

Guidelines: Self-Monitoring of Blood Glucose and Ketones in Diabetes

(Including Recommendations for Choice of Blood
Glucose/Ketone Meters in Adults, Children and Young
People)

North East & North Cumbria

Integrated Care Board

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. If you have any queries or comments on this guideline, please contact the Medicines Optimisation Team at nencicb-sun.mo@nhs.net.

If there are supply issues with the recommended first line options, or they are not deemed suitable or clinically appropriate then only meters that are featured in the [NHS England recommendations](#) should be considered.

Based, with thanks, on guidelines developed by Diabetes Medicines Management
Advisory Group (DMMAG) for Birmingham and Solihull Integrated Medicines
Optimisation Committee (BSol IMOC)

Developed by	NENC Medicines Optimisation and Pharmacy Team
Approved by	NTAG and NENC Medicines Subcommittee
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Guidelines for Self-Monitoring of Blood Glucose and Ketones in Diabetes (Including Recommendations for Choice of Blood Glucose/Ketone Meters in Adults, Children and Young People)

Scope

These guidelines are intended to help healthcare professionals select blood glucose meters and give appropriate advice to people who need to self-monitor their blood glucose (SMBG). The recommendations apply to adults, children and young people with diabetes.

How the guideline was developed

The North East and North Cumbria Integrated Care Board (NENC ICB) Medicines Optimisation Team gained permission from Birmingham and Solihull Integrated Medicines Optimisation Committee Diabetes Medicines Management Advisory Group (BSol IMOC DMMAG) to adopt this guidance for local implementation. A positive consultation process was completed with local diabetes specialists from across NENC, representing both primary and secondary care. NENC Guidelines Group, Northern Treatment Advisory Group and Medicines Committee have approved this approach and implementation of the guidance.

Purpose

In April 2023, new [NHS England recommendations](#) for blood glucose meters were published. The NHSE guideline contains 16 meter recommendations; it would be impractical for teams to stock all the recommended meters, therefore there remains a need for local guidance with first line recommendations in each patient category.

We have considered the differences between the local recommendations across the 3 historical Area Prescribing Committees (APC's) – County Durham & Tees Valley (CDTV), North of Tyne, Gateshead and North Cumbria (NoTG&NC) and South Tyneside & Sunderland (STS) – and the national recommendations. Across the 3 historical APC's from the 23 blood glucose monitors, only 3 are included in the [NHS England recommendations](#), however none of these align fully with the patient categories NHS England has recommended them for.

This guidance will outline recommended first line choices from the [NHS England recommendations](#). The national recommendations will be reviewed annually and will inform future versions of this local guidance which will continue to be produced in consultation with primary and secondary care.

Type of meters

This guideline has divided the [NHS England recommendations](#) for blood glucose and ketone meters into 5 patient cohorts as per the table below. Healthcare professionals are advised to select a meter that best considers patient preferences and clinical needs.

Category
Blood glucose monitoring only (Type 2 diabetes)
Blood glucose monitoring and requiring additional functionality on meter (Type 2 diabetes)
Blood glucose and blood ketone monitoring (Type 1 diabetes/ketosis prone Type 2 diabetes)
Blood glucose monitoring in gestational diabetes (Type 2 diabetes)
Blood glucose monitoring in paediatrics (Type 2 diabetes)

* Additional functionality includes features such as (but is not limited to); on-board carbohydrate counting calculator, large display for visual impairment, and extra memory for Group 2 drivers.

Insulin pump:

If a patient is using an insulin pump, their meter should not be switched in primary care. Please refer to the specialist clinics if any review is required.

Blood glucose targets

Adults with type 1 diabetes should aim for:

- 5 - 7 mmol/litre on waking
- 4 - 7 mmol/litre before meals at other times of the day

Non- pregnant adults who choose to test after meals should aim for:

- 5–9 mmol/litre at least 90 minutes after eating

Bedtime targets should be individualized, taking account of timing of last meal, related insulin dose, and recommended fasting level on waking.

Targets for children differ (see [NICE Guideline NG18](#))

Targets may need to be individualized for older adults, people with certain co-morbidities, during pregnancy and for people engaged in certain high-risk activities.

