

Capillary blood glucose monitoring

Self-monitoring of capillary blood glucose (finger prick testing) is essential for people with diabetes on insulin therapy and can be beneficial for some people on other hypoglycaemic agents. Where capillary blood glucose monitoring is not serving a specific purpose in the management of the condition however, it may have a negative impact on the person's quality of life and lead to unnecessary use of resources (see clinical effectiveness section).

Medicines optimisation projects in this area are aimed at either reviewing the continued need for capillary blood glucose monitoring, reviewing the quantities of blood glucose testing strips (BGTS) prescribed or switching to an alternative test strip with lower acquisition cost which are in-line with NHS England [commissioning recommendations](#).¹

This bulletin reviews the place in therapy of capillary blood glucose monitoring and offers guidance and support materials for organisations considering the review of BGTS. The [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) has more information on continuous glucose monitoring (CGM).

In England, Wales, Northern Ireland, Isle of Man and Scotland, £98.8 million is spent annually on the prescribing of blood glucose and blood ketone testing strips, of which £46.7 million is for products not included in the NHS England commissioning recommendations (NHSBSA Oct-Dec 2024 and Public Health Scotland Oct-Dec 2024).

Recommendations

- If an adult, child or young person cannot use or does not want CGM where it is indicated, offer capillary blood glucose monitoring.
- Ensure the prescribing of BGTS is in line with [NICE guideline \[NG17\]](#) for adults with type 1 diabetes using capillary blood glucose monitoring (and not using CGM):
 - » Routine monitoring of capillary blood glucose at least four times a day including before meals and before bed.
 - » Support more frequent monitoring in appropriate individuals.
 - » Teach self-monitoring skills and assess these at least annually.
 - » Ensure people can interpret the results from capillary blood glucose monitoring and know what action to take.
- People who are using CGM will still need to take capillary blood glucose measurements, although they can do this less often. The quantity of BGTS prescribed should generally not exceed one box of 50 strips per quarter, although there may be exceptions to this (e.g. due to Driver and Vehicle Licensing Agency (DVLA) requirements).
- Do not routinely offer capillary blood glucose monitoring for adults with type 2 diabetes in line with [NICE guideline \[NG28\]](#) unless:
 - » The person is prescribed insulin **or**
 - » There is evidence of hypoglycaemic episodes **or**
 - » The person is prescribed an 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.

Recommendations

- Take the [DVLA's Assessing fitness to drive: a guide for medical professionals](#) into account when offering self-monitoring of capillary blood glucose levels for adults with type 2 diabetes. Use SNOMED code 236320001 - vehicle driver (occupation) to identify bus, coach, train and HGV drivers.
- For adults with type 2 diabetes, review current prescribing of BGTS in partnership with the person and evaluate the need for self-monitoring on an individual basis; where there is no need for capillary blood glucose monitoring, deprescribe.
- Determine the appropriate frequency for testing and make necessary adjustments to the quantity of test strips prescribed.
- Remove BGTS from repeat prescriptions for people who only need to test intermittently, as these should be prescribed on an acute prescription or variable use repeat when required. Inform and explain to the person the reason for this change and how they order BGTS if needed. If acute requests are excessive refer to practice nurse or specialist diabetes nurse for individual review in partnership with the person.
- Offer blood glucose meters for self-monitoring to women with diabetes who are planning a pregnancy in line with [NICE guideline \[NG3\]](#).
- Teach women with gestational diabetes how to self-monitor their blood glucose. Use the same capillary plasma glucose target levels for women with gestational diabetes as for women with pre-existing diabetes.
- Advise children and young people with type 1 diabetes who are using capillary blood glucose monitoring (and their families or carers) to routinely perform at least five capillary blood glucose tests per day although more frequent testing is often needed (for example, with physical activity and during intercurrent illness).
- NICE guidance now recommends that children and young people with type 2 diabetes should be offered equipment for capillary blood glucose monitoring at diagnosis. The child or young person should be under the care of a specialist paediatric diabetes team, who may have provided this equipment and appropriate training, but this should be confirmed by the primary care practitioner.
- Integrated Care Boards (ICBs) should develop local formularies across primary and secondary care based on NHS England [commissioning recommendations](#).
- Implement a person-centred switch program to the preferred meter and test strip in-line with NHS England commissioning recommendations.
- Commence new people requiring BGTS on a preferred meter and test strip in-line with NHS England commissioning recommendations. Tailor test strip choice to individual needs.
- Health Boards in Wales, Scotland and Northern Ireland should consider the NHS England commissioning recommendations to help produce a preferred list of BGTS and meters to be used locally.

Background

Data from Diabetes UK:²

- Estimates that more than 5.8 million people in the United Kingdom live with diabetes.
- 1.3 million people could be living with diabetes who are yet to be diagnosed.
- Approximately 90% of people with diabetes have type 2, around 8% have type 1 and 2% have other forms of diabetes.

Statistics from NHS Business Services Authority state that in England:³

- There were 71 million items prescribed for treating diabetes during 2023/24, at a cost of £1.67 billion.
- This is 15% of the total spend on all prescription items prescribed in England.
- From 2022/23 to 2023/24 the prescribing of diabetic diagnostic and monitoring agents decreased by 5%, but glucose interstitial fluid detection sensor items increased by 41%.

