Blood glucose: To monitor or not in type 2 diabetes? The practical implications of the Choosing Wisely recommendation

John Furler, Jessica Browne, Jane Speight

Originating in the USA in 2012 and launched in Australia in 2015, the Choosing Wisely campaign is a professionally driven initiative that aims to encourage clinicians and consumers to question the use of medical tests, treatments and procedures. One of the most widely adopted campaign recommendations focuses on diabetes, and the role of routine self-monitoring of blood glucose. In this article, the authors explain the Choosing Wisely recommendation for self-monitoring of blood glucose in diabetes and put forward their view on how it fits with today's diabetes environment. They also describe a structured way to use self-monitoring with the ultimate aim of empowering people with diabetes and improving glucose control.

Launched in Australia in 2015, the Choosing Wisely campaign is a professionally driven initiative that aims to encourage clinicians and consumers to question the use of medical tests, treatments and procedures. The aim is to eliminate those that are not supported by evidence, that duplicate other tests or procedures, may cause harm and are not truly necessary. Thirteen countries have now implemented locally adapted versions of the Choosing Wisely campaign.

One of the most widely adopted campaign recommendations in the US, Canada, UK and Australia focused on diabetes. Developed by the Royal Australian College of General Practitioners (RACGP) through evidence reviews and consultation with members and experts, the Choosing Wisely Australia recommendation was to not advocate routine self-monitoring of blood glucose (SMBG) for people with type 2 diabetes who are only on oral medication (Choosing Wisely Australia, 2015). The recommendation suggested that SMBG may possibly reduce HbA_{1c} levels by 0.25–0.3% (2.7–3.2 mmol/mol), but this was considered clinically insignificant. SMBG actually increased hypoglycaemia risk, although the reason for this was unclear. The recommendation, therefore, concluded that HbA_{1c} levels should be used to guide therapy, and promote lifestyle interventions regardless of diabetes control. The recommendation acknowledged that there are exceptions where SMBG is appropriate for people with type 2 diabetes who are on oral medication, such as symptomatic hypoglycaemia; heavy machinery operators on a sulfonylurea; elderly people with renal failure and pregnant women. SMBG may also be appropriate as a possible short-term education tool for how diet influences blood glucose. We believe that such education ought to focus also on the impact of physical activity for regulating glycaemic levels.

The concern about SMBG was not only that it may be clinically unhelpful, but also costly. The Choosing Wisely recommendation (2015) noted that, in 2012, $143 million was spent on test strips by the Australian Government, and that people with diabetes who are not on insulin and who use SMBG, on average use 300 test strips a year. While it is worth noting that only 35% of this spend was for those people with non-insulin-treated type 2 diabetes, nevertheless this is not insubstantial. In Australia, type 2 diabetes costs $15 billion annually (Colagiuri

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Article points

1. The Choosing Wisely campaign is a professionally driven initiative that aims to encourage clinicians and consumers to question the use of medical tests, treatments and procedures.
2. There is concern that self-monitoring of blood glucose (SMBG) is not only clinically unhelpful, but also costly.
3. Structured SMBG does not duplicate other forms of monitoring but, rather, adds detail and value to what can be learnt from HbA_{1c}.

Key words

- Monitoring
- Self-care
- Type 2 diabetes

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1. How to safely, effectively and efficiently achieve target glycaemic levels for people with type 2 diabetes to prevent downstream complications is a priority.
2. The Choosing Wisely campaign aims to encourage a conversation between clinicians and patients about tests, treatments and procedures that may provide little or no value and that may cause harm.
3. One way that could inform the conversation is to distinguish between structured and unstructured self-monitoring of blood glucose.

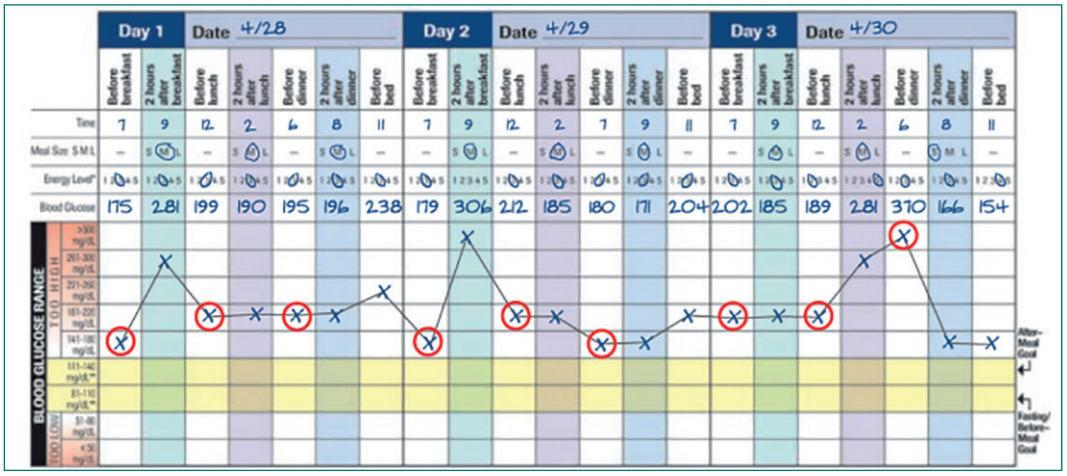

Figure 1: A 3-day structured self-monitoring blood glucose profile.

