instructions/	https://agamatrx.co.uk/support/videos/



[†] Any lancet costing <£6/200 (with associated lancing device) can be used. Patients unable to use lancet devices may benefit from safety lancets to maintain independence e.g. GlucoRx Safety lancets (safety lancets are more costly).

Do not use Accu-Check Aviva range, Contour Next range or FreeStyle range for adults with type 2 diabetes (please note this list is not exhaustive).
These devices have very high test strip costs which cannot be justified.

Type 2 Diabetes: Frequency of blood glucose testing

Type 2 diabetes																									
	Diet and exercise, metformin, gliptins (DPP-4i), flozins (SGLT-2i), pioglitazone, GLP-1RA (e.g. liraglutide, dulaglutide & semaglutide) only	Sulfonylurea, meglitinides	Basal insulin	Other insulins regimens																					
Routine	No need to monitor blood glucose levels. Ensure HbA1c is checked no more than once every 3 months.	Those experiencing hypoglycaemic episodes may need to test 2-3 times per week at different times of day. Also see DVLA advice for drivers See 'Additional' below.	HbA1c to target: test 2 – 3 times a week at different times of the day HbA1c not to target: Fasting glucose should be tested once a day before breakfast to titrate basal insulin. Once fasting glucose is at target, test at different times each day to identify periods of hyper- and hypoglycaemia. Also see DVLA advice for drivers	<u>Biphasic</u> Test twice a day at various times to include pre and post prandial and pre bed time blood glucose. <u>Basal-bolus</u> As for Type 1 diabetes Also see DVLA advice for drivers																					
Strips	Acute prescriptions only if/when consultation deems necessary (see 'Additional' information below) – not on repeat (request as necessary). If not clinically indicated, patients may choose to self-fund (patient choice).	Usually acute prescriptions only – not on repeat (request as necessary).	Prescribed on repeat prescription - quantities depend on testing frequency: <table><tr><th>Tests per day</th><th>Tests per 28 days</th><th>Packs of strips to prescribe</th></tr><tr><td><1 (e.g. 2-3 per week)</td><td>Up to 12</td><td>Up to 4 per year</td></tr><tr><td>1</td><td>28</td><td>8 per year</td></tr><tr><td>2</td><td>56</td><td>1/month; 15/year</td></tr><tr><td>4</td><td>112</td><td>2-3 packs/month; 30 packs/year</td></tr><tr><td>6</td><td>168</td><td>3-4 packs/month; 44 packs/year</td></tr><tr><td>8</td><td>224</td><td>4-5 packs/month; 58 packs/year</td></tr></table>		Tests per day	Tests per 28 days	Packs of strips to prescribe	<1 (e.g. 2-3 per week)	Up to 12	Up to 4 per year	1	28	8 per year	2	56	1/month; 15/year	4	112	2-3 packs/month; 30 packs/year	6	168	3-4 packs/month; 44 packs/year	8	224	4-5 packs/month; 58 packs/year
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Additional	Short-term monitoring should be considered in these circumstances: <ul style="list-style-type: none">When therapy is changed or intensified e.g. if Hba1c is raisedIf steroids are co-prescribed (midday, before evening meal and 2 hours after)Pre-conceptionOn Percutaneous endoscopic gastrostomy (PEG) feed	Monitoring should be considered (or increased if already advised) in these circumstances: <ul style="list-style-type: none">Intercurrent illnessWhen therapy is changed or intensified e.g. initiation of insulin therapy, or if Hba1c is raised, or complaints of hyposIf steroids are co-prescribed (midday, before evening meal and 2 hours after)Post-prandial hyperglycaemiaPre-conceptionLifestyle changes / disruptions to routineOn Percutaneous endoscopic gastrostomy (PEG) feed																							

Type 1 diabetes: Glucose meter recommendations

Type 1 diabetes				
Preferred meters (glucose and ketone monitoring)			Eligible for flash glucose monitoring	Eligible for insulin pump
Glucomen Areo 2K Carbohydrate counting facility via Rapidcalc® app	4SURE Smart Duo Carbohydrate counting facility via Diabetes:M® app	Glucorx HCT	Freestyle Libre 2[†]	Use meter and test strips which are designed for each pump
				
Compatible strips - glucose Cost per 50 strips (£)	Glucomen Areo Sensor £7.25 for 1x50	4SURE £8.99 for 1x50	Glucorx HCT Glucose Test Strips £8.95 for 1x50	
Compatible strips - ketone Cost per 50 strips (£)	GlucoMen Areo Ketone Sensors [†] £9.95 for 10	4SURE β-Ketone Test Strips [†] £9.92 for 10	Glucorx HCT Ketone Test Strips [†] £9.95 for 10	
Compatible lancets Cost of lancets (£)	Glucoject Lancets PLUS (33G) £5.50 x 200	4SURE (33G; 30G) £2.90 x 100	Glucorx Lancet (30G) £4.50 x 200	
Kit contents	10 lancets 10 glucose + 2 ketone test strips	100 lancets 50 glucose + 10 ketones strips	10 lancets 10 glucose + 1 ketone test strips	
Connectivity	NFC; Bluetooth (via external dongle); USB	Bluetooth; USB	USB only	
Software compatibility	Diasend (Transmitter; Uploader; Mobile App), Rapidcalc, Glucolog	Diasend (Transmitter; Uploader; Mobile App), Diabetes:M	Diasend (Transmitter; Uploader)	
Company contact	myglucomen@menarinidiag.co.uk 0800 243667	sales.support@nipro-group.com 02380 604305 / 0800 08 588 08	orders@glucorx.co.uk 01483 755133 / 0800 007 5892	adchelpuk@abbott.com 0800 1701177
Training video	https://www.glucomen.co.uk/areo	https://www.nipro-diagnostics.co.uk/demonstration-videos	https://www.glucorx.co.uk/hct-instructions/	https://www.freestylelibre.co.uk/libre/help/tutorials.html