Diabetic diagnostic and monitoring agents include blood glucose testing reagents, blood ketone testing reagents and urine testing reagents.⁴ There are different types of blood glucose testing:

- HbA1c – this is a blood test that is conducted approximately every three to six months. This test gives an indication of the average blood glucose levels over the previous two to three months.⁵
- Self-monitoring of capillary blood glucose – a drop of blood from a finger prick is placed on a test strip, the blood glucose level is measured quickly using a glucose meter machine.^{4,5}
- Continuous glucose monitoring (CGM) includes both real-time (rtCGM) and intermittently scanned (isCGM, commonly referred to as ‘flash’) monitoring.⁶ CGM uses glucose interstitial fluid detection sensors, that allow for real time testing of glucose levels without finger pricks or test strips. As readings from interstitial fluid can lag behind blood glucose by up to 15 minutes, CGM does not entirely replace the need for other diabetic monitoring.³ This bulletin focuses on capillary blood glucose monitoring. For more information on CGM please see the [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#)

Capillary blood glucose monitoring is considered an effective tool for the management of diabetes, especially for those who require insulin treatment. It gives regular feedback for the person; however, decisions on both the method and frequency of testing need to be made on an individual basis. Self-monitoring is only useful if it is used to inform decisions (e.g. adjusting tablets or insulin dosage).⁷

National guidance

A number of UK guidelines address glucose monitoring in diabetes management, including the following:

Type 1 diabetes in adults

[NICE guideline \[NG17\] - Type 1 diabetes in adults: diagnosis and management](#)

Type 1 diabetes is treated by insulin replacement, supported by active management of other cardiovascular risk factors, such as hypertension and high circulating lipids. Modern insulin replacement therapy aims to recreate normal fluctuations in circulating insulin concentrations. Flexible insulin therapy usually involves self-injecting multiple daily doses of insulin, with doses adjusted based on taken or planned exercise, intended food intake and other factors, including current blood glucose, which the insulin user needs to test on a regular basis. The NICE guideline [NG17] recommendations include:⁶

- Teach self-monitoring skills at the time of diagnosis and the start of insulin therapy.
- Offer adults with type 1 diabetes a choice of rtCGM or isCGM, based on their individual preferences, needs, characteristics, and the functionality of the devices available. See the [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) for more information.
- If a person cannot use or does not want rtCGM or isCGM, offer capillary blood glucose monitoring.
- When choosing blood glucose meters:
 - » Take the needs of the adult with type 1 diabetes into account
 - » Ensure that meters meet current ISO standards.⁶

Note that NHS England commissioning recommendations state that, as a minimum, all recommended devices are compliant with the ISO Standard ISO 15197:2015, measure in mmol/litre and provide plasma-calibrated meter readings only.¹

- Teach adults with type 1 diabetes how to measure their blood glucose level, interpret the results and take appropriate action. Review these skills at least annually.
- Support adults with type 1 diabetes who are using capillary blood glucose monitoring to measure at least four times a day, and up to ten times a day:
 - » If their target for blood glucose control, measured by HbA1c level, is not reached
 - » If they are having more frequent hypoglycaemic episodes
 - » If there is a legal requirement to do so, such as before driving (see the [Driver and Vehicle Licensing Agency \[DVLA\] guide for medical professionals](#))
 - » During periods of illness
 - » Before, during and after sport
 - » When planning pregnancy, during pregnancy and while breastfeeding (see [NICE's guideline on diabetes in pregnancy](#))
 - » If they need to know their blood glucose levels more than four times a day for other reasons (for example, impaired hypoglycaemia awareness, or they are undertaking high-risk activities).
- Enable additional blood glucose measurement (more than ten times a day) for adults with type 1 diabetes who are using capillary blood glucose monitoring if this is necessary because of:
 - » The person's lifestyle (for example, they drive for long periods of time, they undertake high-risk activities or have a high-risk occupation, or they are travelling) or
 - » Impaired hypoglycaemia awareness.
- Advise adults with type 1 diabetes to aim for:
 - » A fasting plasma glucose level of 5 to 7mmol/litre on waking **and**
 - » A plasma glucose level of 4 to 7mmol/litre before meals at other times of the day.
- Advise adults with type 1 diabetes who choose to measure after meals to aim for a plasma glucose level of 5 to 9mmol/litre at least 90 minutes after eating (this timing may be different in pregnancy – for guidance on plasma glucose targets in pregnancy, see [NICE's guideline on diabetes in pregnancy](#)).
- Agree bedtime target plasma glucose levels with each adult with type 1 diabetes. Take into account the timing of their last meal of the day and the related insulin dose, and ensure the target is consistent with the recommended fasting level on waking.
- Consider ketone monitoring (blood or urine) as part of 'sick-day rules' for adults with type 1 diabetes, to facilitate self-management of an episode of hyperglycaemia.⁶

[SIGN guideline 170 - Optimising glycaemic control in people with type 1 diabetes](#)

Scotland fares poorly in regards to optimal glycaemic control, compared with other developed countries, with only 25% of people with type 1 diabetes achieving optimal glycaemic control with significant regional variations across NHS boards. This toolkit recommends:⁸

- Structured education programmes for people with type 1 diabetes (including carers and family members) should include self-monitoring of blood glucose.
- People who can achieve the desired glycaemic targets using finger prick testing, flash glucose monitoring or continuous glucose monitoring plus multiple daily insulin injections, or flash glucose monitoring plus an insulin pump, should be supported to remain on their current diabetes care plan subject to their circumstances and quality of life.
- See the [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) for more information on CGM.

Type 2 diabetes in adults

[NICE guideline \[NG28\] - Type 2 diabetes in adults: management](#)

The NICE guideline for adults (aged 18 and over) with type 2 diabetes recommends:⁹

- Do not routinely offer self-monitoring of capillary blood glucose levels for adults with type 2 diabetes unless:
 - » The person is prescribed insulin **or**
 - » There is evidence of hypoglycaemic episodes **or**
 - » The person is prescribed an 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, see the [NICE guideline on diabetes in pregnancy](#).
- Take the [Driver and Vehicle Licensing Agency \(DVLA\)'s Assessing fitness to drive: a guide for medical professionals](#) into account when offering self-monitoring of capillary blood glucose levels for adults with type 2 diabetes.
- Consider short-term self-monitoring of capillary blood glucose levels in adults with type 2 diabetes, reviewing treatment as necessary:
 - » When starting treatment with oral or intravenous corticosteroids **or**
 - » To confirm suspected hypoglycaemia.
- If adults with type 2 diabetes are self-monitoring their capillary 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
 - » 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.

