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THE sensor report
SPECIAL ISSUE/2022

WELCOME TO
THE SENSOR REPORT SPECIAL CONGRESS ISSUE 2022

As in 2021, this special issue of *The Sensor Report* is reporting on the latest research on how the FreeStyle Libre flash glucose monitoring system and traditional continuous glucose monitoring (CGM) is being applied in real-world settings in the management of people with type 1 diabetes (T1DM) or type 2 diabetes (T2DM). The posters and oral sessions from the *Advanced Technologies and Treatments for Diabetes* congress in Barcelona, April 2022, and those from the *American Diabetes Association 82nd Scientific Sessions*, New Orleans, June 2022, provided new data and insights on established themes but also provided research that showcased the value of the FreeStyle Libre system and traditional CGM in emerging topics of interest in diabetes.

These include the application of flash glucose monitoring and CGM in people with T2DM not on intensive insulin therapy and the importance of psychological outcomes and quality of life for people with diabetes using flash glucose monitoring. Cost-impact studies, that continue to demonstrate the long-term value of providing access to the FreeStyle Libre system for people with diabetes, were a feature of both congresses, as were those providing more detail on the management and risk assessment of hypoglycemia. Of note were significant longitudinal studies that provide clear evidence that the improvements in HbA1c and time in range associated with using the FreeStyle Libre system are sustained for up to two years.

We have selected and reviewed a number of the sessions for the benefit of readers of *The Sensor Report*, with a focus on outcomes centred on flash glucose monitoring and traditional CGM technologies. In both congresses, the many presentations emphasized the considerable body of real-world evidence for sensor-based glucose monitoring technologies, not just for people with diabetes on intensive insulin therapy, but also for those not on insulin therapy, particularly in T2DM. Of note, the value of these systems is now being demonstrated in a psychosocial context, with benefits for quality of life that extend beyond the objective improvements in glucometric control.

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Focus on type 2 diabetes

Flash glucose monitoring in people with T2DM on non-insulin therapy: IMMEDIATE study interim outcomes

People with T2DM who have inadequate glycemic control with non-insulin antihyperglycemic drugs face the prospect of escalation to treatment with insulin. The IMMEDIATE study evaluates the impact of starting flash glucose monitoring on glycemic control in this population.

The IMMEDIATE study enrolled 116 participants into a multi-centre, randomized controlled, open-label crossover study. In Phase 1 of the study, participants were randomized to a 16-week intervention with the FreeStyle Libre system, combined with diabetes self-management education (DSME), or a control arm with a 16-week DSME intervention alone.

At the end of 16 weeks, participants in the FreeStyle Libre + DSME arm showed greater time in range (TIR) compared to the DSME-only control arm (76.1% versus 64.3%; p <0.01). Similarly, time above range (TAR) was significantly lower in the FreeStyle Libre + DSME arm (21.5% vs 31.3% ±25; p=0.03). Change in A1c was also greater in the FreeStyle Libre + DSME arm (-0.9% vs -0.5%, p=0.03). Glucose monitoring satisfaction scores improved only in the FreeStyle Libre + DSME arm (0.6 vs. 0.0; p<0.01).

In the Phase 2 crossover part of the study, participants initially assigned to receive DSME alone will receive FreeStyle Libre for 16 weeks. Participants in the FreeStyle Libre + DSME intervention arms will continue using FreeStyle Libre.

This interim report on the Phase 1 outcomes from the IMMEDIATE study shows that people with T2DM inadequately controlled on non-insulin drugs can achieve significant improvements in HbA1c, TIR and TAR following initiation of the FreeStyle Libre system.

Aronson R and Brown RE. IMpact of flash glucose Monitoring in pEople with type 2 Diabetes Inadequately controlled with non-insulin Antihyperglycemic ThErapy: IMMEDIATE study. OR95: ATTD 15th Scientific Session; April 27-30, 2022

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Role of Ambulatory Glucose Profile in decision making by HCPs in treating people with T2DM on basal-insulin therapy

Healthcare professionals (HCPs) treating people with T2DM who have suboptimal glycemic control and are on basal-insulin therapy may benefit from better understanding of glucose patterns. This study was to evaluate whether a review of the patient's ambulatory glucose profile (AGP) would enable the HCP to recommend a therapy change.