NICE have not recommended targets for instantaneous blood glucose levels in type 2 diabetes.

HbA1c

HbA1c is the most appropriate measure of long-term blood glucose control in both type 1 and type 2 diabetes. Patients should be involved in decisions about their individual HbA1c target. Individual targets should take account of factors such as the person's daily activities, aspirations, likelihood of complications, comorbidities, occupation and history of hypoglycaemia.

Adults with type 1 diabetes, and adults with type 2 diabetes treated with lifestyle and diet +/- a single drug not associated with hypoglycaemia, should be supported to aim for 48mmol/mol (6.5%).

People with type 2 diabetes taking drugs associated with hypoglycaemia or requiring more than one drug should be supported to aim for 53mmol/mol (7.0%).

Relaxed targets should be considered for people with type 2 diabetes who: are unlikely to achieve longer-term benefits; at high risk of the consequences of hypoglycaemia, or; have significant comorbidities.

Driving

The main issue in relation to driving and the law is the risk of hypoglycaemia. It is important that any patient who is using treatment that can cause hypoglycaemia (insulin/sulphonylurea) has the means to test their blood glucose. More information on driving and diabetes can be found on the [Diabetes UK](#) and [DVLA](#) website.

Group 1 license holders

The DVLA must be notified if they have more than one episode of severe hypoglycaemia in the preceding 12 months.

The DVLA notes that it is appropriate to offer self-monitoring of blood glucose at times relevant to driving to enable the detection of hypoglycaemia by drivers of cars and motorbikes who take oral medicines carrying risk of hypoglycaemia.

Group 2 license holders

Evidence is required of twice daily blood glucose testing and at times related to driving (no more than 30 mins before the start of the first journey and at two hourly intervals while driving). These patients must have a blood glucose meter with the facility to store a minimum of 3 months of results, which is reviewed annually by an appropriate medical professional.

Following hypoglycaemia and treatment to correct this, blood glucose must be in the normal range (above 5mmol/l) for 45 minutes prior to resuming driving. There must be full hypoglycaemia awareness at every episode.

The DVLA must be notified if they have one episode of severe hypoglycaemia in the preceding 12 months.

The DVLA notes that it is appropriate to offer SMBG at times relevant to driving to enable the detection of hypoglycaemia by drivers of cars and motorbikes who take oral medicines carrying risk of hypoglycaemia. See DVLA guidance for details.

Alternative site testing

These results must be used with caution in the following circumstances:

- When making frequent insulin dose adjustment decisions e.g. following new diagnosis
- During illness management
- Following exercise
- For hypoglycaemia management especially if poor warning symptoms

Type 1 Diabetes

Who should be offered self-monitoring of blood glucose?

Glycaemic control can be unstable. Patients are at high risk of hypoglycaemia and hyperglycaemia therefore frequent blood glucose testing is required.

Self-monitoring of blood glucose is recommended in **all** patients with type 1 diabetes. Patients should be taught how to adjust insulin therapy in line with results of home blood glucose monitoring.

Test HbA1c at least every 3-6 months.

Frequency of testing

Frequency of testing should be individualised to patients considering specific patient factors. The level of monitoring will vary according to the treatment regime in use and the target level of glycaemic control set for the patient and driving requirement.

This is usually a minimum 4 times daily, including before each meal and at bedtime. Children & young people should be advised to test at least 5 times per day. Testing at night is recommended if unrecognised hypoglycaemic episodes are suspected.

All results should be recorded with the time and date to provide a cumulative record for day-to-day changes.

When is additional testing recommended?

Additional testing is recommended in the following circumstances:

- Pre-conception and pregnancy (+ketones)
- Impaired awareness of or increased frequency of hypoglycaemic episodes intensive regimes
- Pump therapy
- Illness
- Lifestyle changes
- Exercise
- Driving
- Use of steroids
- Changes to insulin dosage
- Exercise
- Terminal care/end of life patients as part of a care plan

Type 2 Diabetes

Who should be offered self-monitoring of blood glucose?