NICE recommends CGM in certain groups of people with type 2 diabetes. See [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) for more information.

The [Scottish Intercollegiate Guidelines Network \(SIGN\) clinical guideline 154](#) focuses on pharmacological management of glycaemic control in people with type 2 diabetes, however lifestyle interventions, including blood glucose monitoring and other behaviours vital to self-management in people with type 2 diabetes, are outside the remit of this guideline.¹⁰ [SIGN guideline 116 Management of Diabetes](#) recommends that capillary blood glucose monitoring may be considered in the following groups of people with type 2 diabetes who are not using insulin:¹¹

- Those at increased risk of hypoglycaemia
- Those experiencing acute illness
- Those undergoing significant changes in pharmacotherapy or fasting, for example, during Ramadan
- Those with unstable or poor glycaemic control (HbA1c > 8.0% (64mmol/mol))
- Those who are pregnant or planning pregnancy.

[SIGN guideline 172 on Prevention and remission of type 2 diabetes](#) was published in March 2025.

Diabetes in pregnancy

CGM is recommended in certain groups of pregnant women.^{12,13} See [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) for more information on the use of CGM in pregnancy.

[NICE guideline \[NG3\] - Diabetes in pregnancy: management from preconception to the postnatal period](#)

NG3 covers managing diabetes and its complications in women who are planning pregnancy or are already pregnant. It aims to improve the diagnosis of gestational diabetes and help women with diabetes to self-manage their blood glucose levels before and during pregnancy.

Preconception and planning for women with diabetes¹²

- Offer up to monthly measurement of HbA1c levels for women with diabetes who are planning a pregnancy.
- Offer blood glucose meters for self-monitoring to women with diabetes who are planning a pregnancy.
- If a woman who is planning a pregnancy needs to intensify blood glucose-lowering therapy, advise her to monitor her blood glucose more often, to include fasting levels and a mixture of pre-meal and post-meal levels.
- Offer blood ketone testing strips and a meter to women with type 1 diabetes who are planning a pregnancy and advise them to test for ketonaemia if they become hyperglycaemic or unwell.
- Agree individualised targets for self-monitoring of blood glucose with women who have diabetes and are planning a pregnancy, taking into account the risk of hypoglycaemia.
- Advise women with type 1 diabetes who are planning a pregnancy to aim for the normal capillary plasma glucose target ranges:
 - » A fasting plasma glucose level of 5mmol/litre to 7mmol/litre on waking **and**
 - » A plasma glucose level of 4mmol/litre to 7mmol/litre before meals at other times of the day.

Gestational diabetes¹²

- For women who have had gestational diabetes in a previous pregnancy, offer:
 - » Early self-monitoring of blood glucose **or**
 - » A 75-g 2-hour oral glucose tolerance test (OGTT) as soon as possible after booking (whether in the first or second trimester), and a further 75-g 2-hour OGTT at 24 to 28 weeks if the results of the first OGTT are normal.
- Teach women with gestational diabetes how to self-monitor their blood glucose.
- Use the same capillary plasma glucose target levels for women with gestational diabetes as for women with pre-existing diabetes.

Antenatal care for women with diabetes¹²

- Advise pregnant women with type 1 diabetes to test their fasting, pre-meal, 1-hour post-meal and bedtime blood glucose levels daily.
- Advise pregnant women with type 2 diabetes or gestational diabetes who are on a multiple daily insulin injection regimen to test their fasting, pre-meal, 1-hour post-meal and bedtime blood glucose levels daily.
- Advise pregnant women with type 2 diabetes or gestational diabetes to test their fasting and 1-hour post-meal blood glucose levels daily if they are:
 - » Managing their diabetes with diet and exercise changes alone **or**
 - » Taking oral therapy (with or without diet and exercise changes) or single-dose intermediate-acting or long-acting insulin.
- Agree individualised targets for self-monitoring of blood glucose with pregnant women with diabetes, taking into account the risk of hypoglycaemia.

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- Advise pregnant women with any form of diabetes to maintain their capillary plasma glucose below the following target levels, if achievable without causing problematic hypoglycaemia:
 - » Fasting: 5.3mmol/litre
and
 - » One hour after meals: 7.8mmol/litre **or**
 - » Two hours after meals: 6.4mmol/litre.
- Advise pregnant women with diabetes who are taking insulin to maintain their capillary plasma glucose level above 4mmol/litre.

[SIGN guideline 171 - Management of diabetes in pregnancy](#)

This guideline recommends:¹³

- Women with type 1 diabetes or type 2 diabetes planning a pregnancy should aim for an HbA1c as low as possible without excessive hypoglycaemia.
- Ensure that all women with type 1 diabetes have access to CGM during pregnancy.
- Consider CGM in pregnant women with type 2 diabetes.
- In pregnant women with pre-existing diabetes, glucose levels closer to those in people without diabetes should be encouraged as this may reduce the risk of large for gestational age infants and the need for emergency Caesarean sections. Levels should be individualised and balanced with risk of hypoglycaemia.
- In pregnant women with gestational diabetes, glucose levels close to those in people without diabetes should be encouraged to help reduce Caesarean birth rates, the risk of large for gestational age infants, neonatal hypoglycaemia and pre-eclampsia. This may result in the increased use of medication and requires more intensive follow up.
- The following glucose levels are recommended for women with gestational diabetes:
 - » Fasting glucose level <5.5mmol/litre
 - » One-hour postprandial glucose level <8mmol/litre, and
 - » Two-hour postprandial glucose level <7mmol/litre
- For pregnant women with type 1 diabetes or type 2 diabetes the glucose targets for women with gestational diabetes provide general guidance.
- CGM should be used to assess overall glycaemic levels and women should aim to spend at least 70% time in range (3.5–7.8mmol/litre).

