Self-monitoring blood glucose strips for adults and children with type 1 diabetes: advice for prescribers in primary care

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Key recommendation: all people with type 1 diabetes should have adequate and appropriate access to glucose monitoring testing strips; please consult local formularies and/or guidance for preferred choices. If you are unsure about local arrangements or advice, please contact your specialist diabetes team.

Current situation in London – Blood glucose testing strips

The number of blood glucose testing strips prescribed in 2017/18 (weighted per person with diabetes (NDA 16/17)) is broadly in line with the figures from 2016/17, with the London average increasing by 1% in 2017/18. When this prescribing data is broken down to individual patient level, the number testing four or more times a day (average taken from number supplied per patient per year) is fewer than the total type 1 diabetes list size across all London CCGs.

There have been frequent concerns expressed, and reported in national[1] and local[2] communications, that numbers of test strips are restricted to those who need them.

Recommendation from the Responsible Diabetes Prescribing Group Report 2017/18: 'A local review to consider which cohorts of patients receive blood glucose testing strips and whether they require more per person in certain groups (or conversely some require a review to discuss optimal testing and potentially reduced use) should be undertaken by all CCGs.'[3]

Why is self-monitoring of glucose levels important?

Insulin helps the body use glucose for energy. In type 1 diabetes the body makes insufficient or no insulin and therefore it needs to be injected. The amount of insulin needed depends on the glucose levels at the time. The ability to monitor real-time blood glucose levels allows people with type 1 diabetes (or their carers) to make informed decisions about diet, activity and adjusting insulin dosages on a daily basis to achieve glucose levels close to target.

What do the results mean?

Blood glucose meters provide a current reading of the glucose level in the blood. Individual target ranges will vary, but NICE advise adults with type 1 diabetes to aim for a fasting plasma glucose level of 5–7 mmol/litre on waking and a plasma glucose level of 4–7 mmol/litre before meals at other times of the day.[4] In children and young people it is recommended that on waking and before meals it should be 4-7 mmol/litre and 5-9mmol after meals. It

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also specifies a plasma glucose of at least 5mmol/litre when driving.[5]

If glucose levels are too low, this is called hypoglycaemia - low blood sugar – which causes a number of symptoms such as dizziness, shaking, confusion, and – if untreated – loss of consciousness, seizures and death. If people with diabetes can be alerted to this by checking, they can make adjustments to try and bring their blood glucose levels back into range.

If glucose levels are too high, this is called hyperglycaemia – high blood sugar – which causes a number of symptoms such as thirstiness, a dry mouth, tiredness, and – if untreated – can lead to diabetic ketoacidosis (please see sheet on ketone monitoring). If people with diabetes can be alerted to this by checking, they can make adjustments to try and reduce their blood glucose back into range.

Most meters also provide a data download function where users can look at trends in their glucose readings over an extended period of time.

Some meters also have built in bolus calculators to make insulin bolus calculations more accurate and less likely to cause insulin stacking from prior boluses.

How often should people with type 1 diabetes check their blood glucose?

It is recommended that for adults, the blood glucose be checked at least four times a day – before each meal and before bed – as a baseline minimum. However, in practice, a number of other factors that require additional checks, mean that most people may be checking between 4 and 10 times a day.

For children and young people with type 1 diabetes, the recommendation is to routinely perform at least 5 glucose tests per day[5]. However, testing may need to be performed 6-10 times per day to optimise intensive control.[6]

In some cases, checking more than 10 times a day may be indicated, because of the person's lifestyle (for example, driving for a long period of time, undertaking high-risk activity or occupation, travel) or if the person has impaired awareness of hypoglycaemia.[4]

When will additional tests be needed?

Testing up to ten times a day is recommended - as and when appropriate - to provide results under certain circumstances as highlighted by NICE NG17 and NG18:

- when the desired target for blood glucose control (measured by HbA1c level) is not achieved;
- when the frequency of hypoglycaemic episodes increases;
- when there is a legal requirement to do so (such as before driving, in line with the Driver and Vehicle Licensing Agency;
- during periods of illness;
- before, during and after sport or physical activity;
- when planning pregnancy, during pregnancy and while breastfeeding (see the NICE guideline on diabetes in pregnancy);
- if there is a need to know blood glucose levels more than 4 times a day for other reasons (for example, impaired awareness of hypoglycaemia, high-risk activities);[4]
- Preschool children are not yet able to identify and articulate their symptoms and it can be difficult for caregivers to detect symptoms;[7]
- For children and young people, where CGM is not available, 6-10 blood glucose checks per day are usually needed for optimal glucose control[7]

What alternative ways of measuring glucose are there?

Another method for checking glucose is by measuring the levels in the interstitial fluid. This includes continuous glucose monitoring devices (e.g. Dexcom G6) and flash monitoring such as FreeStyle Libre®. These results can be very useful for some individuals but are not a complete substitute to blood glucose monitoring, e.g. to comply with DVLA requirements. Therefore, it is important that these individuals also have access to blood glucose monitoring strips in line with any additional requirements where their device is not suitable.

What are the consequences of not checking blood glucose, as and when appropriate?

Maintaining optimal glucose levels can be difficult with type 1 diabetes and being able to review results throughout the day is integral to effective self-management. Without access to these results, people with type 1 diabetes will struggle to monitor their condition and adjust their lifestyle, food intake and insulin dosages.

Better glycaemic control results in better outcomes for people with diabetes long-term, and in the short-term ensures that they avoid unnecessary harm (and potential hospitalisation) because of out of range glucose levels.

How many test strips are enough?

The **minimum** number of test strips required is 4 a day for adults (or around 2.5 boxes a month) or 5 a day for children and young people (3.5 boxes a month).

For those testing up to 10 times a day, up to 300 strips a month - or 6 boxes - may be necessary

It is important to confirm with the patient how many test strips they use on a regular and as required basis – they will know their self-management plan and can provide the best insight into the average number required. Points to discuss include:

- how often do they regularly check?
- how often do they drive and for how long (see DVLA guidance for more information on number of test strips requires)? Any other high risk activities where more testing is needed?
- how often do they play sport?
- are they having more hypoglycaemic episodes or do they have impaired awareness?
- any other relevant conditions, which have increased testing requirements e.g. pregnancy.

Most importantly, prescriptions need to remain flexible to allow for any changes in testing frequency; due to the nature of the condition and the requirements for testing, the number of tests can never be exactly predicted. If ordering levels change dramatically then a review should be encouraged, but **no patient with type 1 diabetes should be denied or restricted access to blood glucose testing strips.**

For further information please contact the London Diabetes Clinical Network on england.diabetes-ldncn@nhs.net.

References:

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