The study recruited 136 patients with HbA1c values of 7.0 - 10.0% and for whom their HCP was unsure of the optimal course of treatment. Participants were provided with FreeStyle Libre Pro sensors, which provide glucose metrics and AGP reports only to their HCP. Based on their AGP, 94.3% (99/105) of the patients were recommended an appropriate therapy change by their HCP based on new insights provided by the AGP.

Notably, 96.7% of patients also reported a better understanding of the rationale in support of the recommended treatment change after reviewing the AGP with their HCP. This data indicates that the AGP report format is an important decision-making aid for HCPs in the treatment of T2DM.

Huang E, et al. Ambulatory Glucose Profile Informs Better Treatment Decisions for Type 2 Basal-Insulin Patients. ADA 82nd Scientific Sessions 2022; 73-LB

CGM use in T2DM reduces HbA1c through earlier patient engagement and changes to diet and lifestyle

This retrospective, observational study analyzed the impact of CGM on changes in HbA1c and medication patterns, as well as demographics of people with T2DM.

The authors reviewed the clinical and insurance claims data of people with T2DM (n=2,231) from a large integrated healthcare system over two years. After eight weeks to twelve months of CGM use, HbA1c was reduced from 8.9% to 8.0%, with the proportion of patients with HbA1c < 8.0% rising from 35.6% to 52.8%. Patients who filled their prescription for CGM within 30 days had larger reductions in HbA1c.

Medication patterns also changed, with a five-fold increase in the proportion of patients who ceased taking antiglycemic medication (from 5.1% to 25.3%). While male gender and age significantly correlated with HbA1c reductions, BMI and race did not. The observation of reduced HbA1c and less pharmacotherapy after starting CGM suggests that changes to diet and lifestyle have helped to drive improvements in glycemic control.

Carlson M, et al. Continuous Glucose Monitoring in Type 2 Diabetes: Demographics and Characterization Of Use Across A Large Integrated Healthcare System. Poster 600: ATTD 15th Scientific Session; April 27-30, 2022

Access CME content from Abbott delivered at ATTD and ADA

As well as the important updates on the accuracy and use of the FreeStyle Libre system, Abbott delivered a series of expert case studies as part of their Speaker's Corner program and produced a range of informative and accredited CME symposia. Together these provide an informative resource for all healthcare professionals on the latest application of flash glucose monitoring in glucose management for people with type 1 diabetes or type 2 diabetes.

These and a range of other diabetes CME content can be accessed at: clinicalwebcasts.com/diabetes

Using the FreeStyle Libre system reduces the time to treatment intensification for people with T2DM in Canada

Therapeutic inertia is an acknowledged hurdle to overcome for people with T2DM who are not achieving recommended glycemic targets. This study assessed the impact of using the FreeStyle Libre system on treatment intensification, compared to self-monitored blood glucose (SMBG) fingerprick testing in T2DM.

A matched retrospective cohort study was conducted using secondary private payer claims data for 850,000 adults in Canada over 24 months. Each month, participants were classified by 8 levels of therapy progression, from: no diabetes drug therapy, to intensive insulin therapy with multiple daily injections (MDI). A total of 373,871 patients met the inclusion criteria.

Across all treatment cohorts, the FreeStyle Libre treatment groups had a statistically higher probability of treatment intensification relative to the SMBG treatment group, independently from the starting therapy at the index date.

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These findings suggest that using the FreeStyle Libre system in T2DM can impact the decision by clinicians and patients to implement earlier and more intensive therapy modification. In this way, using the FreeStyle Libre system may reduce therapeutic inertia in T2DM.

Harris SB and Levrat-Guillen F. Effect of the FreeStyle Libre System on Diabetes Treatment for People with T2D: Results from a Retrospective Cohort Study Using Canadian Private Payer Claims Database. ADA 82nd Scientific Sessions 2022; 680-P

Focus on psychosocial aspects of diabetes

Enhancing the value of personal CGM in people with T2DM using medical and psychological strategies

Using CGM on a daily basis can provide people with T2DM with important biofeedback that can help them positively engage with their condition and help their HCP encourage adherence with therapy. In this study, a series of practical strategies for using CGM was investigated and outlined.