The use of CGM during pregnancy may improve maternal glycaemic levels compared with self-monitoring of blood glucose.¹³

Diabetes in children and young people

[NICE guideline \[NG18\] - Diabetes \(type 1 and type 2\) in children and young people: diagnosis and management](#)

Children and young people with type 1 diabetes

The guideline recommends:¹⁴

- Offer children and young people with type 1 diabetes and their families or carers a continuing programme of education from diagnosis, including the following core topics:
 - » Blood glucose monitoring, including blood glucose and HbA1c targets
 - » Managing intercurrent illness ('sick-day rules', including monitoring of blood ketones)
 - » Detecting and managing hypoglycaemia, hyperglycaemia and ketosis.
- Measure HbA1c level four times a year in children and young people with type 1 diabetes. Think about more frequent testing if they are having difficulty with blood glucose management.

- Agree an individualised lowest achievable HbA1c target with each child or young person with type 1 diabetes and their families or carers. Take into account factors such as their daily activities, individual life goals, complications, comorbidities and the risk of hypoglycaemia.
- Explain to children and young people with type 1 diabetes and their families or carers that the optimal target ranges for short-term plasma glucose management are:
 - » Fasting plasma glucose level of 4mmol/litre to 7mmol/litre on waking
 - » A plasma glucose level of 4mmol/litre to 7mmol/litre before meals at other times of the day
 - » A plasma glucose level of 5mmol/litre to 9mmol/litre after meals
 - » A plasma glucose level of at least 5mmol/litre when driving (see the [Driver and Vehicle Licensing Agency \[DVLA\] guidance for people with diabetes for further details about driving](#)).
- Offer rtCGM to all children and young people with type 1 diabetes, alongside education to support children and young people and their families and carers to use it. See [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) for more information on the use of CGM in children and young people.
- If a person cannot use or does not want rtCGM or isCGM, offer capillary blood glucose monitoring.
- Advise children and young people with type 1 diabetes who are using capillary blood glucose monitoring (and their families or carers) to routinely perform at least five capillary blood glucose tests per day.
- Advise children and young people with type 1 diabetes who are using capillary blood glucose monitoring (and their families or carers) that more frequent testing is often needed (for example, with physical activity and during intercurrent illness). Ensure they have enough test strips for this.
- Offer children and young people with type 1 diabetes who are using capillary blood glucose monitoring (and their families or carers) a choice of equipment for monitoring, so they can optimise their blood glucose management in response to changes in their insulin, diet and exercise.
- Offer children and young people with type 1 diabetes blood ketone testing strips and a meter. Advise them and their families or carers to test for ketonaemia if they are ill or have hyperglycaemia.

Children and young people with type 2 diabetes¹⁴

- Offer children and young people with type 2 diabetes and their families or carers a continuing programme of education from diagnosis. Include the following core topics:
 - » The importance of managing glucose levels, including achieving and maintaining glucose and HbA1c targets
 - » How and when to take capillary blood glucose measurements (self-monitoring).
- Measure HbA1c levels every three months in children and young people with type 2 diabetes.
- Explain to children and young people with type 2 diabetes and their families or carers that an HbA1c target level of 48mmol/mol (6.5%) or lower will minimise their risk of long-term complications.
- Support children and young people with type 2 diabetes and their families or carers to safely achieve and maintain their individual agreed HbA1c target level.
- At diagnosis, offer children and young people with type 2 diabetes equipment for capillary blood glucose monitoring.
- Four weeks after diagnosing type 2 diabetes and starting metformin in a child or young person, review data from glucose monitoring and, if needed, change treatment.
- Review treatment for children and young people with type 2 diabetes, as needed, at least every three months. Assess glucose trends using available data from glucose monitoring and HbA1c measurements.

- Adjust the frequency of capillary blood glucose monitoring based on the person's treatment and whether they are using CGM. Ensure they have enough test strips for capillary blood glucose monitoring.
- NICE recommends CGM in certain groups of children and young people with type 2 diabetes.¹⁴ See [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) for more information.

Note that all children and young people with suspected type 2 diabetes should be referred to a multidisciplinary paediatric diabetes team for specialist review to confirm the diagnosis, and to provide immediate and continuing care.¹⁴ Initial equipment and training for capillary blood glucose monitoring may therefore be provided by the specialist team, but this should be confirmed by the primary care practitioner.

The NICE committee agreed that, for children and young people with type 2 diabetes, it is important to:¹⁴

- Achieve an HbA1c level of 48mmol/mol (6.5%) or lower as early as possible in the treatment pathway to avoid later complications (such as cardiovascular, kidney and liver disease) and
- Avoid staying on the same treatment for too long without reassessing its effectiveness.

As a result, they also agreed that current guidance to measure HbA1c levels every three months should be retained but supplemented with new recommendations, to make provision for an initial visit earlier than three months after diagnosis and for the use of data from capillary blood glucose monitoring or CGM. This is because combining HbA1c and glucose monitoring data will allow seeing trends quicker than changes in HbA1c levels alone.¹⁴

The committee agreed, using their knowledge and experience, that a first visit to review glucose data should take place after four weeks of metformin monotherapy. A period of four weeks was agreed because:¹⁴

- At least four weeks of glucose monitoring data is needed to assess whether glucose levels are improving or whether treatment needs to be escalated
- Although current guidance is for the first clinical visit to take place three months after diagnosis, in practice, this occurs earlier because newly diagnosed children and young people with type 2 diabetes often need more support than those whose glucose levels have already stabilised
- For children and young people with type 2 diabetes who are also on insulin therapy, safely reducing and stopping insulin typically takes two to six weeks, so a review of additional CGM data at four weeks will help.

When a young person transitions from paediatric to adult care it is important to:¹⁴

- Give young people with diabetes enough time to understand how transition from paediatric to adult services will work, because this improves clinic attendance.
- Agree specific local protocols for transferring young people with diabetes from paediatric to adult services.
- Base the decision on when a young person should transfer to the adult service on their physical development and emotional maturity, and on local circumstances.
- Ensure that transition from the paediatric service occurs at a time of relative stability in the young person's health, and that it is coordinated with other life transitions.
- Explain to young people with type 1 diabetes who are preparing for transition to adult services that some aspects of diabetes care will change.

