

## Poster Abstracts

### POSTER TOUR 1—COVID # 1

#### P001 | Glycemic variability and time in range among children with type 1 diabetes on insulin pump during the COVID-19 pandemic

A. Abdel Maksoud<sup>1</sup>, N. Yousef Salah<sup>1</sup>, S. Ayoub<sup>2</sup>

<sup>1</sup>Ain Shams University, Cairo, Egypt, <sup>2</sup>Al Rahmaneya Hospital, El Behera, Egypt

**Introduction:** COVID-19 has impacted the lives of individuals worldwide especially those with chronic illnesses. Children with type 1 diabetes (T1DM) are at risk of glycemic deterioration during the COVID-19 pandemic. However, some studies reported glycemic improvement in these children during the pandemic.

**Objectives:** To assess the impact of COVID-19 on glycemic control and acute complications among children with T1DM on insulin pump in Egypt.

**Methods:** A 42 children with T1DM on insulin pump for at least 1 year were assessed for insulin requirements, insulin-pump problems, frequency of diabetic-ketoacidosis (DKA), hypoglycemia, and HbA1C. Continuous-glucose monitoring was done using Medtronic i-pro device for 5 days. Data were compared to those obtained from the patients' medical records 1 year previously.

**Results:** A 29 children (69%) had insulin-pump problems in the form of skin irritation (31%), skin infection (7.1%) and pump obstruction (31%). The mean insulin requirement of the studied children with T1DM during the COVID-19 pandemic was  $0.88 \pm 0.30$  U/kg/day. Their median time in range (TIR) was 57%, and their mean coefficient of variation (CV) was 38.2%. A significant increase in the daily insulin dose ( $p = 0.001$ ), basal % ( $p = 0.011$ ), TIR ( $p = 0.009$ ), CV ( $p = 0.001$ ) and HbA1C ( $p = 0.001$ ) occurred during the COVID-19 pandemic with a significant decrease in the frequency of DKA ( $p = 0.001$ ) and hypoglycemia ( $p = 0.004$ ). Hypoglycemia and nocturnal hypoglycemia were positively correlated to CV ( $p = 0.002$  and  $p = 0.01$ , respectively) and negatively correlated to TIR ( $p = 0.039$  and  $p = 0.009$ , respectively).

**Conclusions:** Children with T1DM on insulin pump showed glycemic improvement with decreased acute complications during the COVID-19 pandemic.

#### P002 | Role COVID-19 infection on the development of type 1 diabetes in children and teenagers

M. Aripova<sup>1</sup>, F. Khaydarova<sup>1</sup>, N. Alimova<sup>1</sup>, A. Alieva<sup>1</sup>, S. Azimova<sup>1</sup>, A. Sadikova<sup>1</sup>

<sup>1</sup>Center of Endocrinology, Tashkent, Uzbekistan

**Introduction:** In December 2019, a new RNA-beta coronavirus infection emerged in Wuhan, China. The disease quickly spread around the world, and by March 11, the COVID-19 outbreak was classified as a pandemic disease.

**Objectives:** To study the role of COVID-19 infection in the manifestation of type1diabetes mellitus in children and adolescents.

**Methods:** During the year, 30 newly diagnosed children and adolescents with type 1 DM were examined after suffering acoronovirusinfection with acute diabetic complications, hospitalized in the children's and intensivecare department of the Center Endocrinology of Uzbekistan.Resultsare presentedas means  $\pm$  SD.

**Results:** In the period from March 2021 to February 2022, 83 children and adolescents with first diagnosed type 1 diabetes mellitus turned to the clinic. During the examination, positive antibody to SARS-CoV were detected in 30 patients, which amounted to 36%. The mean age was  $10.5 \pm 0.8$  years.From0to 14 years old–76.6% (23 children), from 15 to 18 years old–23.3% (7 adolescents).According to anamnestic data, 10 patients (33.3%) indicated the period of the disease, symptoms. In 20 (77%) patients, the disease was asymptomatic. A 7 patients (70%) had mild disease. Clinical symptoms: body temperature rise 38.5, weakness, sore throat. In 3 of them, a moderately severe course was observed, accompanied by prolonged fever and cough with sputum difficult to separate (30%), hospitalization in a special institution was required. Therapy for COVID infection consisted of antibiotic therapy and symptomatic treatment.1patient required injections of corticosteroids (dexamethasone 1 ml No. 3).

**Conclusions:** According to available data, children get sick less often, with less pronounced clinical symptoms, require hospitalization less often, their disease is milder, which, however, does not exclude cases of severe course. The data available today indicate that children make up to 10% of those infected with SARS-CoV-2 and up to 2% of patients diagnosed with clinical cases of COVID-19.

#### P003 | Lessons learnt from COVID-19 pandemic in maintaining medical supplies to type 1 diabetes disadvantaged communities in low-middle-income countries in Southeast Asia

S.M. Ng<sup>1,2</sup>, N. Toomey<sup>3</sup>, B. Manet<sup>4</sup>, L. Finnigan<sup>5</sup>, H.L. Kyaw<sup>6</sup>, K. Khambuapha<sup>7</sup>, T. Martin<sup>3</sup>, F. Ooi<sup>3</sup>

<sup>1</sup>University of Liverpool, Liverpool, United Kingdom, <sup>2</sup>Southport and Ormskirk Hospitals NHS Trust, Southport, United

Kingdom, <sup>3</sup>Action4Diabetes, Somerset, United Kingdom, <sup>4</sup>Kantha Bopha Children's Hospital, Phnom Penh, Cambodia, <sup>5</sup>Southport and Ormskirk

Hospital NHS Trust, Southport, United Kingdom, <sup>6</sup>550 Bedded Mandalay Children Hospital, Mandalay, Myanmar, <sup>7</sup>University of Health and Science, Vientiane, Lao People's Democratic Republic

**Introduction:** As COVID-19 spread across Southeast Asia (SEA) in 2020–2021, healthcare systems in Cambodia, Laos and Myanmar braced as public health officials closed outpatient diabetes clinics and healthcare professionals (HCPS) were redeployed to COVID-treatment zones. Action4Diabetes (A4D) is a non-profit organization providing free insulin and medical supplies to SEA since 2016. With limited healthcare coverage in Cambodia, Laos, and Myanmar, patients enrolled on A4D's program travel hundreds of miles to diabetes clinics to collect free insulin, blood glucose strips and other medication. Due to COVID-19 lockdowns, insulin often arrived with short expiry dates due to delays in shipments caused by bottlenecks at international logistic hubs, and patients were known to ration insulin due to lack of supply. For disadvantaged people with Type 1 diabetes (T1D) in SEA low-middle-income countries (LMICs), this posed a serious threat due to inaccessible insulin and medical supplies.

**Objectives:** A4D developed a strategic plan to maintain accessible medical supplies and supported the development of remote e-consultations.

**Methods:** *Access to medical supplies and e-consultations.*

A4D initiated e-consultations and networks of couriers to rural parts of Myanmar, Laos, and Cambodia to deliver medical supplies. In Cambodia, TukTuk drivers who ferried tourists around Angkor Wat were used to deliver insulin to the T1D in farming communities. In Myanmar and Laos, agriculture truck drivers that transported vegetable crops were used to transport medical supplies to remote areas. During COVID-19, A4D used local suppliers for insulin and had to purchase insulin and blood testing strips at a premium rate.

**Results:**

**Conclusions:** For many disadvantaged people with T1D in SEA, the COVID-19 pandemic reinforced the fragile nature of their T1D management. Through collaborating closely with HCPs on the ground, A4D has developed a more dynamic and resilient logistical system to maintain key life-saving medical supplies.

**P004 | Auxological data and glycemic control in children and adolescents with type 1 diabetes 2-years after the COVID-19 pandemic**

L. Iughetti<sup>1,2</sup>, F. Candia<sup>2</sup>, F. Stefanelli<sup>2</sup>, V. Trevisani<sup>2</sup>, P. Bruzzi<sup>1</sup>, B. Predieri<sup>1,2</sup>

<sup>1</sup>University of Modena and Reggio Emilia, Department of Medical and Surgical Sciences of the Mother, Children and Adults - Pediatric Unit, Modena, Italy, <sup>2</sup>University of Modena and Reggio Emilia, Department of Medical and Surgical Sciences for Mothers, Children and Adults - Post-Graduate School of Pediatrics, Modena, Italy

**Introduction:** Since the beginning of the coronavirus disease 2019, (COVID-19) pandemic concerns for consequences on auxological data and glycemic control in patients with type 1 diabetes (T1D) were raised.

