KEY POINTS:

- Self-monitoring of blood glucose levels (SMBG) can improve glycaemic control in people with Type 1 diabetes and reduce the incidence of long term complications. It should be regarded as an integral part of treatment and access to blood glucose testing strips and meters should not be restricted.

- Use and frequency of testing, and target blood glucose level should be agreed between the person with diabetes and their diabetes healthcare team.

- Access to self-monitoring test strips and choice of meter should be based on individual need. Local medicines management policies should only be used as a guide. People should be encouraged to seek a review and challenge any restrictions to test strips or choice of meter if necessary.

- Self-monitoring skills should be taught close to the time of diagnosis. This should enable individuals to carry out SMBG and adjust treatment and activities appropriately to support optimal diabetes outcomes.

- Structured assessment of self-monitoring skills, the equipment used, and the quality and use made of the results obtained should be performed at least annually, or more frequently according to need.

- NICE should review their recommendations concerning access to Continuous Glucose Monitoring to widen access.

- People with Type 1 diabetes should be provided with a blood ketone meter and adequate test strips.

Introduction

Self-monitoring of blood glucose (SMBG) is an effective tool to support the self-management of glucose levels in people with Type 1 diabetes.

Tight glycaemic control is associated with a significant reduction in serious long term diabetes-related complications (1). The cost of treating complications contributes to the majority of the NHS expenditure on diabetes, accounting for 80 per cent of the annual £10 billion cost.

SMBG helps people using insulin to achieve
tight glycaemic control and identify low blood glucose levels before the development of severe hypoglycaemia. It should be a core component of self-management for people with Type 1 diabetes as part of an integrated package, which includes ongoing education, and assessment of the interpretation and use of the results obtained.

**Clinical guidelines**

The NICE guidance for adults with Type 1 diabetes (2) includes several recommendations on self-monitoring, which we broadly support.

**Frequency of testing**

NICE advises routine SMBG for all adults with Type 1 diabetes and recommends testing at least 4 times a day, including before each meal and before bed. Some adults with Type 1 diabetes may need to test more frequently, up to 10 times a day, if any of the following apply:

- The desired target for blood glucose control (HbA1c) level is not achieved;
- The frequency of hypoglycaemic episodes increases;
- There is a legal requirement to do so, e.g. before driving, in line with DVLA requirements (3);
- During periods of illness;
- Before, during and after sport;
- When planning pregnancy, during pregnancy, and while breastfeeding.

NICE also recommends additional blood glucose testing (more than 10 times a day) if this is necessary because of the person’s lifestyle (for example, driving for a long period of time, undertaking high-risk activity or occupations, travel) or if the person has impaired awareness of hypoglycaemia.

People on insulin pump therapy should monitor their blood glucose levels at least 4-6 times daily. This is the absolute minimum and more testing may be required.

**Education**

NICE also recommends that self-monitoring skills are taught at the time of diagnosis and initiation of insulin therapy, taking into account the needs of the person with Type 1 diabetes. It is important people receive education that shows them how to interpret results to adapt diet, lifestyle and insulin to achieve optimal outcome. These skills should be reviewed at least annually.

Adults with Type 1 diabetes should be supported to make the best use of data from self-monitoring of blood glucose through structured education or an equivalent diabetes education course. If people with Type 1 diabetes are unable, or don’t wish, to attend a group course they should be offered an alternative.

**Choice of meter**

NICE recommends:

- A choice of blood glucose meters and other monitoring equipment based on individual need in relation to user acceptability and ease of use.
- Health care professionals should ensure that meters prescribed are compliant with ISO15197 standards for blood glucose meters, meaning it is CE certified compliant.

**Pregnancy**

NICE have published recommendations for pregnancy and diabetes (4). NICE recommends pregnant women with Type 1 diabetes test their fasting, pre-meal, 1 hour post-meal and bed time blood glucose level daily.

Striving to achieve tighter diabetes control can increase the incidence of hypoglycaemia, meaning extra testing (e.g. more than 10 tests per day) is likely to be needed.

**Driving**

The DVLA requires insulin treated drivers to carry out testing for licensing and safety reasons as follows (3):

People who hold licences to drive cars and motorcycles (Group 1) should monitor blood glucose no more than 2 hours before start of driving and every 2 hours whilst driving, with more frequent self-monitoring if they have greater risk of hypoglycaemia (for example increased physical activity, altered meal routine).
In addition, people who hold licenses to drive buses and lorries (Group 2) should conduct regular blood glucose testing at least twice daily including on days of not driving. They will need to show 3 months of consecutive blood glucose readings at their annual or biannual assessment to review their license, so they will need to use one or more glucose meters with memory functions.

**Ketone testing**

It is important for people with Type 1 diabetes to check whether their ketone levels are very high if they are unwell. Like a blood glucose meter, a blood ketone meter gives a real time result compared to urine testing, which shows glucose levels that were in the blood a few hours ago.