Young people with type 2 diabetes should be under the care of a specialist team and should be reviewed on an individual basis as they transition to adult services. Differences between the guidance for adults and the guidance for children and young people, for example in who is eligible for CGM or capillary blood glucose monitoring, should not result in young adults having access to CGM sensors or BGTS stopped on the basis of their age.

NHS England commissioning recommendations

NHS England published [commissioning recommendations](#) (updated in November 2024) as a result of a clinically led national assessment of blood glucose and ketone meters, testing strips and lancets. This was undertaken to better understand the products available and how they meet the needs of all people living with diabetes. The intent of the national assessment process was to also support the delivery of the NHS Long-Term Plan for diabetes management through the following key objectives:¹

- a. Equitable access to the same products for all eligible people, no matter where they live;
- b. Minimum quality standards established in a fair and transparent way to better address the needs of all people living with diabetes;
- c. Prescribing practices aligned across primary and secondary care; and
- d. Making best use of NHS resources, whilst ensuring that the price paid is commensurate to the quality offered.

The commissioning recommendations have separated blood glucose and ketone meters, strips, and lancets into the categories shown in table 1:¹

Table 1. NHS England commissioning recommendations types of meters and devices¹

Patient cohort	Cohort description	Category*	Meter examples
Type 2 diabetes	Meters and strips which are suitable for the majority of people with Type 2 diabetes that require a blood glucose testing meter.	2	- On Call Extra Mobile - Finetest Lite - GlucRx Q - CareSens S Fit BT - GlucoFix Tech GK - Contour Plus Blue - TRUE Metrix Air - Agile
Type 2 diabetes (additional functionality)#	Meters and strips which are suitable for people with Type 2 diabetes that require a blood glucose testing meter with additional functionality.	3	- On Call Extra - On Call Extra Voice - Agile - WaveSense JAZZ WIRELESS - WaveSense JAZZ - Nexus Blue

Patient cohort	Cohort description	Category*	Meter examples
Type 1 diabetes or ketosis prone type 2 diabetes	Meters and strips which are suitable for the majority of people that require a blood glucose and ketone testing meter.	1a	- KEYA Smart (Measures glucose and ketones during every test) - GlucoFix Tech GK 4SURE SmartDuo - GlucoRx HCT - CareSens Dual
Type 1 diabetes or ketosis prone type 2 diabetes (additional functionality)#	Meters and strips which are suitable for people that require a blood glucose and ketone testing meter with additional functionality.	1b	- GlucoFix Tech GK 4SURE Smart Duo
Type 1 and type 2 diabetes	Lancets suitable for people with type 1 and type 2 diabetes including people who require additional functionality.	4	See NHS England commissioning recommendations document for details
*Category used in previous recommendations #Additional functionality includes features such as; on-board carbohydrate counting calculator, large display for visual impairment, and extra memory for Group 2 drivers.			

[The All Wales Medicines Strategy Group paper - Items Identified as Low Value for Prescribing in NHS Wales](#) encourages health boards and prescribers to consider more cost-effective BGTS. The recommendations are:¹⁵

In patients with type 2 diabetes:

- Advise health boards that prescribers in primary care should not initiate blood glucose testing strips that cost greater than £10 for 50 strips for any new initiation.
- Advise health boards to support prescribers in deprescribing blood glucose testing strips that cost greater than £10 for 50 strips and where appropriate, ensure the availability of relevant services to facilitate this change.

Patient exemptions: Those with type 2 diabetes who have been trained in carbohydrate counting and utilise an appropriate carbohydrate counting meter.

In Scotland the guidance [Achieving value and sustainability in prescribing](#) was published in December 2024. It aims to promote the effective use of medicines and minimise unwarranted variation in prescribing practice across NHS Scotland. This includes ensuring the best value in the choice of blood glucose monitoring strips. Recommendations are:¹⁶

- Blood glucose monitoring strips (costing more than £10 for 50 strips)
 - » Do not initiate strips that cost over £10 for 50 strips.
 - » Deprescribe or change in individuals currently prescribed.
 - » Prescribe only if no other item or intervention is clinically appropriate or available.

In the NHS England commissioning recommendations, the blood glucose test strips are under £10 for 50, but the majority of the recommended strips are under £6 for 50.¹ Health Boards in Wales, Scotland and Northern Ireland should consider the NHS England commissioning recommendations to help produce a preferred list of BGTS and meters to be used locally.

Clinical effectiveness

Self-monitoring of capillary blood glucose in adults with type 2 diabetes that are not on insulin

A Health Technology Assessment (HTA) systematic review of capillary blood glucose monitoring in type 2 diabetes identified 30 randomised controlled trials (RCTs), although few were of high quality. Ten of the trials comparing capillary blood glucose monitoring with no capillary blood glucose monitoring resulted in a statistically significant reduction in HbA1c of 0.21%, which may not be considered clinically significant. The review concluded that evidence suggested that capillary blood glucose monitoring is of limited clinical effectiveness in improving glycaemic control in people with type 2 diabetes on oral agents, or diet alone, and is therefore unlikely to be cost-effective. Capillary blood glucose monitoring may lead to improved glycaemic control only in the context of appropriate education - both for people with diabetes and health-care professionals - on how to respond to the data, in terms of lifestyle and treatment adjustment. Also, capillary blood glucose monitoring may be more effective if people are able to self-adjust drug treatment. Few studies examined quality of life, but two reported a net adverse effect on anxiety and/or depression. Further research is required on the type of education and feedback that are most helpful, characteristics of people benefiting most from capillary blood glucose monitoring, optimal timing and frequency of capillary blood glucose monitoring, and the circumstances under which capillary blood glucose monitoring causes anxiety and/or depression.¹⁷