**Objectives:** To investigate the 2-years effects of the COVID-19 pandemic on body mass index (BMI) and glycemic control in children and adolescents with T1D.

**Methods:** Data on type and number of annual visit, auxological parameters [height (Ht), weight, and waist circumference (W)], insulin total daily dose (TDD), glycemic control (HbA1c), and weekly physical activity were collected during the annual routine outpatient visit between Dec 2021–Feb 2022 (T2) and were compared with those during the same period in 2019–20 (T0; before lockdown) and in 2020–21 (T1).

**Results:** A 83 children and adolescents with T1D [65% male; median age 14.3 years (range 6.3–18.5); T1D duration 7.09 years (range 2.9–16.3)] were enrolled. The annual number of outpatient visits decreased (4 vs. 3 vs. 3;  $X^2 = 74.2$ ;  $p < 0.0001$ ), while frequency of patient using telemedicine increased (0 vs. 55.4 vs. 33.7%;  $X^2 = 48.1$ ;  $p < 0.0001$ ). BMI z-score significantly changed between periods, remaining within normal range values (0.19 vs. 0.08 vs. 0.23 SDS;  $X^2 = 15.9$ ;  $p < 0.001$ ). Height and Wht ratio were comparable. Physical activity was significantly different between periods (4 vs. 0 vs. 5 h/week;  $X^2 = 128.4$ ;  $p < 0.0001$ ) as well as insulin TDD (0.84 vs. 0.92 vs. 0.92 IU/kg/day;  $X^2 = 8.19$ ;  $p = 0.017$ ). Average of annual HbA1c values significantly improved (62.1 vs. 60.5 vs. 60.6 mmol/mol;  $X^2 = 12.8$ ;  $p = 0.002$ ). Rate of

January 2020 to December 2021	Laos (n = 56 supported A4D patients)	Myanmar (n = 90 supported A4D patients)	Cambodia (n = 181 supported A4D patients)
Total number of patients who received remote e-consultations	44	33	40
Total number of insulin deliveries via alternative transportations that is, TukTuk/agriculture trucks	24	65	Minimally affected (usual A4D supplies direct to local hospitals were maintained and unaffected by the pandemic)
Total number of blood glucose testing kits deliveries via alternative transportations that is, TukTuk/agriculture trucks	24	130	Minimally affected (usual A4D supplies direct to local hospitals were maintained and unaffected by the pandemic)

secondary DKA remained comparable and no severe hypoglycemic event was recorder during follow-up.

**Conclusions:** In our patients, BMI z-score was unchanged and glyce-mic control remained improved in the 2-years after COVID-19 pan-demic spread. Our data may be possibly related to both the resuming of regular exercise and the increased use of sensor during T1 that allowed to continue with telemedicine visits in T2, adjusting patients' insulin TDD and avoiding acute complications.

#### P005 | COVID-19: What is the impact of the pandemic on pediatric endocrinology & diabetes?

S. Abourazzak<sup>1</sup>, A. Sqalli<sup>1</sup>, S. Chaouki<sup>1</sup>, M. Hida<sup>1</sup>

<sup>1</sup>Faculty of Medecine and Pharmacy of Fez, Sidi Mohamed Ben Abdellah University, Pediatrics, Fez, Morocco

**Introduction:** The COVID-19 has serious impact on several systems including health.

**Objectives:** Understanding the impact of the COVID-19 pandemic by evaluating Pediatric Endocrinology & diabetes activity.

**Methods:** Retrospective and descriptive study was conducted. We compared the periods before and after containment in 2020 with 2019 of consultations as well as Endocrinology & diabetes hospitaliza-tions, focusing on diabetes, at the pediatric department.

The 2 periods are defined:

**Period 1:** March 20 to June 10 2020 (containment period) and June 10 to September 10 2020(post containment period).

**Period 2:** the same periods in 2019.

**Results:** - Pediatric Endocrinology & diabetes hospitalizations consultations: A 64% decrease in consultations in 2020 compared to 2019 (798 consultations vs. 286) was noted when comparing the 2 periods. For the containment and post-containment periods in 2020: we report an 18% decrease in post-containment consul-tations. For the containment period, a decrease of 66% was noted in 2020 compared to the same period in 2019 (141 patients vs. 417).

- Diabetic Hospitalizations: A 36% increase in 2020 compared to the similar period in 2019, as well as a 64% increase in severe cases trans-ferred from the ICU were observed throughout the study period.

An increase of 61% was noted during the post containment period compared to the Lockdown period, of diabetic hospitalizations with a 55% ascension of severe DAC transferred from the ICU. For the lock-down period, we noted the same number of patients with more severe cases.

**Conclusions:** SARS-CoV-2 has an impact on the quality of care in gen-eral, with a repercussion on several hospital activities, which has impacted the number of hospitalized patients and severe cases.

#### P006 | Knowledge of final year medical students about diabetes mellitus during and after COVID-19 pandemic, single university experience

W.H. Abdullah<sup>1</sup>, H. Alsaffar<sup>2</sup>

<sup>1</sup>Al-Mustansiriyah University, College of Medicine, Baghdad, Iraq, <sup>2</sup>Sultan Qaboos University Hospital, Child Health Department, Pediatric Endocrine and Diabetes Unit, Muscat, Oman

**Introduction:** COVID-19 pandemic had let to disruption of routine and medical education especially in the first few months from announcing the pandemic status globally. At Al-Mustansiriyah University in Baghdad-Iraq, there was a shift toward providing online classes where students could attend their classes from home in order to reduce the risk of infection transmission. Curfew and lockdown took place during differ-ent times in the year of announcing the pandemic 2020. Online sessions were introduced for the first time in the history of the University.

**Objectives:** To compare the knowledge of final year medical students at Al-Mustansiriyah University about diabetes mellitus during and after the COVID-19 pandemic.

**Methods:** By running an online questionnaire to the 6th year medical students of classes 2019-2020 and 2021-2022. A 39 Questions included 5 main domains; demographics, pathophysiology, diagnosis, management, and technology related to diabetes mellitus. Descriptive analysis was used.

**Results:** Total of 198 students responded, 129 (89F) from the first period, and 69 (43F) from the second period. The self-assessment of knowledge indicated better ratings among students in the second period compared to students from the first period. Overall more stu-dents had attended diabetology classes and felt more prepared to apply their knowledge post pandemic (table 1).

The overall score for correct answers from students of class 2021-22 was higher than the score of students of class 2019-20, 64.6% versus 57.2% respectively.

**Conclusions:** The pandemic had affected the students' attendance for diabetology classes, which resulted in less knowledge, that reflected on lower rating of self-assessment and confidence to deal with diabe-tes. Final year medical students post pandemic had better chance to learn. Those gaps in knowledge need to be bridged during the post-graduate training and education.

	During pandemic (%) n = 129	Post pandemic (%) n = 69
Attendance of diabetology classes	80.3	91.3
Feeling that undergraduate course had covered diabetes and its related topic thoroughly	37	59.4
Feeling un-prepared to manage patients live with diabetes medically	51.9	34.8

**P007 | Use of non-invasive continuous monitoring of blood glucose and self-monitored blood glucose in children with type 1 diabetes mellitus in a resource limited setting during COVID-19 pandemic**

S. Padmanaban<sup>1</sup>, S. Kiran<sup>2</sup>, V. Hn<sup>1</sup>, A. Hegde<sup>1</sup>, S. Olety<sup>3</sup>

<sup>1</sup>Indira Gandhi Institute of Child Health, Pediatric Endocrinology, Bengaluru, India, <sup>2</sup>Indira Gandhi Institute of Child Health, Pediatrics, Bengaluru, India, <sup>3</sup>Karnataka Institute of Endocrinology and Research Center, Pediatric Endocrinology, Bengaluru, India

**Introduction:** COVID-19 pandemic has affected everyone's life, especially children with Type 1 DM with a poor economic background. Monitoring of blood glucose and their follow up with the health care professionals were badly affected during these times.

**Objectives:** To assess the effectiveness of continuous blood glucose monitoring and SMBG on HbA1c level in children with Type 1 diabetes mellitus in COVID-19 pandemic.