The study authors found that CGM was most effective in conjunction with collaborative dialogue with their HCPs. This included a brief discussion of HbA1c as a measure of diabetes control and a greater emphasis on time in range (TIR). Helping people with T2DM to embrace change-thinking of how they viewed trend arrows and the correct use of alarms or alerts was important to achieving improvements in HbA1c, TIR and glycemic variability. Trend arrows specifically were seen as important for insulin dosing decisions and behaviour modification.

When an individual has tangible evidence that a treatment action is accomplishing something, they are likely to take further positive action. In this context, short-term outcomes influence how patients feel about their diabetes.

Edelman S and Polonsky W. Medical and Psychological Approaches Towards Enhancing the Value of Personal CGM in the Type 2 Population. Poster 847: ATTD 15th Scientific Session; April 27-30, 2022

Psychosocial outcomes in young people with T1DM using glucose sensors and their parents

This prospective cross-sectional study explored psychosocial outcomes in parents and young people with T1DM using currently available glucose sensors.

Seventy young people with T1DM aged 6-18 years using glucose sensors and their parents were recruited; they completed questionnaires on quality of life (QOL) and fear of hypoglycemia (FOH) between February 2020 and January 2021. Medical records were used to obtain demographic and diabetes specific parameters.

The study found that parents had a higher mean (SD) FOH than children, 17.8 (10.4) vs. 12.8 (9.0), p=0.01, and lower diabetes specific QoL score, 78.8 (12.2) vs. 82.7 (10.3), p=0.02. There was no association of parental FOH or diabetes-specific QoL score with age, HbA1c, mean glucose levels, or time spent in hypoglycemia.

In the group of FreeStyle Libre users (n=45), lower diabetes-specific QoL for parents correlated with higher scanning frequency amongst their children. The authors concluded that different glucose monitoring modalities can potentially impact psychosocial outcomes, and that parents' perceptions of the risk, frequency and severity of hypoglycemia did not match those of their children.

Glocker V, et al. Psychosocial outcomes in young people with type 1 diabetes using glucose sensors. Poster EP323: ATTD 15th Scientific Session; April 27-30, 2022

Focus on diabetes management

Time in range, time below range and time above range are emerging as a standard of care in diabetes management

HbA1c has traditionally been seen as the gold-standard for assessing glucose control. With the emergence of time in range (TIR), time below range (TBR) and time above range (TAR), this study evaluated the use of these new glucometrics in clinical publications and clinical trials in diabetes.

The authors used Embase, MEDLINE and Clinical Trial Registries databases between 2010 and 2021, with clinical trials completed on or after 2010, to find relevant publications (n=1,561) and clinical trials (n=389). The number of publications and clinical trials reporting time in range (TIR) as a clinical outcome has shown exponential growth, from three publications and two clinical trials in 2010 to 657 publications and 65 clinical trials in 2021.

This analysis confirms that TIR is increasingly accepted as an emerging standard of care in diabetes. This should encourage physicians to use TIR, TBR and TAR as the standard of care in glucose control in people with diabetes by using glucose monitoring devices such as the FreeStyle Libre system.

Patel PM, et al. Time in range as a clinical outcome: results of longitudinal analysis of the literature and clinical trials. Poster presented at: ATTD 15th Scientific Session; April 27-30, 2022.

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Accuracy study reveals a MARD of 7.5% for adult users of the FreeStyle Libre 3 system

FreeStyle Libre 3 is the next generation FreeStyle Libre system, with an on-body component that is about 70% smaller than the FreeStyle Libre 2 sensor. The FreeStyle Libre 3 Accuracy study was conducted at 4 centres, involving participants on intensive insulin therapy.

This was a non-randomized, multi-center, single-arm study with 100 participants (95 of whom aged 6 years or older) on intensive insulin therapy.[1] No glycemic challenges were performed during the study sessions. System performance was evaluated in terms of percent accuracy with respect to venous plasma reference using the YSI 2300 Stat glucose analyzer, except for 5 subjects aged 4-5 years, for whom SMBG fingerstick measurements were performed for comparison.