Routine self-monitoring of blood glucose is NOT recommended for adults with type 2 diabetes not treated with insulin, unless:

- there is evidence of hypoglycaemic episodes or
- the person is on oral medication that may increase their risk of hypoglycaemia while driving or operating machinery or
- the person is pregnant/planning to become pregnant

Patient Cohort	When is self-monitoring of blood glucose recommended?
Diabetes controlled with: <ul style="list-style-type: none"> • Diet & exercise controlled • Metformin • Glitazones • Dipeptidyl peptidase 4 (DPP4) inhibitors • Sodium-glucose co-transporter-2 (SGLT2) inhibitors • Glucagon-like peptide 1 (GLP-1) receptor agonists 	<p>HbA1c is the real outcome measure for these patients. Blood glucose monitoring should not be required routinely, but may be required:</p> <ul style="list-style-type: none"> • During illness • When therapy is changed • If steroids are co-prescribed (midday, before evening meal and 2 hours after evening meal) • When regular HbA1c testing is not available • Patients with postprandial hyperglycaemia • Pre-conception care and pregnancy • Terminal care/end of life patients BUT ONLY as part of a care plan
On sulphonylurea's and/or other treatments	<p>There is an increased risk of hypoglycaemia when on sulphonylurea's compared with other non-insulin therapies.</p> <p>Patients should be individually assessed for self-monitoring of blood glucose requirements and testing should be considered for symptomatic or suspected hypoglycaemia.</p> <p>Testing maybe a useful guide for:</p> <ul style="list-style-type: none"> • Evaluating lifestyle changes • New or increased treatment • Where required for driving or operating machinery
On basal Insulin and oral medication	<p>Fasting glucose should be tested once a day before breakfast to titrate basal insulin plus once per day at different times to identify periods of hypo and hyperglycaemia.</p> <p>Once blood glucose is within target range and very stable, testing frequency can sometimes be reduced to two to three times per week.</p>
On twice daily pre-mixed insulin	<p>Test twice a day at various times to include before and after meals and pre-bedtime blood glucose monitoring.</p> <p>Once blood glucose is within target range and</p>

	very stable, testing frequency can sometimes be reduced to two to three times per week.
On multiple daily insulin injections	Self-monitoring for blood glucose should be as for type 1 diabetics.

Supply of meters

Any patient newly diagnosed with diabetes should be assessed by a healthcare professional and supplied a suitable guideline approved meter if self-monitoring of blood glucose is required. Training on the correct use, storage and interpretation of readings should be provided by the issuing clinician.

Note:

- Meters can be obtained free of charge from manufacturers by all GP surgeries and specialist clinics to issue to patients. There is no need for patients to purchase a meter.
- Patients should be dissuaded from buying their own meter without consulting their diabetes specialist first.
- Prescribing of test strips and lancets for meters that are not guideline approved which have been purchased by a patient will not be supported.
- Clinics and practices are advised not to keep stock of meters that are not recommended in this guidance for use within the local health economy.

Issuing new blood glucose meters

All new patients starting to self-monitor their blood glucose must be initiated on a guideline approved meter. A guideline approved meter should also be used whenever offering a replacement meter.

Existing patients on meters that are not guideline approved

People with diabetes who are already using blood glucose or ketone meters that are not on the recommended list of products should be offered an alternative meter at the earliest opportunity following a discussion with their healthcare professional. Bulk switching of glucose meters without patient counselling is discouraged.

The guideline approved meters are expected to be suitable for the majority of patients (around 80-90%) but it is recognised that some patients may have individual needs and will require an alternative choice. The selection of a meter listed in [NHS England recommendations](#) is advised.

If a patient is using an insulin pump the meter should not be switched in primary care. Please refer to the specialist teams if any review is required.

Points to consider prior to initiating self-monitoring of blood glucose

- Clinicians should ensure that they promote equality for all patients when following this guidance.
- Patients who self-monitor must be given adequate training around the purpose, interpretation, and actions to take with the meter readings.