**Methods:** All children diagnosed with Type 1 Diabetes mellitus with poor economic background aged between 3 and 18 years attending the diabetic OPD in a tertiary care Government hospital in south India were included in this study. Participants were randomized to study arm (CGMS+SMBG) and control arm (SMBG alone). Subjects in study group were placed on ProCGM for 14 days along with regular SMBG and control group were asked to use SMBG and data were analyzed and used to titrate the insulin dose.

**Results:** There were 62 children in both the groups. In the intervention group, 30 were boys and 32 were girls. In the control group, 20 were boys and 42 were girls. In the intervention group, baseline and follow-up values of HbA1c were  $11.232 \pm 1.53$  and  $10.14 \pm 1.99$ ; hyperglycemia were  $61.42 \pm 24.35$  and  $55.12 \pm 22.14$ ; and hypoglycemia were  $3.12 \pm 0.215$  and  $3.10 \pm 0.96$  respectively. In the control group, baseline and follow-up values of HbA1c were  $11.62 \pm 1.62$  and  $11.78 \pm 1.57$ ; hyperglycemia were  $49.92 \pm 24.64$  and  $53.34 \pm 17.23$ ; and hypoglycemia were  $3.09 \pm 5.01$  and  $3.45 \pm 7.97$  respectively. There was a reduction in HbA1C levels ( $1.09 \pm 0.31$ ) and in incidences of hyperglycemia and hypoglycemia in the intervention group.

**Conclusions:** In resource limited settings, use of ProCGMS once in 2 or 3 months will help in understanding the factors affecting glycemic variability. It can reduce school absenteeism for hospital visits and also can be used as an educational tool for families in the management of diabetes.

**P008 | Impact of COVID-19 pandemic on glycemic control of children and adolescents with type 1 diabetes mellitus, two point observational study from a tertiary care center of low middle income country**

M. Arif<sup>1</sup>, F. Memon<sup>1</sup>, M. Haider<sup>1</sup>, K.N. Humayun<sup>1</sup>

<sup>1</sup>Aga Khan University, Pediatric Endocrinology, Karachi, Pakistan

**Introduction:** COVID-19 impacted lives of people globally, especially with chronic conditions like Type 1 Diabetes mellitus (T1DM). Since

its emergence and increase, pandemic restrictions were imposed in Pakistan too to counter infection and prevent spread. This situation posed challenges for T1DM children causing significant lifestyle changes, psychosocial distress, difficult medication access, monitoring, and physician follow-up. This study was planned to see how restrictions and adjustments in health care affected T1DM children by comparing glycemic control prior to and following pandemic.

**Objectives:** To evaluate impact of COVID-19 on glycemic control of children and adolescents with type 1 diabetes.

**Methods:** A 2 point observational cross sectional study was done in 139 T1DM children 10–18 years enrolled in pediatric endocrine clinic of Aga Khan University with disease duration >6 months. Demographics, clinic visits (pre and during pandemic) last HbA1c value before and last value during pandemic were recorded in structured questionnaire at 2 time points (Post pandemic face to face interview between Feb and April 2022 at follow up visit, pre pandemic data from hospital medical records between Sep 2019 and Feb 2020). Paired t-test was used to compare HbA1c values and number of clinic visits before and after.

**Results:** Out of 139 patients, 45% were male, 55% females. Mean age was 13.7 years. Mean HbA1c value increased from 8.7% during 6 months preceding pandemic restrictions to 9.5% during pandemic and difference was statistically significant ( $p$ -value 0.002) using paired T test. Mean clinic visits reduced from 3 visits/year pre-COVID to 1 visit/year during pandemic. This difference was also statistically significant ( $p$  value 0.000).

**Conclusions:** This study demonstrates significantly negative impact of pandemic on glycemic control of children with T1DM, a chronic condition requiring regular monitoring and follow-up. Barriers in continuity of healthcare due to restrictions reflected by less clinic visits during pandemic highlights importance of telemedicine services as well.

**POSTER TOUR 2—COVID # 2**

**P009 | Has the COVID-19 pandemic affected the incidence of type 1 diabetes in Italy? Analysis on population-based registries over a 33-year period**

V. Tiberi<sup>1</sup>, R. Gesuita<sup>2</sup>, V. Marconi<sup>2</sup>, L. Ferrante<sup>2</sup>, F. Carle<sup>2</sup>, M. Marino<sup>1</sup>, L. Favella<sup>3</sup>, C. Giorda<sup>4</sup>, L. De Sanctis<sup>5</sup>, I. Rabbone<sup>6</sup>, V. Cherubini<sup>1</sup>

<sup>1</sup>Azienda Ospedaliero-Universitaria, Ospedali Riuniti di Ancona, G. Salesi Hospital, Department of Women's and Children's Health, Ancona, Italy, <sup>2</sup>Polytechnic University of Marche, Center of Epidemiology and Biostatistics, Ancona, Italy, <sup>3</sup>CSI Piemonte Direzione Sanità Digitale, Torino, Italy, <sup>4</sup>ASL TO5 Regione Piemonte, Unità di Diabetologia e Metabolismo, Chieri, Italy, <sup>5</sup>A.O.U. Città della Salute e della Scienza di Torino, Center of Pediatric Diabetology, Torino, Italy, <sup>6</sup>University of Piemonte Orientale, Division of Pediatrics, Department of Health Sciences, Novara, Italy



**Introduction:** It is currently not well known if the incidence of type 1 diabetes (T1D) changed during COVID-19 pandemic.

**Objectives:** Basing on two population-based registries collecting data of new cases in Italy since 1989, we analyzed changes on incidence in a long and short period.

**Methods:** All new cases of T1D in children aged between 0.5 and 14, recruited by the Piedmont and Marche registries during 1989–2021, were considered. Poisson regression was used to estimate the incidence trend, adjusted for age and sex, for the period 1989–2019 and to predict the incidence in the years 2020 and 2021. The observed rates in the years of the pandemic were compared with those predicted by the model and with those of the three-year pre-pandemic period 2017–2019.

**Results:** Between 1989 and 2021, 4009 children diagnosed with T1D were observed, 2144 males (53.5%). The standardized incidence for the entire period was 16.9 (95%CI 14.4–17.5) per 100,000 person-years, 17.6 and 16.2 for males and females respectively. The incidence over time increased from 12.0 (95% CI 9.6–14.4) in 1989 to 20.9 (95% CI 17.5–24.9) in 2019, with an annual increasing trend of 1.9% (95% CI 1.5–2.2). The observed incidence rates in 2020 and 2021 were 21.6 (95% CI: 18.3–25.3) and 26.7 (95% CI 23.0–30.9) respectively, not significantly different from the ones predicted by the model, 21.6 (95%CI 20.3–23.0;  $p = 0.995$ ) and 22.0 (95%CI 20.5–26.6;  $p = 0.074$ ). The mean incidence rate of T1D in the pre-pandemic 3 years, equal to 20.5 (95%CI 18.6–22.5), was not different from that of 2020, but significantly lower than that observed in 2021 ( $<0.001$ ).

**Conclusions:** The incidence of T1D  $< 15$  years continues to increase over time. During 2020–2021, the observed incidence was in line with the expected trend 1989–2019. However, narrowing the analysis to 2017–2021, there was a higher incidence in 2021. Continuous observation of T1D in children is critical to better understanding the role of COVID-19 in influencing the disease.