Overall MARD for adults aged 18 years or older was 7.5%,[2] and for children and young people aged 6-17 years overall MARD was 8.6%,[2] compared to YSI reference values. Against SMBG reference values, MARD for children 4 or 5 years old was 10.0%.[2] Equally important, the MARD for days 1-3 following activation of the FreeStyle Libre 3 sensor was 8.6%. For glucose levels <70 mg/dL (3.9 mmol/L) 93.3% of readings were within ±20 mg/dL (±1.1 mmol/L) of capillary blood reference values.

These reported outcomes for the FreeStyle Libre 3 system show that accuracy at all stages of wear life and at low glucose concentrations can be favourably matched with capillary blood glucose reference values.[1,2]

1 Wilmot E (2022, April, 28) Continuous glucose monitoring accuracy and performance: impact on clinical decision making. (PowerPoint presentation) *Empowerment Through Next-Gen Technology: From Glucose Monitoring to Personalized Diabetes Care*, Symposium supported by Abbott at Advanced Technologies and Treatments for Diabetes (ATTD) Conference 2022, Barcelona, Spain). 2 Abbott Diabetes Care, Data on file 2022.

Reductions in HbA1c with flash glucose monitoring are sustained for up to two years in people with T1DM or T2DM

In a meta-analysis of 75 real-world studies, using the FreeStyle Libre system was associated with reductions in HbA1c within three months of initiation which persisted for up to 24 months.

The analysis covered studies involving 28,063 children and adults with T1DM and 2,415 adults with T2DM nd confirmed that using the FreeStyle Libre system is associated with significant reductions in HbA1c. For adults these reductions are evident by 3 months after starting flash glucose monitoring, with a fall in HbA1c of -0.53% in T1DM and by -0.45% in T2DM. These reductions are correlated with the baseline HbA1c for FreeStyle Libre users. At the 4.5-7.5 month point, for every percentage point increase in mean baseline HbA1c, adult users with T1DM had an additional -0.49% reduction in HbA1c and users with T2DM had an additional -0.35% fall. These benefits are shown to persist for up to 24 months in T1DM and at least up to 12 months in T2DM.

The observed patterns of change in HbA1c after starting the FreeStyle Libre system in T1DM and T2DM across these 75 real-world studies were not different, indicating that flash glucose monitoring can be used in the same way to reduce long-term glucose exposure for adults with either T1DM or T2DM.

Evans M, et al. Evans et al. Reductions in HbA1c in type 1 and type 2 diabetes with flash glucose monitoring are sustained from 3-24 months: a meta-analysis of real-world observational studies. Poster 151: ATTD 15th Scientific Session; April 27-30, 2022.

Continuous use of the FreeStyle Libre system for two years leads to sustained improvement in glycemic control in T1DM

This prospective observational study evaluated the impact of the FreeStyle Libre system over two years when accompanied by an educational program.

People with T1DM (n=332, age ≥ 16 years) were recruited at a single center in Spain, that provided FreeStyle Libre users with a nurse-led educational program on the use of flash glucose monitoring and based on two initial group sessions and individual visits at 3, 6, 12 and 24 months. Baseline measures for HbA1c, mean glucose, TIR, and TBR, were 7.5%, 161.5 mg/dL, 55.9% and 9.1%, respectively. 275 participants completed the first 12 months of flash glucose monitoring, with reductions in estimated HbA1c (from 7.5% to 7.1%) and mean glucose from (161.5 mg/dL to 155.2 mg/dL), an increase in TIR (from 55.9% to 62.3%) and a reduction in TBR (from 9.09% to 6.97%).

After 2 years follow up on 248 participants, the improvements in HbA1c, mean glucose and TIR were all sustained, and TBR had further improved (5.14%). These outcomes indicate that long-term use of the FreeStyle Libre system, supported by appropriate education, leads to sustained and progressive improvements in glycemic control for people with T1DM.

Bodoque Cubas PJ, et al. Real Life Implementation Of The Flash Glucose Monitoring System In A Tertiary Hospital: Analysis Of Metabolic Control And Glycometric Parameters At Two Years Follow-Up. Poster 330: ATTD 15th Scientific Session; April 27-30, 2022

Understanding different types of glycemic variability can help to identify people with diabetes at risk of hypoglycemia

This study aimed to assess glucose variability and hypoglycemia exposure by contrasting total and within-day coefficient of variation (t-CV, wd-CV) using the FreeStyle Libre system for guidance.