[†] Any lancet costing <£6/200 (with associated lancing device) can be used. Patients unable to use lancet devices may benefit from safety lancets to maintain independence e.g. Glucorx Safety lancets (safety lancets are more costly).

[‡] Users are encouraged to scan their sensor with a mobile phone, rather than the Freestyle Libre meter, as data is automatically transferred to LibreView which can be shared with their clinical team.

Type 1 diabetes: Frequency of glucose testing

	Basal-bolus or biphasic insulin	Insulin pump	With concurrent 'Flash glucose' monitoring e.g. Freestyle Libre 2	With Continuous glucose monitoring (CGM)
Routine	Blood glucose monitoring (SMBG) is essential for ALL people with type 1 diabetes. Test 4-10 times per day; see 'Additional' below.	Blood glucose monitoring (SMBG) is essential for ALL people with type 1 diabetes. Note: Testing frequency may be higher with insulin pump than for basal-bolus or biphasic insulin.	Blood glucose monitoring (SMBG) is essential for ALL people with type 1 diabetes, including those using 'Flash glucose' monitoring. Note: Glucose monitoring should be via 'flash glucose' scanning (> 8 times per day and use the sensor >70% of the time) however SMBG will still be required in some circumstances, see 'Additional' below.	Blood glucose monitoring (SMBG) is essential for ALL people with type 1 diabetes, including those using CGM. Note: Whilst the majority of glucose monitoring is performed via CGM, SMBG is required in some circumstances, see 'Additional' below.
Strips	Prescribed on repeat prescription - quantities depend on testing frequency.	Prescribed on repeat prescription - quantities depend on testing frequency. Please do not change strip type without first speaking to patient's hospital diabetes team; the strips advised by the hospital will be to link to the patient's specific pump to help the patient make best use of their pump.	For most patients, 1x50 strips every 2-3 months is sufficient therefore moving strips to 'variable' or 'acute' prescribing would be appropriate. People using 'Flash glucose' monitoring should see a significant reduction in test strips being used. If a significant reduction in use is not observed (duplication of monitoring), GP should contact the patient's hospital diabetes team for review.	Prescribed on repeat prescription - quantities depend on testing frequency. Reduction in test strips should not be done without speaking to patient and or hospital diabetes team.
Additional	Testing 4 times day is the minimum essential frequency. Adults should test blood glucose between 5 and 10 times a day in these circumstances: <ul style="list-style-type: none"> HbA1c target is not achieved Impaired hypo awareness / frequent hypos Driving (see DVLA advice for drivers) During periods of illness Before, during and after sport Lifestyle changes / disruptions to routine Pre-conception 		Adults using 'flash glucose' monitors should test blood glucose between 0 and 8 times a day in these circumstances: <ul style="list-style-type: none"> Sensor failure or supply problems with sensors Sensor glucose reading does not reflect symptoms Group 2 drivers (see DVLA advice for drivers) 	Adults using CGM should test blood glucose between 0 and 8 times a day in these circumstances: <ul style="list-style-type: none"> CGM sensor not available Fluctuating blood glucose CGM glucose reading does not reflect symptoms If using a CGM monitor which requires calibration using blood glucose - at least 4 times daily Group 2 drivers (see DVLA advice for drivers) During periods of illness

Diabetes in pregnancy: Blood glucose meter recommendations

	GlucoFix Tech Preferred meter unless using GDm-Health app	WaveSense Jazz Wireless Compact; for services using GDm-Health app	WaveSense Jazz Large display; for services using GDm-Health app
			
Compatible strips	Glucofix Tech Sensor	WaveSense JAZZ Duo	WaveSense JAZZ
Cost per 50 strips (£)	£5.95 per 1x50	£8.74 for 2x25	£8.74 per 1x50
Compatible lancets	Glucoject Lancets PLUS (33G) [†]	Agamatrix Ultra-Thin (28G) [†]	Agamatrix Ultra-Thin (28G) [†]
Cost of lancets (£)	£5.50 per 200	£5.43 per 200	£5.43 per 200
Kit contents	10 lancets 10 test strips	30 lancets 25 test strips	30 lancets 25 test strips
Connectivity	NFC; Bluetooth (via external dongle); USB	Bluetooth only	USB only
Software compatibility	Diasend (Transmitter; Uploader; Mobile App), GlucoLog	GDm-Health; Diasend (Mobile App)	GDm-Health; Diasend (Transmitter; Uploader)
Company contact	myglucomen@menarinidiag.co.uk 0118 9444128	customercare@agamatrix.co.uk 0800 0931812 / 07825613033	customercare@agamatrix.co.uk 0800 0931812; 07825613033
Training video	https://www.glucomen.co.uk/glucofix-tech/	https://agamatrix.co.uk/support/videos/	https://agamatrix.co.uk/support/videos/

[†] Any lancet costing <£6/200 (with associated lancing device) can be used. Patients unable to use lancet devices may benefit from safety lancets to maintain independence e.g. GlucoRx Safety lancets (safety lancets are more costly).