#### P010 | Impact of the COVID-19 pandemic on disengagement from advanced diabetes technologies among racial/ethnic groups in the US T1D exchange quality improvement collaborative

S. Carrothers<sup>1</sup>, B. Lockee<sup>1</sup>, D. Williams<sup>1</sup>, E. DeWit<sup>1</sup>, R. McDonough<sup>1</sup>, N. Noor<sup>2</sup>, T. Alonso<sup>3</sup>, H. Akturk<sup>4</sup>, D.J. DeSalvo<sup>5</sup>, M. Kamboj<sup>6</sup>, L. Jacobsen<sup>7</sup>, M.L. Scott<sup>8</sup>, A. Mungmode<sup>2</sup>, O. Ebekozien<sup>2</sup>, M. Clements<sup>1</sup>

<sup>1</sup>Children's Mercy, Kansas City, United States, <sup>2</sup>T1D Exchange, Boston, United States, <sup>3</sup>Barbara Davis Center Pediatrics, Denver, United States, <sup>4</sup>Barbara Davis Center Adult, Denver, United States, <sup>5</sup>Texas Children's Hospital, Houston, United States, <sup>6</sup>Nationwide Children's Hospital, Columbus, United States, <sup>7</sup>University of Florida Health, Gainesville, United States, <sup>8</sup>University of Alabama, Birmingham, United States

**Introduction:** The use of continuous glucose monitors (CGM) and insulin pumps (PUMP) have been associated with improved outcomes

**Table 1: Distribution of T1D population disengaged from diabetes technology pre-COVID-19 (2017–March 2020) and post-COVID-19 (April 2020–2021)**

	Pre-COVID19 (N=15,838)		p-value	During-COVID19 (14,799)		p-value
	Technology Engaged N (%)	Technology Disengaged <sup>b</sup> N (%)		Technology Engaged N (%)	Technology Disengaged <sup>b</sup> N (%)	
<b>N(%)</b>	<b>9806 (68%)</b>	<b>6032 (38%)</b>		<b>8631 (58%)</b>	<b>6168 (42%)</b>	
Age (years), Mean (SD)	21 (13.3)	16.1 (8.8)	<0.001	20.6 (13.9)	16.7 (9.9)	<0.001
Race/Ethnicity—no.(%)			<0.001			<0.001
NH White	6620 (68)	4776 (79)		5806 (67)	4748 (77)	
NH Black	397 (4)	634 (11)		408 (5)	662 (11)	
Hispanic	1171 (12)	165 (3)		1032 (12)	241 (4)	
Other/Unknown	1618 (17)	457 (8)		1385 (16)	517 (8)	
Insurance type no.(%)			<0.001			<0.001
Public	2879 (29)	1295 (21)		2515 (29)	1388 (23)	
Private	6112 (62)	2612 (43)		5083 (59)	2705 (44)	
other	815 (8)	2125 (35)		1033 (12)	2075 (34)	
Duration of diabetes, Mean(SD), years	10.6 (10.6)	6.3 (4.9)	<0.001	9.2 (10.1)	5.1 (4.5)	<0.001
<b>Clinical Outcome</b>						
A1c,% Median(IQR)	8.3 (1.9)	8.5 (1.9)		7.9 (2)	8.3 (2.2)	<0.001
A1c,% Mean(SD)	8.6 (2.7)	8.8 (1.6)	<0.001	8.3 (1.7)	8.6 (1.8)	<0.001

<sup>a</sup> Patients reporting technology use at initial visit (2017 onwards) and at least two subsequent visits

<sup>b</sup> Patients reporting technology use at initial visit (2017 onwards) and not reporting technology use in two subsequent visits

in type 1 diabetes (T1D) care. Therefore, disengaging from these devices represents a risk for worsening health outcomes.

**Objectives:** We sought to evaluate the effect of the COVID-19 pandemic on device disengagement rates by race and ethnicity.

**Methods:** This retrospective cohort study Pre-COVID-19 [ $n = 15,838$ ] + peri-COVID-19 ( $[n = 14,799]$ ) used EMR data from 15 sites (i.e., 3 adult and 12 pediatric diabetes centers) within the T1D Exchange Quality Improvement Collaborative. We identified individuals using at least one Advanced Diabetes Technology (ADT [PUMP or CGM]) at their most recent visit. Individuals who continued to use that technology for at least two subsequent visits were classified as engaged. Those who reported not using ADT in two subsequent visits were classified as disengaged.

**Results:** Comparing pre-COVID-19 (January 2017–March 2020) to peri-COVID-19 (April 2020–2021) time periods, we observed increases in disengagement among non-Hispanic White (NHW; 42% to 45%,  $p = 0.03$ ) and Hispanic (12% to 19%,  $p < 0.001$ ) individuals. We found no difference among NH Black (NHB; 61% to 62%,  $p = 0.7$ ) individuals.

**Conclusions:** The pandemic has presented self-care challenges for individuals with T1D, including continued use of ADT. NHB individuals exhibited the highest disengagement rates overall, while NHW/Hispanic individuals experienced significant pandemic-related increases in disengagement. Future research should evaluate the relative impact of intrinsic (i.e., patient-level) versus extrinsic (i.e., family-, environment-, and system-level) factors associated with race-/ethnicity-based differences in rate of disengagement.

**P011 | Parental experience of COVID-19 lockdown in the children and young people (CYP) with type 1 diabetes (T1D) and behavioral disorder (BD)—A qualitative analysis**

A. Banerjee<sup>1</sup>, T. Banerjee<sup>1</sup>

<sup>1</sup>United Lincolnshire Hospitals NHS Trust/Pilgrim Hospital, Department of Pediatrics, Boston, United Kingdom

**Introduction:** Management of T1D with BD during lockdown was challenging.

**Objectives:** To explore parents' experience in managing CYP with T1D & BD during the lockdown and its influence in this cohort. To understand the effect of lockdown on emotional health for providing better care in the future.

**Methods:** The parents were randomly selected ( $n = 10$ ) from the diabetes clinic. The data were collected using structured open and closed-ended questionnaires. Thematic analysis & deductive coding techniques were used to construct a theory.

**Results:** Most parents believe that the risk of COVID-19 was higher than that of T1D complications, leading to delays in seeking medical attention. Fear, anxiety, and helplessness were the most common emotions linked to uncertainty, conflicting information and unending speculation based on daily media reports of fatalities. Most parents described isolation, restricted physical activity, and stress-induced eating behavior as responsible for weight gain and poor diabetes control. Parents universally stated reduced quality of life, worsening symptoms of autism and attention deficit hyperactivity disorder, explained partly by the suspension of traditional care during the lockdown. Parents reported CYP as having more frequent episodes of meltdowns, arguments, emotional outbursts, destructive behavior, deliberate self-harm, and sleep disturbances and anxiety around losing family members to COVID-19. Additionally, loss of extended family support/peer support in school during the lockdown and a 'toxic' home environment aggravated behavioral deterioration. Furthermore, the suspension of traditional consultant-led clinics and unfamiliarity with remote consultations were other influencers of anxiety.

**Conclusions:** Parents reported a significant deterioration in the behavior of CYP with T1D & BD during the lockdown, which may affect their T1D control. Future studies are required to better understand the health need of this unique cohort so that resources can be aptly diverted to deliver patient-focused diabetes care.

**P012 | Psychological adjustment and glycemic control among adolescents with type 1 diabetes during the COVID-19 pandemic: A mixed methods study**

M. Cusinato<sup>1</sup>, A. Negri<sup>1</sup>, A. D'Agnillo<sup>1</sup>, M. Martino<sup>1</sup>, C. Gabrielli<sup>1</sup>, J. Gutierrez De Rubalcava Doblaz<sup>1</sup>, E. Righetto<sup>1</sup>, C. Moretti<sup>1</sup>

<sup>1</sup>University Hospital of Padova, Department of Women's and Children's Health, Pediatric Diabetes Unit, Padova, Italy

**Introduction:** The COVID-19 pandemic has caused mental health consequences. Preadolescents and adolescents are particularly vulnerable

to stress exposure and social isolation. We focused on the impact of restrictions on youth with type 1 diabetes (T1D).

**Objectives:** The aim of this study was to observe glycemic control and psychological adjustment trajectories after 1 year of the COVID-19 pandemic.

**Methods:** We followed a cohort of youth with T1D of Pediatric Diabetes Unit at the University Hospital of Padova. Inclusion criteria were: age between 12 and 20 years, T1D duration >1 year. We used a mixed method approach.

We analyzed mean glucose, Coefficient of Variance (CV), Time In Range (TIR), Time Above Range (TAR), Time Below Range (TBR) and Glucose Management Indicator (GMI). Test of Anxiety and Depression for Children and Adolescents (TAD) was used to evaluate psychological symptoms. Glucose metrics and psychological data were collected at different COVID-19 time points: 1 year before, during the first lockdown, and during the second wave. Further, during the diabetes summer camp, 24 participants joined group meetings to explore their COVID-19 lockdown experiences. Data were analyzed using thematic analysis.

**Results:** Our data showed that 1 year post-pandemic, the improvement in glycemic control appears time stable, while depression and anxiety symptoms get worse in preadolescents ( $p < 0.05$ ). Common identified themes were: changes in interpersonal relationships and health-related behaviors, lifestyle modifications and emotion regulation. Qualitative data suggest that some participants experienced psychosocial distress during lockdowns, while others spent time self-caring and discovering new aspects of themselves.