The authors used de-identified data from 1,002,946 FreeStyle Libre glucose sensors and sorted them into ten centiles (n=25,074 readers per group) based on daily scan frequency. These were then grouped into quartiles based on t-CV and wd-CV. In order to achieve the consensus target of <1% time below range <54 mg/dL, the data showed that the t-CV and wd-CV values were 39.5% and 33.5% percent, respectively.

While both t-CV and wd-CD are associated with time below 54 mg/dL, wd-CV is always less than t-CV at any given level of hypoglycemia exposure. The authors conclude that a the consensus target of <36% CV might not be appropriate to ensure low risk of hypoglycemia, and that appropriate thresholds could be set of t-CV <39.5% or wd-CV <33.5%, reflecting differences in total or within-day glycemic variability.

Wojtusciszyn et al. Real world time below range related to glucose variability measured by either total or within-day coefficient of variation. Oral communication ID-79, ATTD 15th Scientific Session; April 27-30, 2022.

Access to CGM systems and telemonitoring using sustainable eHealth services for the diabetes community

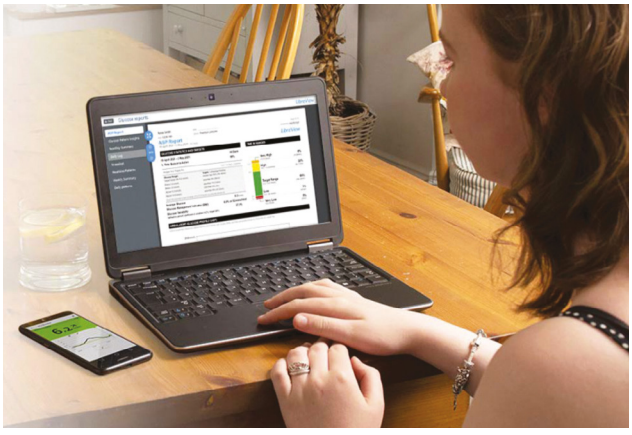
The goal of increased telemedicine as part of diabetes care has been intensified and accelerated as a consequence of the COVID-19 pandemic. This multidisciplinary consensus highlighted the benefits, challenges and solutions for providing access to telemedicine, and the lessons learned after COVID-19.

A group of experts from across Europe established a consensus on the benefits and potential hurdles to accessing continuous glucose monitoring (CGM) systems and their value in telemedicine for people with diabetes. The key challenges that must be met for telemedicine to become standard care in diabetes include limited eHealth education, lack of data integration, and concerns about patient consent and privacy.

The expert group pinpointed several actions that should be a focus in optimizing the value of CGM, telemonitoring and telemedicine. These include, more investment, ensuring access to technology, protecting patient data, incentivizing adoption, and a more flexible approach from regulatory and heath technology assessment bodies in evaluating telemedicine and telemonitoring. They also urged the health policymakers of European countries to take a pan-European action when implementing these solutions for better results.

Ultimately, European stakeholders must work together to better understand and develop best practices for implementing sustainable solutions that support wider application of technologies for telemonitoring and telemedicine in diabetes.

Bellido V, et al. Lessons learnt from COVID-19 for Health Systems: the use case of diabetes remote learning. Poster 44. ATTD 15th Scientific Session; April 27-30, 2022.



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Focus on hypoglycemia risk

Effect of pre-dawn meal timing and hypoglycemia risk in people with T1DM during Ramadan

IDF-Diabetes and Ramadan guidelines recommend a late pre-dawn meal, which does not give much time for glycemic correction and can lead to breaking the Ramadan fast in the early hours. This study compared hypoglycemia risk following early (90-120 mins before dawn) or late (30 mins before dawn) pre-dawn meals.

A total of 44 people with T1DM older than 14 years were randomized to early *vs.* late pre-dawn meal regimens for a week then crossed to the other regimen the second week. Data were collected using pre/post-Ramadan questionnaires and the FreeStyle Libre system. Self-reported hypoglycemia requiring a break in fasting was 64.5% for the early pre-dawn meal group, compared to 58.1% in the late pre-dawn meal group (p=0.16). Mean hypoglycemic events detected by the FreeStyle Libre system were 5.5 per patient per week for the early pre-dawn meal group and 5.4 events for the group taking the late pre-dawn meal, p=0.65.

