

**Methods:** Prospective screening of individuals visiting Apollo Sugar Clinics for doctor consultation from June – August 2018. The screening and risk scoring was done using a mobile tab with DEAR app prior to doctor consultation. The scoring and classification of risk such as no (0–8), low (9–12), medium (13–16), high (17–20) and severe risk (21–25) were defined considering the standard ADA guidelines.

**Results:** Nearly 70% (2707/3867) of the patients were at medium to severe risk. The severity of score increased with increasing age (>65 years), BMI (>30 kg/m<sup>2</sup>), disease duration (>5 years), type of medication (oral and insulin) and HbA1c (>9%). 42% of the patients had at least one of the following complications—lipid, kidney, eye, or foot. Lipid abnormality was the most common with respect to age, BMI, HbA1c. Further, medium to severe risk percentages was higher in oral+insulin medication group compared to only oral medication.

**Conclusion:** The scoring obtained enables the healthcare professionals for thorough investigations and can also serve as an early indicator for appropriate diabetes management program to achieve glycemic, blood pressure and lipid targets to delay complications for better patient outcomes. Patients with higher risk score can be educated appropriately by a health care team.

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### Devices Focused on Diabetic Preventions

#### ATTD19-0169

#### DECREASE IN GLYCEMIC VARIABILITY FOR T2D OVER SIX MONTHS IN PATIENTS MONITORING WITH A DIGITAL DIABETES MANAGEMENT SYSTEM

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High glycemic variability (GV) is a key risk factor in the presence of Diabetes. Frequent glucose fluctuations may not only contribute to increasing the average blood glucose, but also favors the development of chronic diabetes complications. Dario™ Blood Glucose Monitoring System, a digital Diabetes management system, may assist patients to reduce average glycemic levels and hyperglycemia events while simultaneously avoiding hypoglycemia.

A retrospective data evaluation study was performed on the Dario™ database. A population of T2D high-risk patients (blood glucose measurements average ( $GM_{avg}$ ) >180 mg/dL) measuring more than 20 times in the first 30 days (analysis baseline) was evaluated on days 60–90 (3 months) and 150–180 days (6 months). Standard deviation (SD) and  $GM_{avg}$  were calculated and compared to the baseline.

A group of 698 T2D high-risk Dario™ users was selected. GV was reduced by 10% and 14% from baseline through 3 and 6 months, respectively (SD of 55.7, 58.4 vs.65.0).  $GM_{avg}$  was reduced by 8% and 12% from baseline through 3 and 6 months, respectively ( $201.1 \pm 25.57$ ,  $192.8 \pm 54.3$  vs.  $219.5 \pm 38.5$ ) while patient's hypoglycemic event (<70mg/dL) was in average, less than one (<1) during this period. Subgroup analyses (355 patients) revealed substantial GV improvement among non-Insulin T2D patients. The GV was reduced by 14% and 18% from baseline through 3 and 6 months, respectively (SD of 52.8, 50.7 vs.61.7).

To conclude: Patients using a digital Diabetes management platform have the potential to promote behavioral modification

and enhance adherence to diabetes management, demonstrating better glycemic control.

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### Devices Focused on Diabetic Preventions

#### ATTD19-0265

#### RANKING PHYSIOLOGICAL, LIFESTYLE AND ENVIRONMENTAL RISK FACTORS FOR PREDICTING TYPE 2 DIABETES ONSET

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**Objective:** Type 2 diabetes (T2D) arises from the interaction of physiological, lifestyle and environmental risk factors. Numerous models, using different variables, were proposed in the literature to identify subjects at risk of developing T2D. To assess the relative importance of different risk factors, we developed a variable ranking strategy and applied it on the Multi-Ethnic Study of Atherosclerosis (MESA) dataset, including anthropometric measures, fasting glucose values, co-morbidities, lifestyle and environmental factors.

**Method:** A Cox model coupled with LASSO (COX-LASSO) was trained on 4,124 subjects from the MESA dataset to predict the time until incident T2D. COX-LASSO was trained in a Monte Carlo bootstrap resampling scheme with B=100 training/test splits. The Recursive Feature Elimination algorithm was used to rank variables within each bootstrap sample. Then, a global ranked list was derived ordering the variables according to their average ranking in the B resulting lists. COX-LASSO performance was assessed on the other 1,031 subjects from the MESA dataset by the Area Under the ROC curve (AU-ROC) at 10 years.

**Results:** COX-LASSO reaches performance comparable or superior to the other existing models (AU-ROC=0.91). The top 12 predictive variables selected by the model are, ranked by importance: fasting glucose, HDL, waist circumference, T2D family history, alcohol use, ethnicity, noise and lack of parks in the neighbourhood, antidepressants use, occupation, blood pressure, and hypertension.

**Conclusion:** Our approach highlights the importance of environmental variables to predict T2D onset. Interestingly, our model also selected depression, which is related to T2D but is not included in literature models.

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### Glucose Sensors

#### ATTD19-0011

#### EXPERIENCE OF CGM (CONTINUOUS GLUCOSE MONITORING) FOR CHILDREN AND ADOLESCENTS IN A PAEDIATRIC DIABETES UNIT

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**Objective:** Estimate the use of CGM in a Pediatric Diabetes Unit from a Spanish region. To find out differences between the different CGM systems (included flash type or intermittent) and according to the type of treatment. To analyze the metabolic control, frequency of mild and severe hypoglycaemia among the same patients before and after using CGM and to compare patients with and without CGM.