**Conclusions:** Repeated exposure to stress and potentially traumatic events increases risk of psychological morbidity in people with higher vulnerability, such as adolescents with T1D. Patients' cognitive appraisal influenced wellbeing and psychological adjustment to the pandemic.

**P013 | The impact of the COVID 19 pandemic over glycemic control and hospitalizations in members of T1Diams support center Mauritius: A comparison for the period 2018–2021**

B. Jowaheer<sup>1</sup>

<sup>1</sup>T1 Diams Support Center, Medical, Quatre Bornes, Mauritius

**Introduction:** T1Diams is a Mauritian NGO, which assists persons living with Type 1 Diabetes by providing Therapeutic Education and Psychosocial Support. The COVID-19 pandemic (2020-ongoing) turned out to be a litmus test for the adaptability of T1Diams.

**Objectives:** Comparing average HbA1c and number of hospitalizations for T1Diams members for the period 2018–2021.

**Methods:** Data obtained from office/telehealth consultations was collected retrospectively and tabulated.

**Results:** The Number of recorded HbA1c tests done per member decreased from 1.22 in 2018 to 0.45 in 2021. Average HbA1c did not change significantly from 2018 to 2021. Number of Type 1 DM-related hospitalizations increased from 17 in 2019 to 31 in 2020.

	2018	2019	2020	2021
Total number of members	288	307	314	325
Number of HbA1c tests done/year	351	224	137	145
Number of HbA1c tests done per member/year	1.22	0.73	0.44	0.45
Number of people who did not do HbA1c for 1 year	97	170	217	227
Average HbA1c/ %	8.72	8.52	8.59	8.63
Number of Type 1 DM or COVID 19-related hospitalizations per year	25	17	31	22

**Conclusions:** The COVID-19 pandemic disrupted medical follow-ups and insulin collection at hospitals and by T1Diams team due to restrictions on traveling and the fear of infection. Less blood tests were done to monitor glycemic control. COVID-19 infections exacerbated hyperglycemia, hence triggering more hospitalizations due to Diabetic Ketoacidosis. However, Telehealth consultations were effective as mean HbA1c remained stable from 2018 to 2021, despite various setbacks.

#### P014 | Psychological stress and worsening diabetes: An endemic within the pandemic!

N. Agarwal<sup>1</sup>, R. Shukla<sup>1</sup>, M. Gupta<sup>1</sup>, A. Bajpai<sup>1</sup>

<sup>1</sup>Regency Hospital Private Limited, Endocrinology, Kanpur, India

**Introduction:** Strict isolation measures and interrupted healthcare services during the COVID-19 pandemic are contemplated to instigate stress universally, particularly in those with chronic illnesses such as Type 1 Diabetes (T1D).

**Objectives:** To evaluate the determinants of stress and its impact on glycemic control among Indian adolescents and young adults (aged 10–25 years), living with T1D.

**Methods:** A cross-sectional observational study using online, semi-structured survey, including Perceived Stress Scale (PSS-10).

**Results:** A total of 97 patients (49 males; mean age  $18.8 \pm 4.5$  years, mean diabetes duration  $8.0 \pm 5.0$  years; mean HbA1c  $8.1 \pm 1.5\%$ ) were analyzed. Age (y) ( $r = 0.325$ ,  $p = 0.005$ ) and HbA1c (%) within the preceding 3 months ( $r = 0.274$ ,  $p = 0.036$ ) correlated positively

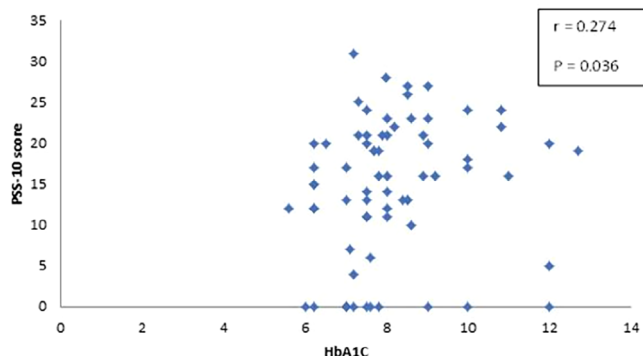


Figure 1: Spearman Correlation showing positive association of PSS-10 with HbA1c.

with PSS-10 score, Figure 1. There was a statistically significant difference in PSS-10 score based on gender ( $t [70] = -2.147$ ;  $p = 0.035$ ), education ( $F [4,67] = 4.34$ ,  $p = 0.003$ ) and occupation ( $F [3,68] = 4.50$ ,  $p = 0.006$ ). On multiple linear regression, gender, occupation and HbA1c were the significant determinants of PSS-10 ( $F [3,55] = 12.01$ ,  $p < 0.001$ ,  $R^2 = 0.363$ ). One-way ANOVA showed a significant impact of mean PSS-10 score on the glycemic control ( $F [2,69] = 3.813$ ,  $p = 0.027$ ).

**Conclusions:** Female gender, salaried individuals, and pre-existing poorly controlled diabetes contributed to an increased risk of stress. Increased stress resulted in worsened glycemic control.

#### P015 | How our families fared with type 1 diabetes home management during the COVID-19 pandemic 2020 lockdown

E. Bhowmik<sup>1</sup>, S. Verma<sup>1</sup>, V. Bhatia<sup>1</sup>, P. Dabadghao<sup>1</sup>, S. Sudhanshu<sup>1</sup>, N. Gupta<sup>1</sup>, A.M. Ansari<sup>1</sup>

<sup>1</sup>Sanjay Gandhi Post Graduate Institute of Medical Sciences, Endocrinology, Lucknow, India

**Introduction:** At the onset of the COVID-19 pandemic, there was limited data and conflicting evidence regarding the effect of the pandemic on type 1 diabetes (T1DM). It was expected that there may be adverse effects on glycemic control and mortality, more so in developing countries like India, with the additional burden of the lockdown on economy and health care. Subsequently, adult and pediatric data from developed countries regarding glycemic control in patients with T1DM were reassuring. Indian data, as well as data from other developing countries from pediatric T1DM addressing such issues are sparse and have conflicting conclusions. Furthermore, possible factors influencing glycemic control were not evaluated by most reports from our country.

**Objectives:** We evaluated the effect of the 2020 lockdown on glycemic control and lifestyle of children with type 1 diabetes (T1DM).

**Methods:** Children and young adults with T1DM ( $n = 104$ , mean  $\pm$  SD age  $13.4 \pm 4.5$  years), were questioned telephonically, regarding access to health care, insulin, food and lifestyle changes during lockdown. Pre and post lockdown HbA1c, body weight, and modifying factors were analyzed.

**Results:** A change in brand of insulin was necessary in 54% and physiologically wrong insulin was being used in 4.8% patients. HbA1c improved significantly post lockdown versus the 1 year pre-COVID

average (7.59 ± 1.77 vs. 8.61 ± 1.80,  $p < 0.05$ ). Parents attributed it to better supervision by (both) parents due to their presence at home, and less opportunity to consume energy dense food. Median (IQR) home blood glucose testing frequency was significantly low during lockdown [14(15) vs. 21.5(3.7) pre-lockdown,  $p < 0.001$ ]. Decreased exercise occurred in 40% and excess weight gain in 51.5%.

**Conclusions:** Despite problems of access to health care and adverse lifestyle conditions, improved parental supervision and meal quality and timing had favorable effect on diabetes management, which is reflected by improvement of HbA1c in a small cohort of our children.

**P016 | Impact of COVID-19 on management of diabetes mellitus in urban towns of Kenya: A case study of Mbagathi County Referral Hospital, Nairobi, Kenya**

G. Waweru<sup>1</sup>, R. Ireri<sup>2</sup>

<sup>1</sup>*Kenyatta University, Food, Nutrition and Dietetics, Nairobi, Kenya,* <sup>2</sup>*Kenya Medical Training College, Clinical Medicine, Nairobi, Kenya*

**Introduction:** Diabetes is a chronic Non-Communicable Disease (NCD) with a rising burden nationally and globally and a leading cause of morbidity. Since December 2019, the world has been battling corona virus pandemic, which was first reported in China, and consequently the first case reported in Kenya on 13 March 2020. Patients >60 years of age and those with underlying conditions such as diabetes have been reported to have an increased risk of the disease, severe diseases and death.

