Journal club: The need to reduce health inequality in accessing diabetes technology

We are just coming up to 100 years since insulin was first used to treat diabetes mellitus: clearly a dramatic turning point in the management of this disease. A perhaps less dramatic but, it could be argued, equally important development was the ability to monitor capillary glucose and thus adjust the insulin dose. Devices to measure capillary glucose first became available in the 1970s. Although not many of today's clinicians will remember this, a significant number of our patients with type 1 diabetes will.

Capillary blood glucose testing has been the standard tool for monitoring and adjusting diabetes treatment for 50 years, but it would seem we are now at another turning point. Continuous glucose monitoring has now been available for over 20 years but it is only in very recent times that we have seen its widespread use. Having now achieved a certain momentum, we are seeing a very rapid rise in the uptake of this technology. In the UK, this is despite commissioning restrictions in place to try and limit the use.

We already know that the more information a person has about their glucose levels, the better control of glucose they achieve. It would seem intuitively obvious that having a continuous record of glucose levels should allow for more accurate adjustment of diabetes treatment than just having two or three moments per day when we know what the level is. The paper by Anita Jeyam and colleagues addresses the question of whether this benefit is restricted to certain groups of patients or whether we are likely to see benefit across the board. The answer from their real-world study strongly suggests that the benefit is universal.

There is a danger in the diabetes clinic that people who are already managing their condition well are the ones to be offered the latest technology to help them improve further, while those who are struggling, for whatever reason, can be left behind. It is possible that the current commissioning arrangement for both flash and continuous glucose monitoring is contributing to this health inequality. In the interest of achieving value for money, we may be penalising the group of patients who potentially have the most to gain. The data from this Scottish paper would support that view. It seems probable that the increasing use of sensor technology will reduce the disease burden of diabetes.

Regardless of the health-economic arguments, these devices are achieving a momentum of their own. The right thing to do is to widen their availability. Now would seem the time to do this. ■

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Effects of widespread flash glucose monitoring use in Scotland

Flash glucose monitoring became eligible for NHS funding in Scotland in 2018. The present study sought to evaluate flash usage in Scotland between 2014 and 2020, and to examine the impact of the technology on HbA_{1c} and diabetes emergencies according to baseline age, sex, socioeconomic group, glycaemic control, insulin pump usage and education.

Using data from the Scottish Care Information – Diabetes Collaboration database, and linked to hospital and national records, a total of 14 682 individuals with type 1 diabetes were evaluated. Use of flash monitoring grew rapidly after it became eligible for funding, rising from 3.1% in 2017 to 45.9% in mid-2020. Usage varied widely by age (from 64.3% in those aged <13 years to 32.7% in those aged ≥65 years) and by socioeconomic status (54.4% vs 36.2% in the least vs most deprived postcodes).

Overall, median HbA_{1c} decreased by 2.5 mmol/mol (0.2%) in the year following flash initiation; however, there was wide variation

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according to baseline HbA_{1c}, with a median reduction of 15.5 mmol/mol in those with HbA_{1c} over 84 mmol/mol (9.8%) at baseline compared with an increase of 1 mmol/mol in those with an initial HbA_{1c} <54 mmol/mol (7.1%). Significant reductions in HbA_{1c} were observed in all age groups, sexes and socioeconomic levels and regardless of insulin pump use, completion of structured diabetes education or early (self-funded) adoption of the technology. Almost all variation within these subgroups was due to the HbA_{1c} level at baseline.

Diabetic ketoacidosis (DKA) rates fell significantly after flash initiation, both in users as a whole and within all subgroups except for adolescents. Adjusting for rates prior to initiation, the DKA event rate ratio was estimated to be 0.59 (95% CI, 0.53–0.64) in the year after flash initiation compared with up to 5 years before.

The rates of hospitalisation for severe hypoglycaemia (HSH) also decreased overall following flash initiation. The reduction was particularly high in those with a prior HSH event in the previous 5 years (rate ratio, 0.25; 95% CI, 0.20–0.32).

The authors conclude that flash glucose monitoring use in Scotland has been associated with significant improvements in HbA_{1c}, especially in individuals with high HbA_{1c} at baseline. They argue that the lower usage in more deprived areas is a priority to overcome, given the striking reductions in DKA seen in all socioeconomic groups.

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ARTICLE

Flash monitor initiation is associated with improvements in HbA_{1c} levels and DKA rates among people with type 1 diabetes in Scotland: a retrospective nationwide observational study

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Abstract
Aims/hypothesis We assessed the real-world effect of flash monitor (FM) usage on HbA_{1c} levels and diabetic ketoacidosis (DKA) and severe hospitalised hypoglycaemia (SHH) rates among people with type 1 diabetes in Scotland and across sociodemographic strata within this population.
Methods This study was retrospective, observational and registry based. Using the national diabetes registry, 14,682 individuals using an FM at any point between 2014 and mid-2020 were identified. Within-person change from baseline in HbA_{1c} following FM initiation was modelled using linear mixed models accounting for within-person pre-exposure trajectory. DKA and SHH events were captured through linkage to hospital admission and mortality data. The difference in DKA and SHH rates between FM-exposed and -unexposed person-time was assessed among users, using generalised linear mixed models with a Poisson likelihood. In a sensitivity analysis, we tested whether changes in these outcomes were seen in an age-, sex- and baseline HbA_{1c}-matched sample of non-users over the same time period.
Results Prevalence of ever-FM use was 45.9% by mid-2020, with large variations by age and socioeconomic status: 64.3% among children aged <13 years vs 32.7% among those aged ≥65 years; and 54.4% vs 36.2% in the least-deprived vs most-deprived quintile. Overall, the median (IQR) within-person change in HbA_{1c} in the year following FM initiation was −2.5 (−9.0, 2.5) mmol/mol (−0.2 [−0.8, 0.2]%). The change varied widely by pre-usage HbA_{1c}: −15.5 (−31.0, −4.0) mmol/mol (−1.4 [−2.8, −0.4]%) in those with HbA_{1c} > 84 mmol/mol [9.8%] and 1.0 (−2.0, 5.5) mmol/mol (0.1 [−0.2, 0.5]%) in those with HbA_{1c} < 54 mmol/mol (7.1%); the corresponding estimated fold change (95% CI) was 0.77 (0.76, 0.78) and 1.08 (1.07, 1.09). Significant reductions in HbA_{1c} were found in all age bands, sexes and socioeconomic strata, and regardless of prior/current pump use, completion of a diabetes education programme or early FM adoption. Variation between the strata of these factors beyond that driven by differing HbA_{1c} at baseline was slight. No change in HbA_{1c} in matched non-users was observed in the same time period (median [IQR] within-person change = 0.5 [−5.0, 5.5] mmol/mol [0.0 (−0.5, 0.5)%]). DKA rates decreased after FM initiation overall and in all strata apart from the adolescents. Estimated overall reduction in DKA event rates (rate ratio) was 0.59 [95% credible interval (CrI) 0.53, 0.64]) after FM vs before FM initiation, accounting for pre-exposure trend. Finally, among those at higher risk for SHH, estimated reduction in event rates was rate ratio 0.25 (95%CrI 0.20, 0.32) after FM vs before FM initiation.
Conclusions/interpretation FM initiation is associated with clinically important reductions in HbA_{1c} and striking reduction in DKA rate. Increasing uptake among the socioeconomically disadvantaged offers considerable potential for tightening the current socioeconomic disparities in glycaemia-related outcomes.

Keywords Diabetes mellitus type 1 · Flash monitoring · HbA_{1c} · Hypoglycaemia · Ketoacidosis

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[Click here to read the study in full.]