- Self-monitoring of blood glucose should always be an integral part of a wider agreed management plan and consider guidance from the Driver and Vehicle Licensing Agency (DVLA).
- Ensure the patient fits the relevant NICE criteria for self-monitoring of blood glucose. Do not routinely offer self-monitoring of blood glucose levels for adults with type 2 diabetes unless ([NICE NG28, 2022](#)):
 - 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 or operating machinery or
 - The person is pregnant or is planning to become pregnant. For more information, see the NICE guideline on diabetes in pregnancy.
- In line with NICE guidance, if patients with diabetes are self-monitoring their blood glucose levels, carry out a structured assessment at least annually. The assessment should include:
 - The person's self-monitoring skills
 - The quality and frequency of testing (frequency can go up as well as down – address any excess usage)
 - Checking that the person knows how to interpret the blood glucose results and what action to take
 - The impact on the person's quality of life
 - The continued benefit to the person
 - The equipment used e.g., not to use strips past their expiry date.
- Frequency of testing may need to increase on a short-term basis such as during periods of illness, or whilst fasting (such as during Ramadan). Prescribing of glucose test strips should be adjusted to support any increased short-term clinical need.
- Increased frequency of testing is required during pregnancy and an appropriate quantity of test strips (glucose/ketone) should be prescribed.
- Short-term self-monitoring in patients who do not otherwise test their glucose may be useful to help understand blood glucose variations over a period of time, when escalation of treatment is being considered. It can also be useful as part of patient education.
- The quantity of test strips prescribed should match the expected need (see guidance on prescribing test strip quantities on pages 12 and 14). Both over- and under-prescribing should be avoided.

Summary of NENC ICB First Line Recommendations for Blood Glucose Meter for NHS England Patient Categories

For use in adults, children and young people who have diabetes. If any of these meters are deemed unsuitable, please select an option from the NHS England Commissioning Recommendations for blood glucose and ketone meters, testing strips and lancets (April 2023)

Category	Meter Name	Compatible Test Strips and Price (August 2023)	Lancets
Blood glucose monitoring only 1st Line (Type 2 diabetes)	GlucoRx Q meter	GlucoRx Q test strips £5.45 x 50	GlucoRx 30G £4.50 x 200
Blood glucose monitoring only 1st Line Alternative (Type 2 diabetes)	Finetest Lite Meter	Finetest Lite test strips £5.95 x 50	Greenlan 28G £3.00 x 100
Blood glucose monitoring & requiring additional functionality on meter (Type 2 diabetes)	AgaMatrix Agile Meter	AgaMatrix Agile test strips £5.99 x 50	Comfort twist 30G £2.69 x 100
Blood glucose & blood ketone monitoring (Type 1 diabetes or ketosis prone Type 2 diabetes)	A. Menarini Diagnostics GlucoFix Tech GK meter	Glucose test strips: <ul style="list-style-type: none"> • Glucofix Tech Sensor • £5.95 x 50 Ketone test strips: <ul style="list-style-type: none"> • Glucofix Tech β-Ketone Sensor • £9.95 x10 • None supplied with meter, prescribe separately 	GlucoJect Lancets Plus 0.22/33G £3.77 x 100
Blood glucose monitoring in gestational diabetes (Type 2 diabetes)	AgaMatrix WaveSense JAZZ Wireless	WaveSense JAZZ test strips £8.74 x 50	AgaMatrix Ultra-thin lancets 0.2mm/33G & 0.35mm/28G £5.43 x 200
Blood glucose monitoring in paediatrics (Type 2 diabetes)	Connect2Pharma On Call Extra Voice	On Call Extra test strips £5.20 x 50	Connect2Pharma On Call 30G £2.75 x 100

Patients on insulin pump therapy or continuous glucose monitoring should be on a dual blood glucose and ketone meter.

If there are supply issues with the recommended first line options, or they are not deemed suitable or clinically appropriate then only meters that are featured in the [NHS England recommendations](#) should be considered.

Please note all concerns about meter/strip malfunctions or errors should be reported to the MHRA via the Yellow Card Scheme (<https://yellowcard.mhra.gov.uk/medicaldevices>). They should also be reported via any local reporting systems.