A Cochrane review in 2012 looked at capillary blood glucose monitoring in people with type 2 diabetes mellitus who are not using insulin. Twelve RCTs were included and evaluated outcomes in 3,259 randomised people. The review concluded that when diabetes duration is over one year, the overall effect of capillary blood glucose monitoring on glycaemic control in people with type 2 diabetes who are not using insulin is small up to six months after initiation and subsides after 12 months. There was no evidence that capillary blood glucose monitoring affects satisfaction, general well-being or general health-related quality of life. More research is needed to explore the psychological impact of capillary blood glucose monitoring and its impact on diabetes specific quality of life and well-being, as well as the impact of capillary blood glucose monitoring on hypoglycaemia and diabetic complications.¹⁸

A systematic review and meta-analysis in 2018 identified 24 recent RCTs involving 5,454 people with type 2 diabetes.¹⁹ This study considered an additional 12 trials compared with a 2012 Cochrane review and arrives at broadly the same conclusion, it found:

- At three months, HbA1c was 0.31% lower (95% confidence interval [CI]: -0.57 to -0.05) in the self-monitoring group compared with the control group. This is just below the 0.4% threshold considered to be a meaningful clinical difference. The meta-analysis included 11 studies (2,558 people) with highly variable results giving less confidence in the pooled estimate.
- A similar difference was maintained at six months: HbA1c 0.34% lower (95% CI -0.52 to -0.17) in the self-monitoring group. This meta-analysis included 19 studies (4,338 people), again with mixed results.
- After 12 months, there was no difference between the self-monitoring and control groups (HbA1c -0.10%; 95% CI -0.28 to +0.08), based on 10 studies (2,427 people).
- People whose HbA1c was higher than 8% at baseline benefited more from self-monitoring. They showed 0.83% greater reduction in HbA1c at three months (95% CI -1.55 to -0.11; four studies) and -0.48% at six months (95% CI -0.77 to -0.19; 11 studies). However, they too showed no benefit after 12 months (0.01%; 95% CI -0.10 to +0.12; four studies).

There were some limitations to the evidence in terms of the diversity of the trials, different groups and monitoring regimens. But overall it supports guideline recommendations that self-monitoring is not used routinely for people with type 2 diabetes unless there is a specific reason to do so.²⁰

For clinical effectiveness of CGM see [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) for more information.

Safety

The [Driver and Vehicle Licensing Agency \(DVLA\) current medical standards of fitness to drive](#) should also be taken into account when reviewing the continued need for capillary blood glucose monitoring for adults with type 2 diabetes, and when providing BGTS for people using CGM.

Table 2. Summary of DVLA requirements with regards to self-monitoring of blood glucose²¹

	Group 1 drivers car and motorcycle	Group 2 drivers bus and lorry
Insulin treated	• Can use finger prick blood glucose testing and CGM (rtCGM and isCGM). • Users of CGM must also have finger prick glucose monitors available when driving. • If using CGM confirm blood glucose level with a finger prick blood glucose reading when: » Glucose level is 4.0mmol/litre 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. • Check glucose no more than two hours before the start of the first journey and every two hours after driving has started. • A maximum of two hours should pass between the pre-driving glucose test and the first glucose check performed after driving has started. • More frequent testing may be necessary if there is a greater risk of hypoglycaemia such as physical activity or altered meal routine.	• Must continue to use finger prick testing for the purposes of driving. • CGM (rtCGM and isCGM) is not legally permitted for Group 2 driving and licensing. • Regular blood glucose testing – at least twice daily including on days when not driving. • Check glucose no more than two hours before the start of the first journey and every two hours after driving has started. • A maximum of two hours should pass between the pre-driving glucose test and the first glucose check performed after driving has started. More frequent testing may be required with any greater risk of hypoglycaemia (physical activity, altered meal routine), in which case a bus or lorry driver may be licensed if they: • Use one or more blood glucose meters with memory functions to ensure six weeks of readings whilst on insulin that will be available for assessment.
Tablets which carry a risk of inducing hypoglycaemia (including sulfonylureas and glinides)	• Should practice appropriate glucose monitoring at times relevant to driving to enable the detection of hypoglycaemia.	• Regular self-monitoring of blood glucose should take place at least twice daily and at times relevant to driving, i.e. no more than two hours before the start of the first journey and every two hours after driving has started.

Group 1 drivers receiving insulin as a temporary treatment (including gestational diabetes and post-myocardial infarction) must notify the DVLA if disabling hypoglycaemia occurs or if treatment continues for more than three months (or for gestational diabetes, continues for three months after delivery). Group 2 drivers receiving insulin as a temporary treatment must not drive and must notify the DVLA (see [DVLA guidance](#) for further information).²¹

Use SNOMED code 236320001 - vehicle driver (occupation) to identify people who drive buses, coaches, trains and HGV's who need to monitor in-line with DVLA guidance.

Patient factors

Consideration should be given to the needs of individual people or specific groups of people, such as those with type 1 diabetes, insulin-dependent diabetes or those living in care homes who have diabetes.

Patient care should be the main priority when deciding on appropriate BGTS as certain people may require meters with additional functionality. NHS England commissioning recommendations include meters for type 1 diabetes and meters with additional functionality. Meters that have additional functionality should be supplied to individuals as appropriate.

All suppliers will provide, free of charge, the recommended meters, lancing devices, and ongoing free control solutions to all healthcare settings across England in primary care, secondary care and to service users.¹

Blood glucose testing strips for people using CGM

Advise people using CGM (and the families or carers of children and young people using CGM) that they will still need to take capillary blood glucose measurements (although they can do this less often). Explain that this is because:^{6,9,14}

- They will need to use capillary blood glucose measurements to check the accuracy of their CGM device
- They will need capillary blood glucose monitoring as a back-up (for example, when their blood glucose levels are changing quickly or if the device stops working).