**Methods:** Data are collected from September to December 2017, from patients whose diagnosis was between 2003 and 2017. Patients are grouped in age groups (<5; 6–10;> 10) and demographic, metabolic control and treatment variables are collected.

**Results:** 120 patients collaborated, implying a response of 80%.70% use MDI, of which 48% use CGM, being 89% in the case of patients using CSII. In older than 10 years there is a predilection for intermittent measurement systems, unlike those under 5 years prefer continuous measurement. The use of CGM significantly reduces HbA1c compared to those who do not use them and significantly reduces the number of mild hypoglycaemia, with the disappearance of severe hypoglycaemia in 6 months. 43% of patients reduce the number of glycemia/day significantly after 6 months of use. CGM decreases almost a 5% the HbA1c value and a 19% the Coefficient of Variation.

**Conclusion:** There exists an improvement in the metabolic control and the glycemic variability of using CGM. Hypoglycemia is diminished by GCM, to a greater extent by the Integrated sensor-augmented pump system. Adolescents prefer to use intermittent measurement systems, reducing the number of glycemia/d.

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### Glucose Sensors

ATTD19-0012

#### THE IMPACT OF PHYSICAL EXERCISE ON SENSOR PERFORMANCE OF THE FREESTYLE<sup>®</sup> LIBRE INTERMITTENTLY-VIEWED CONTINUOUS GLUCOSE MONITORING SYSTEM IN TYPE 1 DIABETES—A RANDOMISED CROSS-OVER TRIAL

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**Background and Aims:** To evaluate the sensor performance of the Abbott Freestyle<sup>®</sup> Libre intermittently-viewed continuous glucose monitoring (iCGM) system to reference blood glucose levels during moderate-intensity exercise while on either full or reduced basal insulin dose in people with type 1 diabetes (T1D).

**Method:** Ten participants with T1D (4 females, age 32.1±9.0 years, BMI 25.5±3.8 kg/m<sup>2</sup>, HbA<sub>1c</sub> 7.2±0.6% (55±7 mmol·mol<sup>-1</sup>)) exercised on a cycle ergometer for 55 min at a moderate intensity for five consecutive days at the clinical research facility, on either a usual or a 75% basal insulin dose. After a four-week wash-

out period, participants performed the second exercise period with the remaining allocation. During exercise reference capillary blood glucose values were analysed by fully enzymatic-amperometric method and compared to the referring interstitial glucose values. iCGM accuracy was analysed by median absolute relative difference (MARD (interquartile range)), Clarke error grid and Bland-Altman analysis for overall glucose levels during exercise, stratified for glycaemic ranges and basal insulin dosing scheme (p<0.05).

**Results:** 845 glucose values were available during exercise to evaluate iCGM sensor performance. The overall MARD across the glycaemic range was 22%(13.9–29.7%), 36.3%(24.2–45.2%) during hypoglycaemia, 22.8%(14.6–30.6%) during euglycaemia and 15.4%(9–21%) during hyperglycaemia. A usual basal insulin dose was associated with a decreased sensor performance during exercise compared to the reduced basal insulin period (MARD: 23.7%(17.2–30.7%) vs. 20.5%(12–28.1%), p<0.001).

**Conclusion:** The iCGM sensor showed diminished accuracy during exercise. Absolute glucose readings derived from the iCGM sensor should be used cautiously and need confirmation by additional finger prick blood glucose measurements.

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### Glucose Sensors

ATTD19-0027

#### COST EFFECTIVENESS OF REAL-TIME CONTINUOUS GLUCOSE MONITORING COMPARED WITH SELF-MONITORING OF BLOOD GLUCOSE FOR TYPE 1 DIABETES PATIENTS IN THE UNITED KINGDOM

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**Background:** The study was designed to estimate the economic value of a new generation rt-CGM (lasts 10 days, no calibration or SMBG, optional receiver) compared with self-monitoring of blood glucose (SMBG). Our analysis used the new Type 1 Diabetes (T1D) Consensus Guideline framework (Diabetes UK, 2018) and complication costs specific to the United Kingdom (UK).

**Methods:** A published and validated economic model was used to assess the long-term (50-year) cost-effectiveness of rt-CGM compared to SMBG for UK patients with T1D. All assumptions were based on published evidence with preference for randomized controlled trials when feasible, followed by other published literature on complications and costs (£2018). Key base case assumptions included: 1) starting HbA<sub>1c</sub> >8.5%; 2) change in HbA<sub>1c</sub>: -1.29% (rt-CGM), -0.53% (SMBG); 3) rates for non-severe hypoglycemic events (NSHEs), severe hypoglycemic events not requiring medical assistance (SHE1) and those severe hypoglycemic events requiring medical assistance (SHE2). Costs and clinical outcomes were discounted at 3.5% per year.

**Results:** Base case incremental cost-effectiveness ratio (ICER) for rt-CGM compared with SMBG was £3,976/QALY. Sensitivity analyses performed under shorter time horizons, increasing NSHE, SHE1 and SHE2 hypoglycemia rates for rt-CGM, and reducing all hypoglycemia disutility rates resulted in ICERs ranging from £3,584/QALY to £22,162/QALY. All ICERs in our analyses were within or very close to the £20,000/QALY threshold attributed to NICE for the UK.