Do not use Accu-Check Aviva range, Contour Next range or FreeStyle range for diabetes in pregnancy. These devices have very high test strip costs which cannot be justified. Women already using these devices should not be switched unless on the advice on their specialist.

Diabetes in pregnancy: Frequency of glucose testing

Diabetes in pregnancy			
	Type 1 diabetes	Type 2 diabetes or gestational diabetes using multiple-daily insulin	Type 2 diabetes or gestational diabetes using diet & exercise, oral therapy or single-dose insulin
Routine	<p>NICE NG3 recommends the use of Continuous Glucose Monitoring (CGM) for all pregnant women with type 1 diabetes. Where CGM is used, refer to corresponding table for Type 1 diabetes above.</p> <p>NICE NG3 recommends the use of Flash Glucose Monitoring (e.g. Freestyle Libre 2) pregnant women with type 1 diabetes who are unable to use CGM or express a clear preference for it. Where Flash is used, refer to corresponding table for Type 1 diabetes above.</p> <p>For women using test strips only; testing 7 - 10 times daily.</p>	7 - 10 times daily	4 times daily
Strips	Prescribed on repeat prescription - quantities depend on testing frequency.	Prescribed on repeat prescription - quantities depend on testing frequency	Prescribed on repeat prescription - quantities depend on testing frequency
Additional	Be aware of any letters from Diabetes or Obstetric team advising on this matter. Please do not change the meter without discussion with hospital team and user of the meter. Meter being us may allow data to be uploaded to hospital records remotely by the individual. Test strips can be removed from individuals repeat prescription with Gestational diabetes Mellitus post-delivery.		

1. Target audience

Primary and secondary care clinicians managing people with diabetes.

2. Purpose

This guideline applies to adults with type 1, type 2 and gestational diabetes. Guidance is provided for:

- Preferred self-monitoring of blood glucose (SMBG) meters with compatible test strips and lancets
- How often people should test
- Who could benefit from access to glucose monitoring
- Initiating and reviewing people with glucose monitoring
- Sharps disposal
- Who could benefit from access to ketone monitoring (blood or urine)

This guideline does NOT apply to paediatrics and adolescents with type 1 or type 2 diabetes

For people with diabetes who fall outside the scope of this guideline, please follow the treatment plan set out by the patient's specialist team. The treatment plan should specify any reasons for exceptionality (an example 'exceptionality letter' is provided in Appendix 1).

3. Self-monitoring of glucose levels

There are three technologies for people with diabetes to self-monitor glucose levels:

- 1) Self-monitoring of blood glucose (SMBG) or 'finger prick testing'
- 2) Interstitial glucose monitoring
 - a) Continuous glucose monitoring (CGM)
 - b) 'Flash glucose' monitoring

Self-monitoring of glucose levels (either blood glucose or interstitial fluid glucose) is not a stand-alone intervention; it should be used in combination with structured education to empower the individual to use the results effectively.

Whilst HbA1c is the mainstay of monitoring the effectiveness of diabetes treatment, glucose monitoring can provide additional valuable information for a variety of situations:

- Safety
 - To support the safe titration of insulin or oral hyperglycaemic agents with a risk of hypoglycaemia
 - To identify and confirm hypoglycaemia if using insulin or oral hyperglycaemic agents with a risk of hypoglycaemia
 - To confirm safety to drive, and before commencing other activities such as swimming if using insulin or oral hyperglycaemic agents with a risk of hypoglycaemia
 - To inform management to optimise glycaemic control in women planning or during pregnancy (foetal safety)
 - To inform management of intercurrent illness and stress in order to reduce risk of acute metabolic decompensation (diabetic ketoacidosis and hyperosmolar hyperglycaemic state) and avoid unplanned admission to hospital
- Special circumstances
 - Can inform medication management to facilitate appropriate adjustments diabetes medications when starting/stopping oral corticosteroids or antipsychotic medications.
 - Empowering lifestyle changes, supporting decision making or reducing complications

When considering suitability for glucose monitoring the following points should be considered:

- Visual acuity
- Manual dexterity
- Ability to use blood glucose meter
- Willingness to perform tests

3.1. Who should be self-monitoring glucose levels?

Glucose monitoring is **essential** for people with T1DM or gestational diabetes, irrespective of whether other monitoring devices are co-prescribed (including 'Flash glucose' monitors and CGM).