Meter Specifications and Functionality (August 2023) of First Line Recommendations

Specification	Recommended Patient Cohort					
	Blood glucose monitoring only 1 st Line (Type 2 diabetes)	Blood glucose monitoring only 1 st Line Alternative Type 2 diabetes	Blood glucose monitoring only and requiring additional functionality on meter (Type 2 diabetes)	Blood glucose & blood ketone monitoring (Type 1 diabetes or ketosis prone type 2 diabetes)	Blood glucose monitoring in gestational diabetes (Type 2 diabetes)	Blood glucose monitoring in paediatrics (Type 2 diabetes)
Name of meter (manufacturer)	Glucorx Q meter (Glucorx)	Finetest Lite Meter (Neon Diagnostics)	AgaMatrix Agile meter (AgaMatrix)	Glucifix Tech GK meter (A. Menarini Diagnostics)	AgaMatrix WaveSense JAZZ Wireless (AgaMatrix)	On Call Extra Voice (Connect2Pharma)
Glucose test strips & quantity supplied with meter (expiry once open)	Glucorx Q test strips x 10 with meter	Finetest Lite test strips x 10 with meter	AgaMatrix Agile test strips x 10 with meter	Glucifix tech glucose test strips, x 10 with meter (12 months from opening)	AgaMatrix WaveSense JAZZ Wireless test strips x 25 with meter	On Call Extra test strips x 10 with meter
Lancets supplied with meter, quantity & lancing device	Glucorx lancets (30G) x 10 with meter	Greenlan lancets (28G) x 10 with meter Grey and white lancing device	Comfort Twist lancets x 10 with meter AgaMatrix lancing device	Glucosject lancets plus x 10 with meter Glucosject dual lancing device	Ultra-thin lancets 33G x 30 with meter	On Call Extra lancing device
Ketone test strips (expiry once open)	N/A	N/A	N/A	Glucifix Tech β - Ketone Sensor ketone test strips (12 months). Can be provided for type 1 diabetic patients, quantity depends on what is agreed with diabetic specialist team otherwise will need to	N/A	N/A

				be prescribed separately.		
Ability to download results	Yes <ul style="list-style-type: none"> Smart phone connectivity to free 'GlucoRx Voyager.' USB cable for free Windows software: 'GlucoRx HealthCare Management System' & 'GlucoRx Voyager.' GlucoRx meter and Voyager are integrated with (I) Apple Health app (II) 'Vision'	Yes <ul style="list-style-type: none"> Bluetooth USB Cable & Smart phone connectivity 	Yes Bluetooth	Yes QuickLink NFC Bluetooth Dedicated USB cable	Yes Bluetooth	Yes USB download capability
Supported by smart phone application ('app') as stated by manufacturer	Yes Diasend®/Glooko® and Eclipse Remote Platform (https://www.eclipselive.org)	Yes <ul style="list-style-type: none"> Glooko Mobile App Diasend Uploader Finetest Lite Ap 	Yes <ul style="list-style-type: none"> AgaMatrix diabetes manager app ALLY diabetes patient management system GDM-Health Diasend Glooko Apple Health My mHealth Social Diabetes 	Yes <ul style="list-style-type: none"> GlucoLog Lite GlucoLog Web & RapidCalc Bolus Advice App Glooko Diasend 	Yes <ul style="list-style-type: none"> AgaMatrix diabetes manager app ALLY diabetes patient management system GDM-Health Diasend Glooko Apple Health, My mHealth Social Diabetes 	Yes <ul style="list-style-type: none"> On Call Diabetes Management Software
Pregnancy	Not stated	Not stated	Yes	Yes	Yes	Not stated
Paediatrics	Not stated	Not stated	Not stated	Yes	Not stated	Yes
Visual impairments	Not stated	Not stated	Yes	Yes – extra large toplit screen	Yes	Not stated
Dexterity problems	Not stated	Not stated	Yes	Yes – wide strip, large port and ejector button	Yes	Not stated
Patient/clinician helpline, or to order supplies	info@glucorx.co.uk http://www.glucorx.co.uk/	0800 0093378 info@neondiagnosics.co.uk	0800 093 1812 customercare@agamatrx.co.uk	0800 243667 myglucomen@menarindia.com	0800 093 1812 customercare@agamatrx.co.uk	0203 307 4646 info@oncallmeters.co.uk

	01483 755133 / 0800 007 5892					
Website	https://www.glucox.co.uk/	https://www.neondiagnostics.co.uk/	https://agamatrix.co.uk/	https://glucomenday.com/newplatform/	https://agamatrix.co.uk/	https://www.oncallmeters.co.uk/

Lancets and Lancers

Each meter is supplied with a lancer and will require lancets on prescription. The required lancets / lancers are listed in the NHSE recommendations.