**Objectives:** The impact of the pandemic to diabetic care has been sparsely documented in developing countries and so this study sought to look into its effect on accessibility of care and the burden of reported complications in Nairobi, Kenya.

**Methods:** This is a retrospective cross-sectional survey of diabetic patients at Mbagathi county hospital in Kenya. A total of 232 participants were randomly recruited. Modified cox regression analysis was used to measure the correlation between access to health services and diabetes complications during the COVID-19 pandemic.

**Results:** Difficulties in access to the health care services was experienced by 40% of the people living with diabetes (PWD) in Nairobi. The difficulties included access to consultations (62%), medication (18%), and lab testing (12%). About 61% (142) of the participants developed either acute or chronic diabetes complications between March 2020 and June 2021. Those who had service access difficulties were 1.4 times (PR 1.40, 95% CI: 1.09–1.83) more likely to develop diabetes complications than those who did not.

**Conclusions:** The COVID-19 pandemic has an impact on access to health care services and diabetes related complications as seen in PWD in Nairobi, Kenya. We recommend effective communications to ensure patient engagement with diabetes care services and appropriate use of home monitoring, remote consultations, and other innovations in care.

**P017 | A quality improvement (QI) innovation during the COVID-19 pandemic: Improving early diagnosis of type 1 diabetes (T1D) in children and young people (CYP) in Cardiff & Vale University Health Board**

A. Shetty<sup>1</sup>, M. Dyban<sup>2</sup>

<sup>1</sup>*Children's Hospital for Wales, Cardiff and Vale University Health Board, Pediatric Diabetes, Cardiff, United Kingdom,* <sup>2</sup>*Cardiff and Vale University Health Board, Primary Care Lead Clinician for Health Pathways, Cardiff, United Kingdom*

**Introduction:** Most CYP present with symptoms of T1D for the first time to primary care. Delayed diagnosis is common and associated





	01/04/2018– 31/03/2020 (pre-pandemic)	01/04/2020– 31/03/2022 (pandemic)
Newly diagnosed T1D	38	60
Diagnosed in primary care	28	49
Delayed diagnosis	7	4
Delayed presentation to HCP	10	13
DKA total number	12	17
Mild DKA	5	10
Moderate DKA	6	3
Severe DKA	1	4

with risk of life threatening diabetic ketoacidosis (DKA). In Cardiff, we had a pre-pandemic QI project to improve early diagnosis. As the pandemic changed delivery of healthcare, we introduced systems to facilitate early diagnosis of T1D.

**Objectives:** To facilitate early diagnosis of T1D via effective pathways during the pandemic. The primary objective is to reduce the incidence of DKA at diagnosis. **Methods:** We worked with partners in primary care to identify barriers and develop initiatives at the start of the pandemic. This included an updated referral pathway, training for triage staff, revising online algorithms, and raising public awareness. Retrospective case note analysis of all newly diagnosed CYP covering pre-pandemic (1/4/2018–31/3/2020) and pandemic (1/4/2020–31/3/2022). Key points included delayed diagnosis, presentation, appropriate testing, and prompt referral.

**Results:** Pre-pandemic, 6/7 with delayed diagnosis had delayed triage and 1 had fasting blood glucose (BG). 25/28 had POC BG testing and 2 had a urine test. During the pandemic, 2/4 with delayed diagnosis had delayed triage. 46/49 had POC BG test and 3 a urine test. The 4 in severe DKA had delayed presentation but promptly diagnosed, of which 2 were presumed to have COVID. During the pandemic 91% had POC testing and prompt referral to secondary care compared with 75% pre pandemic. There was no increase in the DKA rates during the pandemic despite a significant increase in the number newly diagnosed.

**Conclusions:** During the pandemic, we demonstrated an improvement in prompt diagnosis following the QI initiatives between primary and secondary care. Delayed presentation has resulted in severe DKA despite public awareness campaigns. Data analysis, feedback, training and public awareness campaigns across other health boards is planned.

#### P018 | Assessing technology needs and satisfaction of virtual appointments during the pandemic

V. Pais<sup>1</sup>, E. Gucciardi<sup>2</sup>, S. Goldstein<sup>3</sup>

<sup>1</sup>The Hospital for Sick Children, Department of Endocrinology, Toronto, Canada, <sup>2</sup>Ryerson University, Department of Nutrition, Toronto, Canada, <sup>3</sup>Ryerson University, Toronto, Canada

**Introduction:** COVID-19 imposed constraints on in-person medical care, challenging pediatric diabetes care.

Patients and healthcare providers (HCP) can benefit from telehealth virtual visits at this time.

**Objectives:** Assess the access to and utilization of technology as it relates to videoconferencing and telehealth services.

Assess patient and HCP satisfaction with the current virtual care services offered.

**Methods:** A survey was sent to patients, primary caregivers, and HCP at the clinic. Questions related to technology access, usage, and satisfaction with virtual care. Interviews were then conducted with HCP. The baseline characteristics were summarized descriptive results relating to technology access and usage were included, along with mean and median satisfaction scores. Answers to the open-ended questions and interviews were transcribed and analyzed using theme analysis.

**Results:** Response rate was highest among patients with HbA1C of 7–7.9% and lowest with HbA1C > 10%. Access to appropriate technology was high, patient and HCP satisfaction with virtual care was high. Patients preferred virtual education focused visits and in-person clinical visits. Benefits to virtual care include convenience, efficiency, money saving and challenges include lack of physical exam, excess coordination, lack of personal connection, technology issues, increased administrative burden on the HCP and a decrease in inter-professional collaboration. HCP prefer to continue with virtual care with 30%–80% of their practice.

**Conclusions:** Virtual care appointments were satisfactory with few technology concerns. Participants in study were high income, high education, and spoke English. Suggestions to improve virtual care from the HCP and patient perspective were provided to include a technology support team, appointment reminders, notification for delayed appointments & better organization of blood requisitions. Further evaluation required assessing clinical outcomes of virtual care, needs of patients with language barriers, low-income & higher HbA1C.

#### POSTER TOUR 3—COVID # 3

##### P019 | The aim of the study is to evaluate the impact of nutrition changes & programmed physical training on type 1 diabetic adolescents during COVID-19 lockdown

V. Maheriya<sup>1</sup>, D. Hasnani<sup>1</sup>, R. Chhtraliya<sup>1</sup>, S. Pal<sup>1</sup>, V. Chavda<sup>1,1</sup>

<sup>1</sup>Rudraksha Institute of Medical Sciences, Department of Nutrition, Ahmedabad, India

**Introduction:** According to WHO and IDF it is stated that healthy diet and regular physical activity and maintaining healthy weight is very effective for type 1 and type 2 diabetes.

**Objectives:** The main objectives of study was to schedule personalized healthy nutrition, to programmed physical training schedule & was to find out the impact of nutrition & physical activity in term of SMBG changes, weight, muscle mass, HbA1c.



**Methods:** Number of type 1 diabetic children & adolescents enrolled for the intervention were 15 (F = 9, M = 6). Number of subject completed the intervention was 13. The intervention conducted for 3 months during the lockdown from 1 April to 1 July 2020. All subjects were counseled and educated and followed up Through tele-consultation at baseline visit (Day 0), visit 1 on (day 15), visit -2 on (day 30) visit 3 on (day 60) visit 4 on (day 90). The parameters evaluated were anthropometric data, HbA1C & SMBG readings from baseline to end of the intervention.

**Results:** Data showed significant improvement of hba1c of 0.8%, also improvement of glycemic control is seen. On evaluation of anthropometric data there was no significant changes in weight but increment seen in muscle mass.

**Conclusions:** It has been concluded that MNT & physical activity comprise the basic pillars in treatment of diabetes. Especially for kids, young adults with a chronic condition following a strategic plan for nutrition & exercise can do in appropriate growth and development. In the real world, implementation of the MNT and exercise for the pediatric population still remains a challenge. This can be easily solved by including sports of the person's choice in their routine activities and healthy food options. These together can impact the glycemic status and the quality of life of young adults up to great extent.