Glucose monitoring via SMBG is **essential** for people with T2DM who:

- Are prescribed insulin
- Are a Group 2 driver licence holder (large lorries [category C] or buses [category D]) and are prescribed sulphonylureas or meglitinides

Glucose monitoring via SMBG **may be considered** for non-insulin managed people with T2DM:

- Are a Group 1 driver licence holder (vans, cars and motorcycles) **or** operate machinery **and** prescribed sulphonylureas or meglitinides. For those who drive or operate machinery for a living, testing is strongly recommended.
- See 'Additional information' in section [Type 2 Diabetes: Frequency of blood glucose testing](#)

3.2. Who should not need to self-monitor glucose levels?

Glucose monitoring should not be required for people with T2DM who:

- Control their diabetes by diet and exercise alone
- Control their diabetes using metformin alone or in combination with a gliptin (DPP-4i), flozin (SGLT-2i), GLP-1 receptor agonist or pioglitazone.

3.3. DVLA guidance for driving and glucose monitoring

Appendix 2 provides the following tables:

- Section 1: To notify or not to notify the DVLA
- Section 2: Additional requirements for license issue by DVLA
- Section 3: Monitoring requirements for drivers
- Section 4: Additional information for drivers

See full [DVLA website](#) for further details and [DVLA Patient Information Leaflets for drivers with diabetes](#)

3.4. Sick day monitoring

People with diabetes should be provided with the Trend Diabetes leaflets:

- [Type 1 diabetes: What to do when you are ill](#)
- [Type 2 diabetes: What to do when you are ill](#)

3.5. Process for initiating blood glucose monitoring

SMBG

- Offer a standardised meter suitable for the person's needs; see sections [Type 2 diabetes meter choices](#), [Type 1 diabetes choices](#) and [Gestational diabetes meter choices](#)
 - *Supply meter from practice/service stock (practice/service to order meters)*
- Demonstrate meter and finger pricking device, identifying procedure for the individual to follow
- Demonstrate how to wash hands before use
- Give information on the safe disposal of sharps
- Issue blood glucose monitoring diary indicating agreed individual target range and frequency of testing (see section [Frequency of testing](#))
- Agree the individual's blood glucose target and give verbal and written information regarding what to do with results
- Provide a contact number for access to HCP advice
- Arrange to review self-testing results at a suitable interval
- Explain the importance of regularly Quality Checking the accuracy of their meters by using control solutions (control solution should be used in line with the manufacturers' recommendations; typically with each new pot of strips, in the event of an unusual reading or if the meter has been dropped, damaged or exposed to liquids).
- Encourage users to register their meter with the company (to obtain free batteries and control solution, and to allow the company to contact the user in the event of an alert/recall)

'Flash glucose' monitors or CGM

'Flash glucose' monitors and CGM requires specialist training for initiation and monitoring.

3.6. Process for reviewing glucose monitoring

Assess at least annually in a structured way:

- 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

3.7. Troubleshooting: things to consider for users reporting erratic SMBG results

If results are outside what is expected then:

- 1) Ensure hands are always washed prior to testing
- 2) Check expiry date of strips
- 3) Carry out quality control test on the meter using the control solution
- 4) Ensure strips have been stored within the appropriate temperature range and appropriate place

Clinicians are asked to convey to SMBG users the importance of regularly checking the accuracy of their meters by using quality control solutions.

4. Self-monitoring of ketones

Where blood ketone test strips are indicated, use must be carefully monitored as usage **does not usually exceed more than 10 strips per year** (moving strips to 'variable' or 'acute' prescribing would be appropriate), with the **exception of** people with:

- frequent DKA admissions
- frequent recurrent acute illness
- pregnant women with type 1 diabetes, or as advised by diabetes obstetric team

Use a meter that can measure both blood glucose and blood ketones, see below:

- GlucoMen Areo 2K (GlucoMen Areo Ketone Sensors; £9.95 for 10 strips)
- GlucoRx HCT (GlucoRx HCT & Ketone Test Strips; £9.95 for 10 strips)
- 4Sure Smart Duo (4SURE β -Ketone Test Strips ; £9.92 for 10 strips)

Do not offer FreeStyle Optium strips (compatible with the Freestyle Libre meter). These strips are expensive and offer no clinical or technological advantage. Freestyle Libre users should have access to Glucomen Areo 2K, 4SURE Smart Duo or GlucoRx HCT meters.

4.1. Type 1 diabetes: Blood ketone monitoring

	Groups	Ketone monitoring?	Counselling
Type 1	People with T1DM [†] not taking SGLT2i	Yes	NICE NG17 recommends that everyone with Type 1 diabetes has access to blood ketone monitoring as part of 'sick-day rules', to facilitate self-management of an episode of hyperglycaemia. Provide Trend Diabetes leaflet Type 1 diabetes: What to do when you are ill . Patient must understand when to test ketones and how to respond to high levels.
	People with T1DM [†] taking SGLT2i	Yes	People being initiated on SGLT2i (dapagliflozin and sotagliflozin ^a) for Type 1 diabetes have an elevated risk of euglycemic DKA. Initiation should be restricted to secondary care only and the following (pragmatic) monitoring is advised: <ul style="list-style-type: none">• Two weeks before initiation: Daily blood ketone monitoring• Two weeks after initiation: Daily blood ketone monitoring• Ongoing: Routine 'sick-day rules' blood ketone monitoring. Provide Trend Diabetes leaflet Type 1 diabetes: What to do when you are ill. Patient must understand when to test ketones and how to respond to high levels. Advise patients to withhold their SGLT2i if at risk dehydration and seek medical help if feeling any symptoms of DKA. Restart SGLT2i when feeling well again.