The recommended lancets are suitable for the majority of people and are suitable for people that require additional functionality. The higher the gauge (G) of a lancet, the smaller the diameter of the needle. A low gauge needle (28G) may be quite uncomfortable for the patient while a higher gauge (33G) may not provide sufficient blood for testing. Generally, 30G lancets are suitable for most patients. Lancets are designed to fit into proprietary finger-pricking devices but from local experience most appear to be a universal fit for all.

Finger pricking devices are not prescribable but are supplied with the blood glucose monitoring meter. Lancets are for single use only; ensure patients are educated about safe disposal via a sharps bin.

Lancers are not available on prescription. Replacement lancers are available from the manufacturers of the meter (usually free of charge) and are not prescribable as they are not listed as appliances under Part IXA of the Drug Tariff.

Safety lancets are designed so that the sharp retracts after use. These are primarily for the benefit of healthcare workers to avoid needle stick injury and should not be used by patients self-monitoring blood glucose. They should not routinely be prescribed by GPs on prescription.

Lancets are for single use only; patients should be provided with suitable containers for the collection of used lancets. Arrangements should be available for the suitable disposal of these containers.

Lancets for self-use must not be used by healthcare workers to take samples from more than one patient.

Multi-device lancets, which contain a pre-loaded drum, can be used for patients with specific clinical needs e.g. those with dexterity problems, needle phobia or visual impairment. Accu-Chek Fastclix lancets are currently recommended across North East and North Cumbria where a multi-device lancet containing a pre-loaded drum is required.

Testing Strips and Lancets Quantity Guide

Patients	Quantities / Packs		Quantities shown are based on typical testing routines. Individual requirements will vary & depend on recommended testing frequency. Expiry dates should be taken into consideration. Both strips and lancets are for single use and equal quantities should be needed/provided. Continuation and frequency of use should be evaluated at each diabetes review. Consider issuing as acute or automatic rather than as repeat prescriptions.
	Testing Strips (packs of 50)	Lancets (packs of 100)	
Type 1 diabetes & Type 2 diabetes treated with intensive insulin therapy	2-3 packs every month	1 to 1½ packs every month	
Type 2 diabetes treated with basal or pre-mixed insulin	1 pack every month initially	1 every two months	
Type 2 diabetes at risk of hypoglycaemia due to insulin secretagogues	1 pack every three months	1 pack every six months	

Pen Needles

NHS England published guidance in 2019, recommending that any insulin pen needles that cost >£5 per 100 should be switched to a more cost-effective insulin pen needle. The guidance also stated that any prescribers should not initiate any new patients on insulin pen needles that cost >£5 per 100.

The [Forum for Injection Technique \(FIT\) UK](#) considers the 4mm needle to be the safest pen needle for adults and children regardless of age, gender and body mass index (BMI). Using needles of a shorter length (6mm or less) helps to prevent the inadvertent IM injection of insulin.

Most pens are compatible with most needles. The recommended first line choice for pen needles is **GlucorX Care Point Needles** which are available at a cost of £2.75 for 100 needles (as per NHSBSA Electronic Drug Tariff August 2023). The [GlucorX Care Point compatibility chart](#) provides a list of insulin pens that the needles are compatible with. Please note this is not an exhaustive list.

The above preferred cost-effective pen needles are recommended for use in North East and North Cumbria, and they are expected to be suitable for most patients. However, it is recognised that some patients may have individual needs and alternative non-preferred pen needles may need to be considered in exceptional circumstances. e.g., if a patient is not able to use the above brands/have shown difficulties with them.

i-Port Advance™ injection port:

4mm needles should not be prescribed to patients with the i-Port Advance™ injection port. These patients will require needles that are 5mm in length. Please ensure the most cost-effective needles are prescribed.

When diabetes specialists initiate alternative pen needles to meet specific patient needs, they should inform the GP of this to support ongoing prescribing of consumables.

Safety Needles:

Safety needles should not be used routinely.

They should only be provided for patients who have:

- their insulin administered by district nurses or by school staff
- dexterity issues
- visual impairment or tremor
- needle phobia
- their insulin administered by relatives and informal carers only if there is risk of disease transmission and the relative/carer is not working for any health and social care sector.