#### P020 | Comparison of BMI and HbA1c in pediatric patients with established type 1 and type 2 diabetes and those at risk for type 2 diabetes, before and after the COVID-19 pandemic

D. Chatila<sup>1</sup>, J. Mon<sup>2</sup>, B. McKinney<sup>1</sup>, T. Hannon<sup>1</sup>, A. Neyman<sup>1</sup>

<sup>1</sup>Riley Hospital for Children/Indiana University, Pediatric Diabetes and Endocrinology, Indianapolis, United States, <sup>2</sup>Indiana University-Purdue University Indianapolis, Indianapolis, United States

**Introduction:** We know that nutritional education and goal BMI are important to all diabetes management.

**Objectives:** Aim was to see how HbA1c and BMI were affected pre- and post- COVID-19 pandemic in youth with established type 1 (T1D), type 2 (T2D) and those followed in youth diabetes prevention clinic (YDPC).

**Methods:** Retrospective chart review. Youth included if diagnosed with diabetes prior to 4/2/2019, seen the year pre-COVID (between 4/2/2019–3/22/2020) (or for YDPC clinic just seen in that year prior), who also had 1 follow-up (f/u) visit after the start of the pandemic (3/23/2020–12/31/2020). The second f/u interval was 8/1/2021–12/31/2021. The statistical analysis was conducted using GraphPad Prism Version 8. For continuous variables, the D'Agostino and Pearson test was used to determine normality, and data were compared using a paired t-test or a Wilcoxon matched-pairs signed-rank test depending on variable type.

**Results:** There was no change in HbA1c or BMI z-score pre-COVID pandemic versus first f/u visit in the YDPC or T1D group (see Table). However, in the T2D group, there was a statistical increase in HbA1c at first f/u ( $p = 0.003$ ), with no change in BMI z-score. In the second f/u interval ( $n = 166/277$  T1D group,  $n = 15/34$  T2D group), there was no change in HbA1C, but there was a statistical decrease in BMI z-score ( $p$ -value of 0.03) in the T1D group.

**Conclusions:** Of our 3 cohorts, it appears that the youth with established T2D had a significant increase in HbA1c at first follow-up after the COVID-19 pandemic, with no significant change in BMI z-score. Thus, this change in HbA1c appears related to other factors. Youth with established T1D did not have a change in HbA1c or BMI z-score. However, in the subset of patients that were seen during the second f/u interval, their BMI z-score did seem to increase. This potentially reflects the national trend of increased obesity in healthy children. Even in those with T1D, these trends in BMI are important to help guide improved outcomes.

Table: Demographics and HbA1C and BMI z-score outcomes of the 3 groups

	T1D (n = 277)	T2D (n = 34)	YDPC (n = 11)
<b>Baseline Characteristics</b>			
HbA1c at diagnosis (%)	11.5 ± 2.1 n = 186	8.8 ± 2.3 n = 28	5.6 ± 0.3
BMI z-score at diagnosis	0.6 [0.4, 1.4] n = 79	2.34 ± 0.56 n = 25	2.45 ± 0.41
BMI value at diagnosis (kg/m <sup>2</sup> )	18.4 [16.3,21.6] n = 80	33.8 [29.4, 39.2] n = 25	37.4 ± 8.8
<b>Results</b>			
<b>HbA1c (%)</b>			
Pre-COVID-19 visit	8.4 [7.3, 9.5]	8.34 ± 2.49	5.6 ± 0.27
First follow-up	8.3 [7.2, 9.7]	9.31 ± 3.09	5.96 ± 0.88
p-score	0.83	<b>0.0030**</b>	0.24
<b>BMI z-score</b>			
Pre-COVID-19 visit	0.93 [0.34, 1.51]	2.17 ± 0.65	2.45 ± 0.41
First follow-up	0.91 [0.25, 1.56]	2.15 ± 0.61	2.47 ± 0.44
P-score	0.78	0.49	0.63

Note: Data are mean ± SD or median [IQR].

\*\* P < 0.01.

### P021 | Clinical characteristics of pediatric diabetic ketoacidosis admissions to COVID-19 free UAE tertiary center during pandemic

S. Marei<sup>1</sup>, D. Ra'a Said<sup>1</sup>, R. Almazrouei<sup>1</sup>, W. Kaplan<sup>1</sup>, N. Al Hassani<sup>1</sup>

<sup>1</sup>Tawam Hospital, Pediatric, Al Ain, United Arab Emirates

**Introduction:** COVID19 pandemic led to delayed diagnosis and increase in number and severity of Type 1 Diabetes Mellitus (T1DM) and Diabetic Ketoacidosis (DKA) cases in pediatric population worldwide. The indirect impact of the pandemic on pediatric DKA admissions to COVID19 free hospitals worth to be evaluated.

**Objectives:** Our aim was to evaluate the characteristics and severity of DKA admissions before and during the pandemic.

**Methods:** This retrospective observational study included 130 episodes of DKA for patients aged below 16 years admitted to Tawam Hospital, a COVID-19-free hospital, between March 2017 to Feb 2021. Data from March 2020–Feb 2021 (pandemic) was compared to the previous 3 years, March 2017–Feb2020 (pre-pandemic). Data was retrieved from the electronic records and analyzed using STATA13.

**Results:** We evaluated 130 DKA admissions (63 pandemic and 67 pre-pandemic). The majority of patients in the pandemic group were in, the age group of (6–11.9 years) (54% vs. 23.9%,  $P 0.001$ ), and higher proportion of them was diagnosed with new onset diabetes (42.9% vs. 25.4%,  $P 0.035$ ). Overall, there was no significant difference in symptoms duration, DKA severity, or time to DKA resolution but there was a difference in the median (IQR) HbA1C, 11% (9.4–12.95) versus 10.15% (9.27–11.80) ( $p = 0.0297$ ) in the pandemic and pre-pandemic groups, respectively.

**Conclusions:** In our COVID-19-free hospital, the pandemic and service reallocation has led to an increased rate of DKA admissions with increased number of newly diagnosed T1DM. Clinical presentation and severity were not adversely affected.

### P022 | Clinical characteristics and outcome of hospitalized children and adolescent patients with type 1 diabetes during the second wave of COVID-19 pandemic

H.H Aly<sup>1</sup>, R.A Thabet<sup>1</sup>, Y.I Elhenawy<sup>1</sup>

<sup>1</sup>Faculty of Medicine Ain Shams University, Pediatrics, Cairo, Egypt

**Introduction:** It is unclear whether diabetes alone contributes to increased risk of morbidity and mortality related to COVID-19.

**Objectives:** This study aimed to explore the relationship between diabetes and the severity of COVID-19 infection as well as the impact of COVID-19 on the clinical presentation and outcome in patients with type 1 diabetes.

**Methods:** This cross sectional study included 51 children and adolescents with type 1 diabetes mellitus (T1DM) attending the Pediatric Hospital. Participants included all patients with type 1 diabetes admitted to Children's Hospital, Ain Shams University in the period between August and December 2020. Data of studied patients was extracted from inpatient files and reports.

**Results:** The age of the patients ranged from 1–17 years with median of 9 (6–13) years, with female predominance [27 (52.9%)]. A 45 presented in DKA, with mean pH of  $7.04 \pm 0.29$ . The median duration of hospital admission was 4 (2–7) days. A 33 patients were newly diagnosed and presented in DKA except 5 (15.2%) patient that presented in hyperglycemia. The mean HbA1c was  $11.70 \pm 1.86$ , the median time till hospital admission was 1.5 (1–2) days. Acute kidney injury (AKI) and echocardiographic changes were reported in 12 (36.4%) and 4 patients 4 (12.1%) respectively. All patients with AKI were admitted to ICU, all showed significantly lower PH at presentation, HCO<sub>3</sub> level, and serum albumin level ( $p < 0.05$ ). Although 22 patients had COVID infection either by PCR or antibodies, only six patient required respiratory support, 13 patients required circulatory support and 6 had echo changes. Two patients had manifestation of MIS-C and required ICU admission and anticoagulants.

**Conclusions:** COVID infection in diabetic patients was associated with sever presentation of DKA and multiple organ affection, which could be related to viral affection or delayed hospital admission during the pandemic.

### P023 | New-onset type 1 diabetes in children and adolescents before and during COVID-19 pandemic in Belgium

A. Messaoui<sup>1</sup>, L. Hajsellova<sup>1</sup>, S. Tenoutasse<sup>1</sup>

<sup>1</sup>Université Libre de Bruxelles, Diabetology Clinic, Hôpital Universitaire des Enfants Reine Fabiola, Brussels, Belgium

**Introduction:** Viral infections have been implicated in the development of type 1 diabetes. There have been reports of COVID-19 induced new-onset diabetes.