[†] People with pancreatic disorders suggesting insulin deficiency, including pancreatitis and Latent Autoimmune diabetes of Adulthood, should be managed similar to people with Type 1 diabetes.

^a SGLT2i are a treatment option for those who meet NICE criteria; [TA597](#) and [TA622](#). Sotagliflozin has not launched in the UK at time of writing.

4.2. Type 2 diabetes: Ketone monitoring

	Groups	Ketone monitoring?	Counselling
Type 2	People with T2DM not taking SGLT2i (+/- other OADs or insulin)	No	Nil
	People with T2DM taking SGLT2i with no prior history of ketosis and no elevated risk of DKA (+/- other OADs or insulin)	No	Follow MHRA advise to health professionals on the risk of DKA with SGLT2i. Advise patients to withhold their SGLT2i if at risk dehydration and seek medical help if feeling any symptoms of DKA. Restart SGLT2i when feeling well again. Offer patients Trend Diabetes leaflet ' Type 2 diabetes and diabetic ketoacidosis '.
	People with T2DM taking SGLT2i with an elevated risk of DKA: <ul style="list-style-type: none"> • Acute illness resulting in increased insulin requirements and hospitalisation • Conditions leading to restricted food intake or severe dehydration • Concurrent and history of alcohol overuse/abuse • Insulin deficient states (poor compliance to insulin regimen; insulin dose reduction; refusal of insulin initiation) • History of previous DKA admission • Ketone prone diabetes Specialist initiation only.	Yes	Follow MHRA advise to health professionals for SGLT2i and DKA. Urine ^b or blood ketone testing should be offered: <ul style="list-style-type: none"> • at initiation (6-8 weeks): daily • if insulin is being altered/weaned: daily • at risk of dehydration: twice-daily Patient must understand when to test ketones and how to respond to high levels. Advise patients to withhold their SGLT2i if at risk dehydration and seek medical help if feeling any symptoms of DKA. Restart SGLT2i when feeling well again. Offer patients Trend Diabetes leaflet ' Type 2 diabetes and diabetic ketoacidosis '.

^b Anecdotally better compliance and cheaper option

5. Sharps disposal

Sharps disposal boxes are available on prescription:

- Sharpsguard 1 litre (landscape)
- Sharpsafe 1 litre (portrait)

The boxes should be disposed according to the patient's local council procedures.

CCG	Disposal instructions
Barnet	https://www.barnet.gov.uk/citizen-home/rubbish-waste-and-recycling/household-recycling-and-waste/clinical-waste.html
Camden	020 3567 8105 http://camden.gov.uk/ccm/content/contacts/council-contacts/environment/contact-environment-service/
Enfield	https://new.enfield.gov.uk/services/rubbish-and-recycling/special-collections/household-clinical-waste-collection/
Haringey	https://www.haringey.gov.uk/environment-and-waste/refuse-and-recycling/commercial-hazardous-and-clinical-waste/clinical
Islington	https://www.islington.gov.uk/recycling-and-rubbish/clinical-waste

6. Associated documents

NCL [Antihyperglycaemic agents for Type 2 diabetes](#)

NCL [Flash Glucose Monitoring – Position statement](#)

NCL [Flash Glucose Monitoring – Implementation guide](#)

Trend Diabetes: [Type 1 diabetes: What to do when you are ill](#) leaflet, via <https://trenddiabetes.online/>

Trend Diabetes: [Type 2 diabetes: What to do when you are ill](#) leaflet, via <https://trenddiabetes.online/>

Trend Diabetes: [Safe Driving and DVLA](#) leaflet, via <https://trenddiabetes.online/>

Trend Diabetes: [Type 2 diabetes and diabetic ketoacidosis](#) leaflet, via <https://trenddiabetes.online/>

Responsible Diabetes Prescribing Bulletin: Diabetes and Driving, March 2020. NHS London Procurement Partnership

Appendix 1: Exceptions to NCL Blood glucose & ketone monitoring for adults with diabetes

Date:

Patient Demographics:

Glucose & ketone monitoring for adults with diabetes

Dear GP,

We are aware of the NCL guidance regarding blood glucose and ketone testing for adults with diabetes.

We feel the patient above requires a testing arrangement outside of this guidance for the following reasons:

Please can you therefore prescribe:

Meter:

Strips:

Lancet Device:

Frequency of Testing:

This specific choice has been made because....

Enclosed is a copy of the most recent clinic assessment/letter relating to this patients care

If you require any further information regarding this request please do not hesitate to contact me.

Kind regards,

Appendix 2: Diabetes and driving

Section 1: To notify or not to notify the DVLA

Drivers have a legal responsibility to tell the DVLA about any conditions or treatments that may affect their ability to drive; clinicians should enable patients to do this by ensuring they are aware of what they do and do not need to report to the DVLA. Very occasionally, patients may choose to not do so, and continue to drive even if they are not fit to. Clinicians must then make a decision about whether to disclose relevant information without consent to the DVLA in the public interest. GMC has published guidance on this, which can be found on the [GMC website](#).