Provide them with enough test strips to take capillary blood glucose measurements as needed.^{6,9,14}

People who use CGM will not need the same quantity of BGTS as people who only use capillary blood glucose measurements. The expected quantities to support testing would be 1 box of 50 strips per quarter, but be aware that some people may need more (e.g. due to DVLA requirements discussed above).

Monitoring of blood glucose for people in care homes

By 2050, the number of people aged 85 years and over, will be over eight million in the UK. The number of older people living with diabetes is set to rise, with a growing population requiring care in their older age. One in four people in care homes have diabetes. [Diabetes UK](#) have many resources and tools available to improve care for people living with diabetes in care homes.²²

The recommendations relating to who should monitor their capillary blood glucose and the frequency of testing in national guidelines should be followed for care home residents and details should be included in the resident's care plan.

NICE guidelines recommend offering isCGM to adults with type 2 diabetes on multiple daily insulin injections if they have a condition or disability (including a learning disability or cognitive impairment) that means they cannot self-monitor their blood glucose by capillary blood glucose monitoring but could use an isCGM device (or have it scanned for them).⁹

Blood glucose testing for people counting carbohydrates

Some patients are taught how to carbohydrate count and require BGTS and meters with additional functions such as on-board carbohydrate counting to support this. Associated apps can provide further support such as bolus advice to calculate insulin doses for the carbohydrates contained in a meal. Selection and supply of these meters to people should be made by the specialist services such as hospital care or community diabetes nurses in-line with NHS England commissioning recommendations.¹ Wales, Northern Ireland and Scotland may wish to consider the NHS England recommendations.

Ketone testing strips

Blood ketone testing is recommended for adults, children and young people with type 1 diabetes as part of 'sick-day rules' to help with self-management of hyperglycaemia.^{6,14}

Blood ketone testing strips and a meter should also be offered to women with type 1 diabetes who are planning a pregnancy or who are pregnant. They should be advised to test for ketonaemia if they become hyperglycaemic or unwell (pregnant women should also seek urgent medical advice).¹² SIGN 171 recommends that pregnant women with type 1 diabetes check blood ketones if blood glucose level is ≥ 10 mmol/litre or during illness.¹³ People with type 2 diabetes who are prone to ketosis also need to be able to monitor their blood ketones.¹

With the exception of people with an insulin pump and people with complex diabetes under ongoing secondary care, the use of ketone strips must be carefully monitored. Ensure that quantities are rationalised to reflect intended frequency of testing.

Categories 1a and 1b in the NHS England commissioning recommendations highlight recommended meters and strips for type 1 diabetes or ketosis prone type 2 diabetes with or without additional functionality.¹

Ketone testing strips should not be prescribed on the NHS for testing associated with ketogenic diets intended for weight loss.

Costs

In England, Wales, Northern Ireland, Isle of Man and Scotland, £98.8 million is spent annually on prescribing blood glucose and blood ketone testing strips (NHSBSA Oct-Dec 2024 and Public Health Scotland Oct-Dec 2024). Table 3 below illustrates a breakdown of this spending.

Table 3. Spend on BGTS and blood ketone testing strips (BKTS)

	BGTS spend	BGTS spend per 100,000 population	BKTS spend (including KEYA Smart testing strips)	BKTS spend per 100,000 population	Total spend	Total spend per 100,000 population
England	£73,067,384	£114,691	£8,976,517	£14,090	£82,043,900	£128,782
Wales	£4,709,141	£142,547	£765,701	£23,178	£5,474,841	£165,725
Northern Ireland	£2,530,988	£122,715	£237,403	£11,510	£2,768,392	£134,225
Isle of Man	£120,876	£134,963	£21,230	£23,704	£142,106	£158,667
Scotland	£7,217,528	£119,920	£1,186,386	£19,712	£8,403,914	£139,632
Total	£87,645,916	£116,578	£11,187,237	£14,880	£98,833,153	£131,458

The [PrescQIPP cost comparison charts](#) on the PrescQIPP website are updated monthly and can support choosing the least costly testing strip suitable for individuals and also for medicine formulary inclusions. The blood glucose/ketone monitoring cost comparison chart provides cost comparisons for blood glucose and ketone testing strips available in the Drug Tariff (England, Wales, Northern Ireland and Scotland). The blood glucose testing strips are compared based on the cost for a box of 50 strips and the ketone strips are compared based on the cost for a box of 10 strips. The chart also indicates which glucose and ketone strips are included in the NHS England commissioning recommendations.

Table 4 shows the total spend on products not included in the NHS England commissioning recommendations.

Table 4. Spend on BGTS and BKTS not included in the NHSE commissioning guidance

	Spend on non-NHSE BGTS	Spend per 100,000 population on non-NHSE BGTS	Spend on non-NHSE BKTS	Spend per 100,000 population on non-NHSE BKTS	Total spend on non-NHSE BGTS and non-NHSE BKTS	Total spend per 100,000 population
England	£31,530,724	£49,493	£5,313,514	£8,340	£36,844,237	£57,833
Wales	£2,628,628	£79,569	£524,910	£15,889	£3,153,538	£95,458
Northern Ireland	£1,805,258	£87,528	£188,332	£9,131	£1,993,590	£96,659
Isle of Man	£64,704	£72,245	£16,752	£18,705	£81,457	£90,950
Scotland	£4,017,407	£66,750	£651,705	£10,828	£4,669,112	£77,578
Total	£40,046,722	£53,266	£6,695,213	£8,905	£46,741,935	£62,172

Blood glucose testing strips

There are a wide variety of blood glucose testing meters available (meters cannot be prescribed) and the Drug Tariff lists the compatible testing strips available to prescribe. The prices range from £5.20 to £16.41 per 50 strips.²³⁻²⁵

It is appropriate that prescribing formulary choices are streamlined to include only cost-effective testing strips in-line with the NHS England commissioning recommendations or with other Nations' guidance.