et al, 2014). Globally, up to 15% of national health budgets are spent on diabetes, between a quarter and a half of which is for blood glucose-lowering medications including insulin (Gregg et al, 2014). The problem of how to safely, effectively and efficiently achieve target glycaemic levels for people with type 2 diabetes to prevent downstream complications is a priority. However, the Choosing Wisely recommendation suggests that SMBG should not be part of the solution – at least not until people are using insulin, initiated typically several years after diagnosis and often long after increased risk of downstream complications is established.

Around the same time as the Choosing Wisely Australia campaign was launched, the Federal Government concluded an extensive, 2-year review and consultation process focused on the use of SMBG in people with non-insulin-treated type 2 diabetes, undertaken within the Pharmaceutical Benefits Scheme. Based on that process, the Government have announced that access to subsidised SMBG strips will be restricted from 1 July 2016 for those with type 2 diabetes who are not using insulin and who have their blood glucose level under control (Australian Government Department of Health, 2013). The Pharmaceutical Benefits Advisory Committee also recommended that these patients be limited to a 6-month supply (approximately 100 strips) following changes to their diabetes management, with an additional 6-months' supply available at the prescriber's discretion. Unrestricted access to SMBG strips will continue for people with type 2 diabetes using insulin or other medicines (e.g. corticosteroids and sulfonylureas) to detect asymptomatic hypoglycaemia or during illness that may cause fluctuations in blood glucose (Australian Government Department of Health, 2013).

What should we advise people with type 2 diabetes?

The Choosing Wisely campaign aims to encourage a conversation between clinicians and patients about tests, treatments and procedures that may provide little or no value and that may cause harm (Hoffmann et al, 2015). Every person with type 2 diabetes is indeed different and conversations about SMBG need to be person-centred and tailored to the individual and their circumstances. So, what sort of conversation should we be having about monitoring of glycaemia? Is there a more nuanced and helpful message than simply "stop monitoring your blood glucose levels"?

One way that could inform the conversation is to distinguish between structured and unstructured SMBG. We have written two papers to contribute to the conversation about this issue (Speight et al, 2013; 2015) and revisit some of the evidence and controversy here.

The reviews that informed the Choosing Wisely recommendation (e.g. a 2012 Cochrane

review [Malanda et al, 2012]) and the changes in Government subsidies included several randomised controlled trials. However, these trials varied significantly in the instruction and support provided for the frequency of self-monitoring checks and the sort of feedback and self-management support individuals were given. This may obscure a potentially important difference between monitoring that is routine, random and low frequency (unstructured SMBG), and monitoring that is more strategic (structured SMBG). To paraphrase George Orwell, all monitoring is equal, but some monitoring is more equal than others.

Certainly the experience of practitioners and people with type 2 diabetes around unstructured SMBG is largely negative. Unstructured SMBG is ineffective because (a) it does not easily allow the identification of blood glucose patterns by people with type 2 diabetes or their health professionals, and (b) it can not inform rational therapeutic and self-management choices (e.g. food intake or physical activity). GPs can find the blood glucose diaries that a person with type 2 diabetes might bring to clinic quite difficult to interpret and act upon and may not lend them much weight. For people with type 2 diabetes, for whom monitoring can be "painful", "inconvenient" and "expensive", the dismissal of their glucose diaries by health professionals can be demotivating and frustrating (Speight et al, 2015).

Structured SMBG

Structured SMBG involves a short burst of multiple daily blood glucose checks, for example, seven times a day – before and 2 hours after each meal and before bed – over 3 days. Recording of meal sizes and energy levels are also made to provide context to the readings. This is sufficient to identify times below, above and within target range and recognise meaningful blood glucose patterns – which HbA_{1c} alone cannot do (*Figure 1*). Importantly, structured SMBG is best implemented within a collaborative therapeutic relationship with a supportive health professional who is trained in interpretation of SMBG data (*Box 1*). The collaborative consultation and interpretation of the SMBG pattern can drive shared plans for how to change diet, activity and medication to improve glucose levels. Structured SMBG may be more empowering for people with type 2 diabetes as well as their health professionals. It might also drive more targeted use of the money spent on blood glucose-lowering medications. It is worth noting that this type of monitoring uses as few as 84 test strips per year (i.e. 21 strips over 3 days, every 3 months prior to a GP visit).