	Group 1 – Cars and motorbikes	Group 2 – Buses, coaches, lorries (plus taxi/private hire in London [†])
Diabetes managed by diet	No – do not need to notify the DVLA [‡]	No – do not need to notify the DVLA [‡]
Diabetes managed by non-insulin injections and oral tablets	<p>No – do not need to notify the DVLA unless:</p> <ul style="list-style-type: none"> • Had more than 1 episode of severe hypoglycaemia while awake in preceding 12 months and the most recent episode was less than 3 months ago. • Medical team feel at high risk of developing hypoglycaemia. • Develop impaired awareness of hypoglycaemia (defined as “inability to detect the onset of hypoglycaemia because of total absence of warning symptoms”). • Experience severe hypoglycaemia while driving. • Problems with vision in both eyes, or in remaining eye if sight in one eye only • Need laser treatment in both eyes, or in remaining eye if patient has sight in one eye only • Develop any problems with circulation or sensation in the legs or feet which mean need a certain type of vehicle to drive (e.g. automatic, vehicles with a hand operated accelerator or brake) • If monitoring has been deemed as appropriate, this is carried out as per agreement between driver and their specialist team – if on sulphonylureas or meglitinides then monitoring should be carried out at times relevant to driving to enable detection of hypoglycaemia • An existing medical condition gets worse or you develop any other condition that may affect your driving safety <p>NB Individual should be under regular medical review</p>	Yes – notify the DVLA
Diabetes managed by insulin	Yes – notify the DVLA	Yes – notify the DVLA

[†] In order to drive a taxi or private hire vehicle in or around London, Transport for London (TfL) have decided to be guided by the DVLA Group 2 driver standards. For full details, see the TfL website. The medical declaration form can be found here <http://content.tfl.gov.uk/tph204-medical-declaration.pdf>. Taxi drivers or public hire vehicles drivers outside of London should consult their local council for details on local requirements.

[‡] If relevant disqualifying complications develop or insulin treatment is required then MUST NOT drive and need to notify the DVLA

Reporting hypoglycaemic episodes to DVLA

For Group 1 drivers, notifiable episodes of severe hypoglycaemia (requiring the assistance of another person) are defined as those whilst awake. If more than one episode occurs within the preceding 12 months, the driver must not drive and must notify the DVLA so that they can undertake medical enquiries into their fitness to drive. Any developments in impairment of awareness of hypoglycaemia must also be reported.

NHS LPP recommends that clinicians use validated tools such as the Gold score to document awareness of hypoglycaemia. This is a simple score that asks the question:

Do you know when your hypos are commencing?
Always aware 1 2 3 4 5 6 7 Never aware

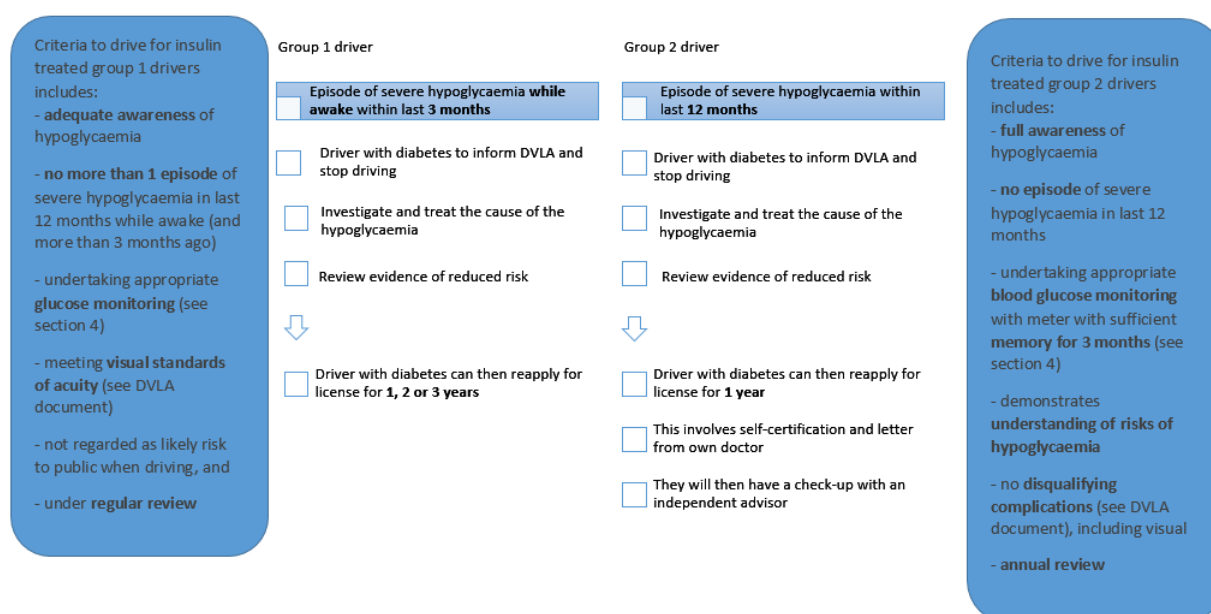
A score of 4 or above indicates impaired awareness, while a score of 7 indicates absolute loss of awareness.