Checking blood ketones rather than urine ketones and acting quickly can help prevent hospital admission for diabetic ketoacidosis (DKA), a potentially life threatening complication of diabetes.

NICE recommends that:

- Ketone monitoring (blood or urine) is considered part of 'sick day rules' for adults with type 1 diabetes, to facilitate self management of an episode of hyperglycaemia (2).

- Women with Type 1 diabetes who are planning pregnancy should be offered a blood ketone meter and blood ketone testing strips, and be advised how and when to use them. Diabetes UK fully supports this guidance.

**Continuous Glucose Monitoring**

Continuous Glucose Monitoring (CGM) systems measure your glucose level every few minutes, so that you can get a graph of glucose levels over time rather than a single measurement. There are two main types of CGM:

- ‘Real-time’ CGM is a system that allows you to check your blood glucose levels at any time. CGM alarms can be set to let you know when your glucose levels go too high or low.

- ‘Retrospective’ CGM lets you look back at results by downloading results to a computer.

NICE (2) do not recommend that real-time CGM is offered routinely to adults with Type 1 diabetes. Real-time CGM should instead be considered specifically for adults who are willing to commit to using it at least 70% of the time and to calibrate it as needed, and who, despite optimised use of insulin therapy and conventional blood glucose monitoring, have any of the following:

- More than 1 episode a year of severe hypoglycaemia with no obviously preventable precipitating cause.

- Complete loss of awareness of hypoglycaemia. Frequent (more than 2 episodes a week) asymptomatic hypoglycaemia that is causing problems with daily activities.

- Extreme fear of hypoglycaemia.

- Hyperglycaemia (HbA1c level of 75 mmol/mol [9%] or higher) that persists despite testing at least 10 times a day recommendations.

NICE then says to continue real-time continuous glucose monitoring only if HbA1c can be sustained at or below 53 mmol/mol (7%) and/or there has been a fall in HbA1c of 27 mmol/mol (2.5%) or more.

**Continuous Glucose Monitoring and driving**

Because this system measures tissue glucose concentration and not blood, the DVLA stipulates drivers must monitor their blood glucose levels as previously listed, with test strips and a meter (3).

### Current situation in the UK

We have conducted three surveys since 2013 (5, 6, 7) to monitor restrictions and assess the impact on people with diabetes. Each found that access to blood glucose test strips is subject to geographical variation and not always based on need.

In our most recent survey, conducted from March to May 2016, 27 per cent of the 1,000 respondents said that they had, in the past 12 months, been refused a prescription for blood glucose test strips or had the number of test strips on their prescription restricted. Of these, over half (52 per cent) have Type 1 diabetes.
It seems likely financial constraints are leading to restrictions on the numbers of test strips being prescribed and reduction of choice on meters, and that policies to constrain costs for people with Type 2 diabetes are being erroneously applied to people with Type 1 diabetes.

We asked people in this survey what reasons they were given for the restriction of test strips on their prescription.

Test strip restriction

Budget constraints and being told they were “testing excessively” were two of the reasons why restrictions were being implemented:

“...told they were expensive and we should test less and that we only need to test 4 times a day” (despite the respondent using an insulin pump)

“A blanket limit on the number of test strips available to diabetics across the CCG”

People stated they had to ration the number of times they tested and had to make difficult decisions about when to test or not. Many people with Type 1 had bought or considered buying test strips from pharmacies or online, where the quality cannot be guaranteed.

Respondents also reported that GP reception staff and Practice Managers prevented them from accessing the number of test strips they needed:

“...I have been refused a prescription in the past for testing strips, not by my GP but by the receptionist at the surgery...”

GP reception staff and Practice Managers should have training in the basic needs of people with diabetes so they can respond to prescription requests appropriately.

Our surveys consistently show the restriction of test strips impacted on the ability of people with diabetes to effectively control their diabetes, and people were concerned for their immediate safety and future health:

“...This restriction greatly reduced my ability to change my insulin dosage and carbohydrate intake to maintain blood sugar levels within accepted parameters”

“As a pump user I need to monitor numerous times a day. I also need to drive to work which also necessitates testing. Run out of test strips at times”

Worryingly, the DVLA guidance is not always being considered by GPs when prescribing test strips. Too frequently respondents commented that they were being provided with too few test strips or even none at all to meet DVLA legal requirements:

“I now have to buy strips as DVLA requires me to test before driving and every 2 hours whilst driving”

Self-managing diabetes can require a huge amount of time and effort. Respondents frequently commented that the restriction of test strips severely impacted on their quality of life. They found it inconvenient having to order their prescription so regularly due to the restriction of number of test strips prescribed, which does not make allowances for extra need e.g. illness.

“It’s time consuming having to do repeat prescriptions for test strips as I need to do the repeats more regularly than the repeats for the insulin and needles which come in larger sizes to last longer”

“It is very stressful... I have to remember to check stocks to get a prescription..... it is a process which I have to start every 2 weeks. It makes living with diabetes feel like a real chore...”