Analysis of AGP reports indicated no significant difference in GMI, Time in range (70-180 mg/dL), Time below range (<70 mg/dL) or Time above range (>180 mg/dL) between the early and late pre-dawn mealtime regimens.

From this study there was no difference between early and late pre-dawn meal, confirming that managing T1DM and hypoglycemia is challenging during Ramadan. Adjusting the timing of pre-dawn meal and insulin dosing to allow post-meal correction provides some flexibility. However larger studies are needed to demonstrate effectiveness of this approach.

Alamoudi R, et al. Suhoor Timing in T1DM Patients Fasting during Ramadan: A Randomized Crossover Trial. ADA 82nd Scientific Sessions 2022; 712-P

The FreeStyle Libre system helps reveal time of day with highest hypoglycemic risk for people with T1DM who meet targets for time in range and time below range

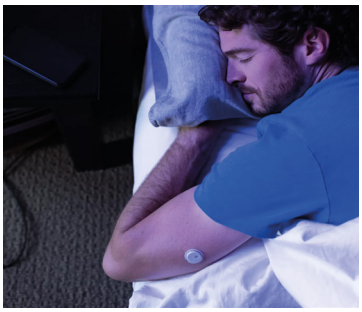

Image for illustrative purposes only. Not real patient.

The aim of this study was to determine the time of day with the highest hypoglycemia risk for people with diabetes who meet consensus targets for time in range (TIR) and time below range (TBR).

In this study de-identified data were analyzed from 60,446 FreeStyle Libre users who met CGM targets for >70% TIR, <4% TBR <70 mg/dL and <1% TBR <54 mg/dL. Glucose patterns were analyzed at different times of the day for this cohort of FreeStyle Libre users and indicated that there was a high hypoglycemia risk in 18% of these users.

Results also showed that, despite meeting consensus targets for TIR and TBR, patients are still at the risk of hypoglycemia at a specific time of day. This study confirms that understanding their glucose patterns can reduce adverse hypoglycemia for people with diabetes who meet consensus glycemic targets, by revealing the most-risky time of the day for low glucose. This may also help them identify the root cause of this problem.

Bhattacharya A, et al. To identify time of day with hypoglycemia in persons who achieve goals for time in range and time below range ID-50: ATTD 15th Scientific Session; April 27-30, 2022

Flash glucose monitoring reduces impaired awareness of hypoglycemia and severe hypoglycemia in people with T1DM

This subanalysis of the ABCD audit data investigated the before and after impact of flash glucose monitoring on the prevalence of impaired awareness of hypoglycemia (IAH), factors associated with IAH and improvement in hypoglycemia awareness among adults with T1DM in the UK.

The authors analysed data from 14,248 adults (96.4% with T1DM) before and after starting flash glucose monitoring to assess the prevalence of IAH and associated factors, along with hypoglycemia awareness using the GOLD score, with a score of ≥4 indicating IAH and a score ≥7 indicating complete unawareness. With the follow-up data in 6,383 people (mean follow-up time 7.6 months), prevalence of IAH and complete unawareness of hypoglycemia decreased from 28.1% and 3.7% at baseline to 18.1% and 3.2% with flash glucose monitoring use respectively. Importantly, severe hypoglycemia was reduced from 14.4% at baseline to 4.7% with flash glucose monitoring use.

Although FreeStyle Libre use improves hypoglycemia awareness (p<0.001) and increases time in range (p=0.004), prevalence of IAH remains very high in T1DM. The study does indicate that use of the FreeStyle Libre system can help to improve hypoglycemia awareness among people with T1DM.

Pieri TB, et al. Impaired Awareness of Hypoglycaemia; Prevalence and Associated Factors Before and After FreeStyle Libre Use in the Association of British Clinical Diabetologists (ABCD) Audit. Poster 194: ATTD 15th Scientific Session; April 27-30, 2022

Focus on older people with diabetes

Effectiveness of flash glucose monitoring in people with diabetes aged 65 years or older

The efficacy of the FreeStyle Libre system is well established for people with T1DM and T2DM, but there are limited data regarding flash glucose monitoring in older individuals. This study investigates whether people with diabetes aged 65 years or older using the FreeStyle Libre system are meeting consensus targets for time in ranges.