Group 2 drivers must notify the DVLA after any episode of severe hypoglycaemia (requiring the assistance of another person) and must not drive and must notify the DVLA. Any degree of impaired awareness of hypoglycaemia must be reported.

All episodes of severe hypoglycaemia whilst driving must be reported to the DVLA in both groups. Severe hypoglycaemia has been defined by the International Hypoglycaemia Study Group as an episode resulting in severe cognitive impairment requiring external assistance for recovery.

For more detailed information on what to do if an episode of severe hypoglycaemia occurs, please see Figure 1.

Figure 1: Actions to take regarding DVLA and license if an episode of severe hypoglycaemia occurs



Further groups of drivers with diabetes subject to additional guidance

- Those with a **pancreas transplant or islet cell transplantation** must notify the DVLA. Licensing will depend on the patient not having a disqualifying condition and Group 2 drivers will require an individual assessment.
- **Pregnant women** with diabetes who are using insulin temporarily do not necessarily have to notify the DVLA if they are a Group 1 driver and under medical supervision with no risk of disabling hypoglycaemia. If treatment continues for more than 3 months after birth or disabling hypoglycaemia occurs, then the DVLA must be notified. All Group 2 drivers using insulin – even if only temporarily – must notify the DVLA.

- Anyone with **impaired awareness of hypoglycaemia** must notify the DVLA. Next steps vary depending on whether the individual is a Group 1 or a Group 2 driver.
- Major diabetes complications require notification to the DVLA and may require the individual to stop driving (bar visual complications in Group 2 drivers where they **MUST** stop driving). These include:
 - **Visual complications** affecting visual acuity or visual field
 - **Renal complications**
 - **Limb complications** – including peripheral neuropathy – that means the driver must meet requirements (such as vehicle adaptations) for disabilities.
- **Seizures** that were provoked by hypoglycaemia require a period of not driving due to the prospective risk of a further seizure

Section 2: Additional requirements for license issue by DVLA

The following groups of drivers need to meet certain criteria to be issued a license by the DVLA:

- Group 1 drivers on insulin
- Group 2 drivers on insulin, tablets with a hypoglycaemia risk or other medications including non-insulin injections and/or oral tablets

Applicants will be asked to sign an undertaking to comply with the directions of the healthcare professionals treating their diabetes and to report any significant change in their condition to the DVLA immediately. Group 2 drivers require an additional assessment as detailed in the main DVLA document.

As highlighted above, episodes of severe hypoglycaemia are a key concern when issuing licenses, and action needs to be taken after such an episode. A summary of the process to go through with the driver is provided in Figure 1.

Please note that licenses may be refused or revoked if disqualifying complications of diabetes develop, such as diabetic retinopathy or other visual field defects. Short term licenses may be issued in some cases.

	Group 1 – Cars and motorbikes	Group 2 – Buses, coaches, lorries (plus taxi/private hire in London*)
Diabetes managed by non-insulin injections and oral tablets with a low hypoglycaemic risk	N/A	License issued for indeterminate period of time if individual under regular medical review and does not have any of the following: <ul style="list-style-type: none"> • More than 1 episode of severe hypoglycaemia in last 12 months • Medical team feel at high risk of developing hypoglycaemia • Development of impaired awareness of hypoglycaemia (defined as “inability to detect the onset of hypoglycaemia because of total absence of warning symptoms”) • Severe hypoglycaemia while driving • Problems with vision in both eyes, or in remaining eye if sight in one eye only • Need for laser treatment in both eyes, or in remaining eye if patient has sight in one eye only • Development of any problems with circulation or sensation in the legs or feet which mean need a certain type of vehicle to drive (e.g. automatic, vehicles with a hand operated accelerator or brake)
Diabetes managed by oral tablets carrying a hypoglycaemia risk (including sulphonylureas and glinides)	N/A	License may be issued for 1, 2 or 3 years if: <ul style="list-style-type: none"> • No episode of severe hypoglycaemia in the last 12 months • Full awareness of hypoglycaemia • Regular self-monitoring of blood glucose (see Error! Reference source not found.) • Demonstrates an understanding of the risks of hypoglycaemia • No disqualifying complications of diabetes
Diabetes managed by insulin	License may be issued for 1, 2 or 3 years if: <ul style="list-style-type: none"> • Adequate awareness of hypoglycaemia • No more than 1 episode of severe hypoglycaemia while awake in the preceding 12 months and the most recent episode occurred more than 3 months ago • Practices appropriate blood glucose monitoring as defined in Table 3 • Not regarded as a likely risk to the public when driving • Meets the visual standards for acuity 	License may be issued for 1 year (with annual review as detailed in full document) if: <ul style="list-style-type: none"> • Full awareness of hypoglycaemia • No episode of severe hypoglycaemia in the preceding 12 months • Practices blood glucose monitoring as defined Table 3 • Uses a glucose meter with sufficient memory to store 3 months of necessary readings • Demonstrates an understanding of the risks of hypoglycaemia • No disqualifying complications of diabetes

	<ul style="list-style-type: none"> • Under regular review 	
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[†] In order to drive a taxi or private hire vehicle in or around London, Transport for London (TfL) have decided to be guided by the DVLA Group 2 driver standards. For full details, see the TfL website. The medical declaration form can be found here <http://content.tfl.gov.uk/tph204-medical-declaration.pdf>. Taxi drivers or public hire vehicles drivers outside of London should consult their local council for details on local requirements.

