The flash glucose monitoring revolution: the Sat Nav journey

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I am setting readers a challenge (Figures 1 and 2). I would like you to drive to Park Row in Leeds, a place you have not visited before. To get there you can drive your car and use your satellite navigation (Sat Nav) system. However, you can only look at your Sat Nav system on four occasions during your whole journey. Are you feeling uncomfortable? No wonder. But this is essentially what we have been asking people with diabetes to do for decades when it comes to glucose monitoring. Asking people with diabetes to check their blood glucose only before meals and before bed provides very limited information about what is happening to glucose levels in between meals and overnight. What would be preferable, of course, is the ability to see the glucose data across the full day, on demand, to check how the journey is going and, most importantly, to arrive safely at the desired destination.

In 2014 the Abbott FreeStyle Libre device became available in the UK, allowing people with diabetes to monitor their glucose levels continuously. The Freestyle Libre flash glucose monitoring device is an arm-worn glucose sensor, the first two versions of which were the size of a £2 coin. The device reads glucose data every minute and transfers this information to a mobile phone app. The person with diabetes can then access their glucose data by scanning their phone over the sensor or, for those without a smartphone, there is a reader which can be used for scanning the sensor and doing glucose checks.

The Impact flash glucose monitoring randomised controlled trial in 2014 demonstrated that the use of flash glucose monitoring in people with well controlled T1DM resulted in a 38% reduction in hypoglycaemia.¹ Interestingly, this reduction in hypoglycaemia occurred after the first fortnight of use, even though the users had no instructions on how to respond to their glucose data. This may initially seem surprising but viewing the data from the device shown in figure 3 makes clear how intuitive it can be for people with diabetes to understand and respond to their glucose levels. For example, in the UK to be safe to drive a car in accordance with the DVLA regulations, your glucose must be above 5.0 mmol/L.² In the finger prick example in Figure 3 the glucose reading is 5.3mmol/L, implying that the individual would meet the criteria for safe driving. In the second example with a reading of 5.3mmol/L and a straight across arrow, indicating a steady glucose profile, again this would be reassuring for driving. In the third example with a reading of 5.3mmol/L and a downwards arrow indicating a rapidly reducing glucose level, it is clear that the person would need to take extra rescue carbohydrates to avert the risk of hypoglycaemia.

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Over the past eight years we have seen a substantial increase in access to flash glucose monitoring. Figure 4 demonstrates the journey to improving access to flash glucose monitoring. This became available initially to self-fund in 2014, and people living with diabetes started to gain insight into the potential benefits. Many were frustrated that such a life-changing device was not available on prescription. Diabetes UK responded on their behalf with their ‘Fight for Flash’ campaign. Flash glucose monitoring became available on the NHS drug tariff in 2017 but access remained patchy, with the emergence of a postcode lottery. In response, NHS England rolled out national access criteria associated with a national reimbursement policy. Interestingly, these criteria included indications such as psychosocial or occupational indications for flash glucose monitoring, opening the doors for wider access for those who were struggling with blood glucose monitoring. Since then, we have seen a substantial uptick in the levels of access. Towards the end of 2022, more than 70% of people living with T1DM have access to this technology, representing the most rapid increase in uptake of a new technology in the history of T1DM.

From 2017 ABCD undertook a national audit of flash glucose monitoring with the aim of understanding better the clinical outcomes associated with using the device. The data, published in Diabetes Care in 2020, demonstrated a - 5.2mmol/mol reduction in HbA1c, with even greater reductions witnessed in those with higher baseline HbA1c values. The other striking finding was a significant reduction in admissions with diabetic ketoacidosis (DKA), hyperglycaemia, hypoglycaemia, paramedic call outs and severe hypoglycaemia. Importantly there was also an improvement in the Gold score (a marker of hypoglycaemia awareness): proportion of those with impaired awareness of hypoglycaemia at baseline reverted to normal hypoglycaemia awareness; reducing from 28% to 18%.

A further concern which some may have when initiating flash glucose monitoring is whether structured education might be needed prior to starting the device. However, in contrast to the assumptions made, our work demonstrated that it did not matter whether somebody had attended structured education or not – HbA1c reduction was seen across the board independent of prior education status. This finding is further supported by the real-world data which showed that during the pandemic lockdown, a period when people with diabetes had limited support from healthcare professionals, there was an improvement in time in range, reflecting improved self-management. Finally, and possibly most importantly, the ABCD audit has also demonstrated that flash glu-
In the past decade we have witnessed a revolution in the access to flash glucose monitoring. The recent NICE update extends this revolution to real-time CGM also, providing choice and the ability to respond to individual needs when discussing glucose monitoring options in clinic. Never before has there been such a rapid increase in diabetes technology. As we move into the era of automated insulin delivery, the future is looking very bright indeed.

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**References**

8. NICE NG17 https://www.nice.org.uk/guidance/ng17/chapter/Recommendations#blood-glucose-management last accessed 22/9/22.