Table 5 shows the savings available from switching products not included in the NHS England commissioning guidance to those included, based on reaching 80% achievement. It also shows savings available from reducing inappropriate prescribing, assuming a 10% reduction in spend.

Table 5. Cost avoidance - to reach 80% prescribing of BGTS included in NHS England commissioning guidance or a 10% reduction in total spend

	12 months cost avoidance to reach 80% prescribing of BGTS included in NHS England commissioning guidance	Cost avoidance per 100,000 patients	12 months cost avoidance of 10% reduction in prescribing of BGTS by discontinuing inappropriate use	Cost avoidance per 100,000 patients
England	£9,049,318	£14,204	£7,306,738	£11,469
Wales	£754,416	£22,836	£470,914	£14,255
Northern Ireland	£518,109	£25,120	£253,099	£12,271
Isle of Man	£18,570	£20,734	£12,088	£13,496
Scotland	N/A	N/A	£401,741	£6,675
Total	£10,340,413	£13,754	£8,444,580	£11,232

People with diabetes are often offered free meters by the companies through diabetes groups and magazines. These are more often newer meters that the companies are promoting with high-cost strips and the person will then request a prescription for these strips from their GP practice. Having a preferred selection of meters obtained from the companies in practice, a preferred test strip formulary, and a clear policy to review each person for clinical appropriateness before initiating prescribing of testing strips, will ensure that this does not occur and will minimise spend on testing strips.

Ketone testing strips

There is a significant difference in cost between the ketone testing strips. The Drug Tariffs list nine ketone testing strips available to prescribe. The prices range from £8.95 to £21.94 per 10 strips with seven of the nine strips costing $\leq$ £10.00 per 10 strips.²³⁻²⁵ It is appropriate that prescribing formulary choices are streamlined to include only cost-effective testing strips in-line with the NHS England commissioning recommendations¹ or with other nations' guidance.

Table 6 shows the savings available from switching products not included in the NHS England commissioning guidance to those included, based on reaching 80% achievement. It also shows savings available from reducing inappropriate prescribing, assuming a 10% reduction in spend.

Table 6. Cost avoidance - to reach 80% prescribing of BKTS included in NHS England commissioning guidance or a 10% reduction in total spend

	12 months cost avoidance to reach 80% prescribing of BKTS included in NHS England commissioning guidance	Cost avoidance per 100,000 patients	12 months cost avoidance of 10% reduction in prescribing of BKTS by discontinuing inappropriate use	Cost avoidance per 100,000 patients
England	£1,524,978	£2,394	£897,652	£1,409
Wales	£150,649	£4,560	£76,570	£2,318
Northern Ireland	£54,051	£2,621	£23,740	£1,151
Isle of Man	£4,808	£5,368	£2,123	£2,370
Scotland	N/A	N/A	£65,170	£1,083
Total	£1,734,487	£2,307	£1,065,256	£1,417

Joint blood glucose and ketone strips

KEYA Smart are blood glucose and ketone testing strips. They are included in NHS England recommendations for category type 1 diabetes or ketosis prone type 2 diabetes. When used they give a blood glucose measurement plus they accurately detect blood ketones whenever they are present.²⁶ The price for 50 strips is £15.86.²³⁻²⁵ These strips maybe appropriate for people who require frequent ketone testing as they may be a cost-effective alternative to prescribing separate glucose and ketone strips.

Environmental cost

There is the issue of sustainability and the cost to the environment, for example due to the use of plastic in blood glucose testing meters and test strips. Promote recycling of outer packaging and aim to reduce waste of blood glucose and ketone testing strips. This can be achieved by determining the appropriate frequency for testing and making necessary adjustments to quantity of test strips prescribed. [PrescQIPP bulletin 340. Sustainability in medicines optimisation](#) focuses on sustainability and reducing the carbon footprint of medicines to support NHS organisations wanting to reduce their medicines carbon footprint.

Sharps disposal

When self-monitoring capillary blood glucose, people will need to finger prick using a lancet device and compatible lancets. A sharps bin is required to safely dispose of the lancet after use.

- See [PrescQIPP Bulletin 354. Lancets](#) for more information on lancet disposal.
- See [PrescQIPP bulletin 333. CGM and insulin pump formulary and commissioning guidance](#) for more information on the disposal of CGM sensors.

Summary

- Follow national guidelines when considering:
 - » If capillary blood glucose testing is appropriate,
 - » Number of tests recommended per day,
 - » Targets for blood glucose levels.
- Commence new people requiring BGTS on a preferred meter and test strip in-line with NHS England commissioning recommendations. Implement a switch program for people already prescribed testing strips to the preferred meter and test strip in-line with NHS England commissioning recommendations.
- The quantity of test strips on prescription should reflect the frequency of testing required by the individual. Where testing is only required intermittently, prescriptions should be generated only when needed and not as a regular repeat prescription.
- People who are using CGM will still need to take capillary blood glucose measurement, although they can do this less often. The quantity of BGTS prescribed should generally not exceed one box of 50 strips per quarter, although there may be exceptions to this (e.g. due to DVLA requirements).
- Use SNOMED code 236320001 - vehicle driver (occupation) to identify people who drive buses, coaches, trains and HGV's who need to monitor in-line with DVLA guidance.
- For adults with type 2 diabetes, evaluate the need for self-monitoring in partnership with the person; where appropriate make necessary adjustments to the quantity of test strips prescribed and if there is no need for testing, deprescribe the strips. Decisions to amend the quantity of BGTS or to stop prescribing them should be discussed where necessary and clearly communicated to the person.

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Additional PrescQIPP resources

Including
implementations
resources and data

<https://www.prescqipp.info/our-resources/bulletins/bulletin-298-capillary-blood-glucose-monitoring/>

Information updated by Sarah Clarke, PrescQIPP CIC, April 2025, and reviewed by Katie Smith, April 2025. Non-subscriber publication date April 2026.

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