Information for those unable to drive due to complications of their diabetes (London)

The London Council Freedom Pass team have confirmed: “If a person has been medically ruled out from driving and their fitness to drive form confirms this there is no reason we would rule them out from a disabled persons freedom pass”. Hence if a person with diabetes is medically ruled out from driving, they should contact their local borough directly about this matter, to discuss their eligibility for a disabled persons freedom pass, as each borough locally assesses based on the disabled criteria for this application process.

Section 3: Monitoring requirements for drivers

The use of interstitial glucose monitoring (Flash Glucose Monitoring [FGM] and Real Time Continue Glucose Monitoring [RT-CGM]) is now accepted as a method to monitor glucose levels for Group 1 drivers. However, please note these drivers must still have a blood glucose meter with them in the vehicle as they will be required to finger prick test in the following circumstances:

- when the glucose level is 4.0 mmol/L or below
- when symptoms of hypoglycaemia are being experienced
- when the glucose monitoring system gives a reading that is not consistent with the symptoms being experienced (e.g. symptoms of hypoglycaemia and the system reading does not indicate this)
- if you are aware that you have become hypoglycaemic or have indication of impending hypoglycaemia.
- at any other times recommended by the manufacturer of your glucose monitoring system.

For Group 2 drivers, blood glucose testing requirements still apply and interstitial glucose monitoring is not permitted for the purposes of monitoring as per the terms of their license.

	Group 1 – Cars and motorbikes	Group 2 – Taxis/private hire, Buses, coaches, lorries
Diabetes managed by diet	No documented requirement	No documented requirement
Diabetes managed by non-insulin injections and oral tablets with low hypoglycaemic risk	No documented requirement – decision made based on individual risk of hypoglycaemia	No documented requirement – decision made based on individual risk of hypoglycaemia
Diabetes managed by oral tablets carrying a hypoglycaemic risk (including sulphonylureas and glinides)	May offer self-monitoring of interstitial and/or blood glucose at times relevant to driving to enable detection of hypoglycaemia, if deemed necessary	Monitor blood glucose: <ul style="list-style-type: none">• at least twice daily (including on days not driving) AND• no more than 2 hours before start of first journey AND• every 2 hours while driving
Diabetes managed by insulin	Monitor glucose level (interstitial and/or blood): <ul style="list-style-type: none">• no more than 2 hours before start of first journey AND• every 2 hours after driving has started	Monitor blood glucose: <ul style="list-style-type: none">• at least twice daily (including on days not driving) AND• no more than 2 hours before start of first journey AND• every 2 hours while driving Meter(s) should have sufficient memory to store 3 months of readings.

Drivers on insulin should always carry their glucose meter and testing strips with them, including if they use an interstitial glucose monitor.

More frequent self-monitoring (either via interstitial or blood glucose monitoring) may be indicated with any greater risk of hypoglycaemia e.g. increased physical activity, altered meal routine.

Information for those unable to drive due to complications of their diabetes (London)

Monitoring requirements vary between driver groups and are dependent on treatment type, but please note that insulin treated Group 2 drivers have to undertake additional monitoring and must be reviewed by specialist healthcare professionals in order to retain their license. Part of this requirement is to provide sight of blood glucose self-monitoring records for the previous 3 months, stored on the memory of a blood glucose meter. The responsible clinician should therefore ensure these drivers have a meter with sufficient memory. See the DVLA guide for full information on additional measures to be taken when assessing insulin-treated Group 2 drivers.

Section 4: Additional information for drivers

What immediate action should be taken if blood glucose is low BEFORE driving?

If blood glucose is:

- $\leq 5\text{mmol/l}$ - the individual should take a carbohydrate snack before driving
- $< 4\text{mmol/l}$ - the individual should not drive as below and treat with fast acting glucose followed by a carbohydrate snack

What immediate action should be taken if the person with diabetes begins to experience symptoms of hypoglycaemia DURING driving?

- Stop the vehicle as soon as possible.
- Switch off the engine, remove the keys from the engine and move from the driver's seat.
- Take 15 – 20g of fast acting carbohydrate, such as glucose tablets, sweets or a non-diet sugary drink. Once blood glucose is above 4mmol/l , it is recommended to take some form of longer-acting carbohydrate.
- Do not start driving until 45 minutes after blood glucose returns to normal (as confirmed by meter reading).

Motor insurance

All drivers should notify their motor insurance provider if they have diabetes. The driver should promptly inform their insurance provider of:

- Any changes to the driver's condition
- Any changes to the driver's treatment
- Any new notifications that are made to DVLA
- Any changes in the terms of the driver's license

In conjunction with this, the insurance is only fully valid if the DVLA are also notified of any relevant changes.