The study included 36 people with diabetes aged 65 years or older who had sufficient FreeStyle Libre data for analysis. Amongst these, 75% met the consensus target in older people for >50% of TIR 3.9-10 mmol/L, and 72% met the consensus target for <4% TBR <3.9 mmol/L recommended for younger people with diabetes. However, only 17% met the target in older people for <1% TBR <3.0 mmol/L. With regard to glycemic variability, 61% of older people with diabetes had a CV of ≤36%.

Since the majority of participants met the consensus target for TIR, the authors conclude that using the FreeStyle Libre system was effective in this older population. However, when they are not in their target glucose range, many of these older people with diabetes are at risk of hypoglycemia. This older population might be recommended to use the FreeStyle Libre system with optional alarms to reduce this risk of low glucose.

Gill D, et al. Evaluating the efficacy of FreeStyle Libre flash glucose monitoring in the older population. Poster EP13: ATTD 15th Scientific Session; April 27-30, 2022.

Significant variation between HbA1c and average glucose in T1DM is evident across different ethnicities and ages

Different factors influence the glycation of HbA1c such that it may not accurately reflect average glucose. The aim of this study was to investigate the effect of age, gender and race on this relationship in different ethnicities with T1DM.

This prospective cohort study involved 216 participants with T1DM. Data obtained from continuous glucose monitoring (CGM) and HbA1c values were tested over three months. A kinetic model was used to calculate the apparent glycation ratio (AGR) for each patient.

The results show a statistically significant difference in AGR between white and black populations noted as 69.9 and 74.2 ml/g, respectively. Age also affected the AGR, being highest in people >50 years old (75.4 ml/g), decreasing in those aged 19-50 years (73.2 ml/g), with a further drop in the youngest group (71.0 ml/g). Gender did not affect the relationship between average glucose and HbA1c. The authors conclude that AGR calculations can be used to develop individualized HbA1c targets for people with diabetes, based on age and race. Ethnicity-based, individualized HbA1c targets may lead to better glycemic control in people with T1DM.

Xu Y, et al. personalized glucose-HbA1c relationship for clinical management of individuals with diabetes. Poster 32: ATTD 15th Scientific Session; April 27-30, 2022.

Image is for illustrative purposes only. Not real patient.

Impact of the FreeStyle Libre system on time in range and time below range in older adults with insulin-treated T2DM

Hypoglycemia is a limiting step for optimizing glycemic control in older adults. This prospective observational cohort study assessed changes in TBR <70 mg/dL and TIR 70-180 mg/dL using the FreeStyle Libre system in adults >65 years old with insulin-treated T2DM.

Paticipants were identified from a public hospital and a private diabetes clinic (n=462). Participants wore the FreeStyle Libre system continuously during a 6-week study period, with clinic visits every 2 weeks for data downloading and placement of a new FreeStyle Libre se nsor.

A total of 125 participants were randomized, 49 of whom completed the 6 weeks follow-up. The participants had a median TIR of 65% at baseline and 68% after 6 weeks using the FreeStyle Libre system. The median TBR was 3% at baseline and 2% at study end. This study suggests that individualized care is possible using the FreeStyle Libre system to manage hypoglycemia and thus avoid overtreatment or undertreatment of T2DM in older adults, which can be helpful in diabetes care.

Leite SA, et al. Time in Range and Time Below Range in Insulin-Treated Older Adults with Type 2 Diabetes. ADA 82nd Scientific Sessions 2022; 704-LB

Focus on cost-impact benefits

Flash glucose monitoring with optional alarms is cost-effective in Swedish adults with diabetes on intensive insulin therapy

This study investigated the cost-effectiveness of using the FreeStyle Libre system compared to self-monitored blood glucose (SMBG) finger prick testing amongst adults with diabetes in Sweden on intensive insulin therapy.