Meter restriction

66 per cent of respondents were not given any choice in blood glucose meter and GPs very often switched to a different, cheaper meter without discussing with the person with diabetes. Of these, one in four were not happy with the meter provided. For instance, the meter was too large to easily carry around or didn’t upload the data to a computer.

“...meter is useless, can’t test discretely, can’t test in the dark, battery dies quickly, can’t upload meter readings to a computer”

Ketone testing restriction

As noted above, checking for ketones when glucose levels are very high, or if you are unwell or planning a pregnancy is vital. But the survey suggests that local medicines management policies do not always reflect this guidance:

“...my ketone strips were limited ......another
Recommendations

SMBG should be part of an integrated package of care for everyone with Type 1 diabetes and access to blood glucose testing strips and a meter, which fulfills the requirements of the person with diabetes, should not be restricted.

NICE guidance (2, 4) and the DVLA guidance (3) should be followed as a minimum concerning testing of blood glucose and ketones.

Healthcare professionals are encouraged to work in partnership with people with diabetes to discuss, and agree together in a joint decision, frequency of testing according to individual needs and circumstances. This should always be made on a patient by patient basis.

Number of test strips provided

The NICE guidance listing number of tests should not be used by healthcare professionals or commissioners to limit test strips and should only be regarded as a guide.

GPs need to be familiar with the latest DVLA guidance and ensure licensing requirements for testing are adhered to so that their patients have adequate test strips and the correct meter as detailed (3).

If GPs are not prescribing enough test strips to meet their patient’s need, people with Type 1 diabetes are within their rights to challenge this decision. Often explaining the reason behind their need is sufficient, but if this does not work they should ask their diabetes team to write to their GP and tell them how many strips should be prescribed.

Choice of meter

People have individual needs so flexibility is paramount and local medicines management policies should only be used as a guide. People with diabetes should be involved in developing any local recommendations about prescribing of meters and test strips.

The needs of adults with Type 1 diabetes should be taken into account. If they have been limited to a meter that does not meet their requirements they are within their rights to challenge this decision and discuss with their GP why they would prefer a different meter. A recently published Meds and Kit guide for healthcare professionals showed there are 54 glucose meters available with different features to meet the individual needs of people with diabetes (8).

Continuous Glucose Monitoring

We recommend NICE review their recommendation concerning access to CGM and propose increased access to this technology by supporting our Council of Healthcare Professionals consensus that there will be other instances when people with Type 1 diabetes will benefit, such as if achieving moderate control.

Research also suggests CGM can reduce incidences of severe hypoglycaemia and improve HbA1c (9).

Ketone testing

NICE recommend a blood ketone meter for women with Type 1 diabetes who are planning to become pregnant, which we support.

Though NICE recommend ketone monitoring (blood or urine), we recommend the use of blood ketone meters because it gives a real time result compared to urine testing.

It is unlikely a GP will not prescribe a blood ketone meter but our survey has highlighted blood ketone test strips are not always provided. People with Type 1 diabetes are within their rights to challenge this decision. Often explaining the reason behind their need is sufficient but if this does not work they should ask their diabetes team to write to them to request the prescription.

Additional barriers

When GPs are prescribing blood glucose test strips, it is important that allowance is made for increased need (e.g. illness and holidays) to prevent people with Type 1 diabetes having to undertake repeated trips to their Doctors and pharmacists for repeat prescriptions.

Further information

If adults with Type 2 diabetes or their carers are experiencing restriction on test strips and blood glucose meters they can contact the following for support:

A charity registered in England and Wales (215199) and in Scotland (SC039136); © Diabetes UK 2016
• Diabetes UK Advocacy Service
The Diabetes UK advocacy service is here for all people with diabetes, their family, friends and carers to help with issues connected to diabetes. We give you the information and support you need to make sure you know your rights, understand your options and help you get your voice heard.
www.diabetes.org.uk/How_we_help/Advocacy/
• Diabetes UK helpline
Call: 0345 123 2399, Monday to Friday, 9am–7pm
Or email helpline@diabetes.org.uk
If you’re in Scotland:
Call: 0141 212 8710, Monday to Friday, 9am–7pm.
• INPUT Patient Advocacy a charity supporting patients’ access to diabetes education and technology, for more information and assistance.
www.inputdiabetes.org.uk/ or tel: 0800 228 9977

Juvenile Diabetes Research Foundation (JDRF) is the type 1 diabetes charity, improving lives until we find the cure. WE fund research to cure, treat and prevent type 1 diabetes, including a major initiative to perfect the artificial pancreas, a technology that could revolutionise treatment of type 1 diabetes.
www.jdrf.org.uk

Type 1 Technology. A guide for adults with type 1 diabetes, 2016. Diabetes UK, INPUT, JDRF

References

(2) NICE NG17, Type 1 diabetes in adults: diagnosis and management. August 2015. Updated: July 2016. www.nice.org.uk/guidance/ng17/chapter/1-Recommendations#blood-glucose-management-2
(7) Test strip and meter survey, Diabetes UK, 2016.