There is a small but emerging evidence base for structured SMBG. The STeP (Structured Testing Program) Study, a randomised trial in primary care in the US, evaluated the use of structured SMBG on four occasions per year and found a statistically significant reduction in HbA_{1c} (–0.3%, $P<0.001$; intention-to-treat analysis), and per protocol analysis (focused on those who completed structured SMBG as intended) showed a clinically significant reduction (0.5%, $P<0.001$ [Polonsky et al,

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1. Structured self-monitoring of blood glucose (SMBG) involves a short burst (e.g. 3 days) of multiple blood glucose checks (e.g. seven times a day – before and 2 hours after each meal and before bed) with recording of meal sizes and energy levels to provide context to the readings.
2. Unstructured SMBG is thought to be ineffective because it does not easily allow the identification of blood glucose patterns and can not inform rational therapeutic and self-management choices.
3. There is a small but emerging evidence base for structured SMBG.

Box 1. One GP's view of working with people with type 2 diabetes to undertake structured self-monitoring blood glucose.

I frequently talk with my patients about blood glucose monitoring, regardless of whether they are on insulin. We talk about how unhelpful and frustrating random monitoring can be and about what we can achieve if they used a structured approach from time to time. I find people are often curious about what is going on with their glucose levels and are interested to know more. If people decide they want to try structured self-monitoring blood glucose, I provide them with a simple recording sheet so they can record and then chart their glucose readings, as well as note medicines, meal size and activity.

In particular, before they leave the consultation, I acknowledge that it will likely be a bit of a burden for a few days but we talk about how beneficial it will be to see a clear pattern in their glucose levels and what we will be able to do with that information. I also mention that this may be all the monitoring they have to do for the next 3 months, and generally find that people welcome the idea of less monitoring.

When they return with their complete 21-point profile, its like a light bulb is turned on. Seeing the patterns and times when their glucose levels are below, above and within target has been is illuminating. Importantly, we don't just focus on what might have caused particular "highs" or "lows" – I also invite them to point out all the times their glucose was in the target range, and we talk about what contributed to those and how they might be able to do a bit more of whatever "that" is.

I have found that people from a range of backgrounds are able to undertake structured monitoring, with a little support and encouragement from me. Working together in this way can really build people's confidence and give them a sense that their self-management efforts are worthwhile.

"We believe a more positive recommendation would be for health professionals to advocate for structured self-monitoring of blood glucose for all people with type 2 diabetes not using insulin or other hypoglycaemia-inducing medications."

2011]). Furthermore, structured SMBG leads to other important psychological benefits reported in this trial and other studies (Fisher et al, 2012; Speight et al, 2013).

Future developments

There is no doubt that even structured SMBG on just four occasions per year can be burdensome to patients. Some patients in the STeP Study did not complete the required monitoring. There is now growing interest in the potential for wearable devices (such as continuous glucose monitors) worn on occasions to provide similarly structured (but more detailed) patterns of glycaemia to people with type 2 diabetes and their health professionals, without the burden of finger pricks and active recording of glucose levels. With growing evidence that people are increasingly interested in wearable devices to support health improvements and behaviour change, this is a promising avenue for future research.

We are now embarking on a National Health and Medical Research Council funded study to investigate the effectiveness of such an approach to monitoring. Any GPs in Victoria who are interested in participating in the GP-OSMOTIC study can contact Associate Professor John Furler at the University of Melbourne or read the study pamphlet for more information (http://bit.ly/1UVbB0i).

Conclusion

The aim of the Choosing Wisely campaign is to eliminate those clinical practices that are not supported by evidence, duplicate other tests or procedures, may cause harm and are not truly necessary. While there is evidence that unstructured monitoring is ineffective, there is some evidence that structured monitoring may be effective, although implementation barriers remain. Structured SMBG does not duplicate other forms of monitoring but, rather, adds detail and value to what can be learnt from HbA_{1c} alone. Structured monitoring does not cause harm but, rather, generates a range of positive psychological benefits. Structured monitoring may well be a necessary part of collaborative care for all people with type 2 diabetes, as all diabetes is serious and all diabetes leads to complications if not monitored and managed appropriately. As we wrote last year (Speight et al, 2015), we believe a more positive recommendation would be for health professionals to advocate for structured SMBG for all people with type 2 diabetes not using insulin or other hypoglycaemia-inducing medications. ■

Conflicts of interest

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