Clinical trials on the use of continuous glucose monitoring (CGM) have shown declines in severe hypoglycemic episodes (SHEs) compared to SMBG testing. CGM-related alarm fatigue might be avoided with the FreeStyle Libre 2 system with optional alarms, which also has a lower acquisition cost than traditional CGMs. Using the IQVIA CORE model over a 50-year horizon, the cost-effectiveness of the FreeStyle Libre 2 system versus SMBG was analyzed in Swedish adults with diabetes and impaired awareness of hypoglycemia (IAH), receiving intensive insulin therapy.

According to the base case analysis, using the FreeStyle Libre 2 system provided 0.72 additional quality-adjusted life years (QALYs) compared with SMBG. Medical expenses for the FreeStyle Libre 2 system were SEK 1.64 million compared to SEK 1.48 million for SMBG, with an incremental cost-effectiveness ratio of SEK 226,000/QALY. All incremental cost-effectiveness ratios (ICERs) were below SEK 300,000/QALY, which is below usual in Sweden. The main drivers were reduced costs associated with SHEs. This study confirms that the FreeStyle Libre 2 system is more cost-effective than SMBG for people with diabetes and IAH who are on intensive insulin therapy.

Hellmund R, et al. Abstract number 232. Cost-Effectiveness Of Flash Glucose monitoring With Optional Alarms In Swedish Adults With Diabetes And Impaired Awareness Of Hypoglycaemia, Using Intensive Insulin. Presented at ATTD 15th Scientific sessions April 27-30, 2022

Cost-Effectiveness of the FreeStyle Libre system compared to SMBG in people with T2DM on intensive insulin therapy in Israel

The aim of this study was to assess the cost-effectiveness of the FreeStyle Libre system compared to SMBG testing for people with T2DM on multiple daily injections of insulin (MDI) in Israel.

Literature over a 5-year duration was analysed and incremental cost per QALY gained calculated, both for flash glucose monitoring and SMBG. Costs and incidence rates of diabetic ketoacidosis (DKA) and severe hypoglycemic events (SHEs) were taken from real-world data in Israel and France.

Analysis showed that using the FreeStyle Libre system resulted in a cost increase of ILS 27,021 ($US 8,444) and a reduction in HbA1c and rates of SHEs or DKA. Overall, using the FreeStyle Libre system showed an incremental gain of 0.26 QALYs compared to SMBG, resulting in an ICER of ILS 103,977 ($US 32,493) per QALY. Factoring in patient co-payments yielded an ICER of ILS 91,901 ($US 28,719) per QALY; extrapolating this over three years increased the ICER to ILS 106,030 ($US 33,134) per QALY.

Using the FreeStyle Libre system results in significant QALYs gain at manageable costs for people with T2DM on MDI and is a cost-effective alternative to SMBG for T2DM patients in Israel on MDI therapy.

Greenberg D. Cost-Effectiveness of the FreeStyle Libre® System Versus Blood Glucose Self-Monitoring in patients with type 2 diabetes on MDI insulin Treatment in Israel. ADA 82nd Scientific Sessions 2022; 73-LB

Reduced hospital and emergency care resource use is associated with flash glucose monitoring

More than half of people with T1DM in the UK now have access to the FreeStyle Libre system. This study investigated the effect of flash glucose monitoring on glycemic control and resource utilisation for people living with diabetes in the UK.

The Association of British Clinical Diabetologists (ABCD) national audit of FreeStyle Libre use in the UK collected data in 16,034 people living with diabetes and using the FreeStyle Libre system, of whom 6,859 had follow-up data. Flash glucose monitoring was associated with a 67% reduction in hospital admissions due to hypoglycemia, a 63% reduction in hospital admissions related to hyperglycemia and/or diabetic ketoacidosis (DKA) and a 85% reduction in paramedic callouts.

At follow-up, the audit data showed that reductions in HbA1c were greater in those with a higher %TIR, with a mean reduction in HbA1c of 6.8 mmol/mol for people with TIR≥50% and a 9.8 mmol/mol reduction for those with TIR≥70%. None of the participants with TIR ≥50% had hospital admissions related to hypoglycemia during the follow-up period. The reduction in hospital admissions and paramedic callouts was independent of the TIR achieved.

Deshmukh H, et al. Time in range with Freestyle Libre (FSL);impact on glycaemic control and resource utilization in the ABCD national audit. Poster 444: ATTD 15th Scientific Session; April 27-30, 2022.

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