Additional Information:

When prescribing sharps please ensure patients have a sharps bin (Example Sharpsafe yellow 1 litre) and are aware of the importance of disposing of needles appropriately.

Ketones: self-monitoring guidance and strip quantities to prescribe

Self-monitoring guidance

Ketone monitoring should be taught as part of 'sick-day rules' to facilitate self-management of an episode of hyperglycaemia (see Primary Care Sick Day Information for Adult patients with diabetes). Advise patients with type 1 diabetes to check their ketones if they are feeling unwell or present with symptoms of hyperglycaemia (see NICE NG17 for adults and NG18 for children and young people):

- Adults can measure ketones in either blood or urine. Current best practice is to measure blood ketones
- Children, young people, and pregnant women should measure blood ketones (offer appropriate meter)

Be aware that people taking an SGLT2i, and children and young people taking insulin for diabetes may develop DKA with normal blood glucose levels.

Remind patients not to use strips after their expiry date, which may be reduced once the pack is opened. Quantities prescribed should be appropriate to avoid wastage (see guidance below). If large quantities are being requested, review diabetes control and discuss appropriate use with patient. Teach patients to interpret blood ketone results as follows:

Green	<0.6mmol/l	Normal levels
Amber	0.6 – 1.5 mmol/l	Slightly increased risk of Diabetic Ketoacidosis (DKA), extra insulin is needed. Follow advice from diabetes healthcare team and test ketones again in 1-2 hours
Red	1.6 – 2.9 mmol/l	Increased risk of DKA – contact your diabetes team or GP as soon as possible

****WARNING: Blood ketones ≥ 3.0 (or urine ketone of 2+ or greater) should be treated as a medical emergency due to the very high risk of DKA - get medical help immediately****

Ref: NHS Choices - Diabetic Ketoacidosis www.nhs.uk/conditions/diabetic-ketoacidosis

Blood Ketone Testing Strips: Quantity Guide

Diabetes Type	Treatment Group	Medication	Testing Frequency	Rationale	Prescription requirements (as advised by specialists)
Type 1 diabetes	Adults Children & young people Pregnancy	Insulin	During periods of illness or hyperglycaemia	<ul style="list-style-type: none"> • Ketone testing is required to facilitate self-management. • Adults can monitor blood or urine ketones. • Children/young people and pregnant women should only measure blood ketones, using the appropriate meter. 	Minimum of 1 box of 10 strips, as needed. (Note reduced shelf life once box opened)
Type 2 diabetes	People at high risk of recurrent diabetic ketoacidosis (DKA) as identified by the diabetes specialist service		During periods of illness or hyperglycaemia following specialist recommendations only	<ul style="list-style-type: none"> • Recurrent DKA may warrant home ketone monitoring. • Do not issue ketone strips solely for use by patients prescribed an SGLT-2 inhibitor, but if a patient on one of these agents presents unwell, their blood ketone levels should be checked even if blood glucose levels are in the normal range. 	Not required routinely.

Note - ketone testing for paediatric patients can be more frequent in the initial period following diagnosis whilst optimising insulin treatment and glucose control. Ensure patients are prescribed an appropriate supply of ketone test strips. Use of ketone strips during pregnancy may also be high.

Useful Resources

Diabetes Care in the UK, FIT Forum for Injection Technique UK. The UK Injection and Infusion Technique Recommendations. 4th Edition.

http://www.fit4diabetes.com/files/4514/7946/3482/FIT_UK_Recommendations_4th_Edition.pdf

NHS England Commissioning recommendations following the national assessment of blood glucose and ketone meters, testing strips and lancets

<https://www.england.nhs.uk/publication/commissioning-recommendations-blood-glucose-and-ketone-meters-testing-strips-and-lancets/>

NICE guideline [NG17]. Type 1 diabetes in adults: diagnosis and management

<https://www.nice.org.uk/guidance/ng17>

NICE guidelines [NG18]. Diabetes (type 1 and type 2) in children and young people: diagnosis and management

<https://www.nice.org.uk/guidance/ng18>

NICE guideline [NG28]. Type 2 diabetes in adults: management

<https://www.nice.org.uk/guidance/ng28>