**Objectives:** In this context, this study aimed to describe and compare the characteristics at diagnosis of children who develop type 1 diabetes before and during the COVID-19 pandemic in Belgium.

**Methods:** This observational study compares two groups of children and adolescents who develop type 1 diabetes: the first includes new-onset diabetes before the pandemic (1 March 2018 and 31 December 2019) and the second during the pandemic (1 March 2020 and 31 December 2021) in HUDERF, Brussels, Belgium.

**Results:** In our center, the number of new-onset type 1 diabetes in the pre-pandemic period was 87 and in the pandemic period was 147 ( $p = 0.010$ ). During the COVID-19 pandemic, patients with new-onset diabetes were more often male (62% vs. 44%;  $p = 0.010$ ) and had a slightly higher pH at admission [ $7.35 (7.22–7.41)$  vs.  $7.34 (7.18–7.38)$ ;  $p = 0.043$ ] than before the pandemic. There was no difference in age, BMI SDS, HbA1c or severity of ketoacidosis at type 1 diabetes diagnosis. During the pandemic, 2 children (2%) had a positive SARS-CoV2 PCR test on admission but were asymptomatic.

**Conclusions:** The number of new cases of type 1 diabetes in our center during the COVID-19 pandemic was significantly higher than before the pandemic. These new patients were mainly male. Longer-term and national follow-up is needed to assess the role of COVID-19 in the development of type 1 diabetes.

**P024 | Real life experience 2 years after lockdown: coronavirus triggers video game addiction and worsen glycaemic control in youth with type 1 diabetes**

 N. Elbarbary<sup>1</sup>, A. Abou Elnasr<sup>2</sup>
<sup>1</sup>Ain Shams University, Faculty of Medicine, Department of Pediatrics, Diabetes Unit, Cairo, Egypt, <sup>2</sup>Cairo University, Department of Neurosurgery, Cairo, Egypt

**Introduction:** COVID-19 pandemic and eventual lockdown gave a major boost to online heavy action gaming like PUBG. Adolescents are finding gaming the best avenue to connect and socialize with friends addressing their needs of human interaction and coping with the pandemic.

**Objectives:** This pilot study aimed to evaluate changes in glycaemic control and the role of online gaming during the exceptional time of COVID-19 complete lockdown in a cohort of children with T1DM and 2 years after.

**Methods:** We evaluated children with T1DM on basal bolus regimen who were monitored using the FreeStyle Libre<sup>®</sup> glucose monitoring system. Analysis were extracted from downloads and compared to timing after lockdown.

**Results:** A 47 patients (39 males) with mean age  $13.6 \pm 2.8$  years and duration of diabetes ( $5.2 \pm 1.3$  years) were followed up. The glycaemic control was worse during than after lockdown mean glucose management indicator of 8.3% versus 7.2% ( $p = 0.001$ ).

There was higher time above range of 44%, lower time in range of 39% and time below range of 6% during quarantine than after ( $p < 0.001$  for all). A significantly higher coefficient of variation (CV) indicating an increased glucose variability in the lockdown period compared to post-lockdown was observed (42.6% vs. 37.2%,  $p = 0.011$ ). Time spent playing online games occupied  $\geq 8$  h daily in 73% together with decreased sleep duration. They had more snacking leading to increase insulin bolus by 32% ( $p = 0.002$ ) and weight gain by 12% ( $p = 0.006$ ).

**Conclusions:** Glycaemic control in T1DM adolescents addicted to online gaming worsened during restrictions of COVID-19 pandemics. Maintaining regular physical activity in a safe home environment with dietary and insulin dose recommendations is an essential strategy for young individuals to better control glycaemic excursions. As we mark 2 years of the COVID-19 pandemic, a central pillar of building more

attention to sedentary behavior and lifestyle factor management in patients with T1DM if unprecedented waves of the global pandemic hit and beyond.

**P025 | Perfect Storm in Mississippi: High rate of childhood obesity leading to a surge in pediatric diabetes during the COVID-19 pandemic**

 N. Dixit<sup>1</sup>, S. Pasha<sup>1</sup>, A. Sukumaran<sup>1</sup>, F. Kamran<sup>1</sup>
<sup>1</sup>University of Mississippi, Pediatrics, Jackson, United States

**Introduction:** Mississippi ranks second for childhood obesity prevalence (22%) above the national average of 16% with significant racial and health disparities. Since March 2020, stay-at-home orders, virtual learning, stress, and poor lifestyle may have provided a perfect setup leading to new diagnosis of diabetes and accounting for record high hospitalizations.

**Objectives:** To determine the impact of the COVID-19 pandemic on the rate and clinical characteristics of newly diagnosed pediatric diabetes at University of Mississippi Medical Center.

**Methods:** Chart review and data comparison completed for patients with new-onset-diabetes between January 2019–February 2020 (pre pandemic); and between March 2020–October 2020 (pandemic).

**Results:** Females were predominant in both groups (53% vs. 52%). There was no significant difference in the racial distribution in the two groups. A 34% were Whites while 61% were African Americans in the prepandemic group. The pandemic group comprised of 30% Whites and 63% African Americans. There was no significant difference in BMI percentile in the two groups. African Americans were disproportionately diagnosed with diabetes (64%). A 80% of obese patients had type 2 diabetes with 38% presenting in DKA, 3 patients in HHS. Four patients were COVID-19 positive on admission.

**Conclusions:** Our observations corroborate the steep rise in the number of new-onset type 1 and type 2 diabetes, particularly in African Americans, in a highly prevalent obese pediatric population. Additional studies are required to determine the detailed effects of SARS-CoV-2 infection and pandemic associated psychosocial/ physical effects on development of diabetes in the pediatric population.

Table 1: Characteristics of patients with new onset diabetes

	Prepandemic (January 2019–February 2020 (14 months))	Pandemic March–October 2020 (8 months)	<i>p</i> value
Total number of new onset diabetes (NOD)	140	164	
Number of NOD/month	10	20.75	0.00002*
Age (y), mean $\pm$ SD	11.3 $\pm$ 3.7	12 $\pm$ 3.4	0.075
A1c %, mean $\pm$ SD	10.9 $\pm$ 2.1	11.6 $\pm$ 1.9	0.00255*
BMI %ile, mean $\pm$ SD	72.1 $\pm$ 31.2	75.5 $\pm$ 32.5	0.16
Diabetes Type 1, n (%)	94(67)	83(51)	0.00357*
Diabetes Type 2, n (%)	45 (32)	78(47)	0.00633*
DKA, n (% of total NOD)	53 (38)	78 (47)	0.08857
SevereDKA(pH < 7.1)(type2)	21 (0)	22(8)	0.69257

## P026 | Rise in pediatric type 2 diabetes mellitus diagnoses in Philadelphia during the COVID-19 pandemic

H. Nasir<sup>1</sup>, T. Lipman<sup>1</sup>, M. Kuye<sup>1</sup>, B. Schwartzman<sup>1</sup>, L. Katz<sup>1</sup>

<sup>1</sup>Children's Hospital of Philadelphia, Endocrinology, Philadelphia, United States

**Introduction:** Concurrent with the obesity epidemic in children in the US, there has been a marked rise in type 2 diabetes mellitus (T2DM) in youth.

**Objectives:** Our objective was to ascertain the trend of new diagnoses of T2DM during the COVID pandemic at our institution and as part of the Philadelphia Pediatric Diabetes Registry.

**Methods:** New diagnoses of T2DM from 2017 to 2021 were identified through the EMR. They were divided into two groups, those from the city of Philadelphia, and those from outside the city limits.

**Results:** We found an increase in the diagnoses of T2DM overall at our center, with a marked increase post-pandemic (n = 29, 30, 59, 86, 97; 2017, 2018, 2019, 2020, 2021), and also within the city of Philadelphia (n = 12, 14, 26, 40, 50; 2017, 2018, 2019, 2020, 2021). African-Americans comprised 61%–66% of the new diagnoses, followed by Latinos at 10%–16%, Whites and Asians. The majority of the patients were females (61% to 65%), with roughly the same proportion in both groups. Mean age at diagnosis for females was consistent throughout at 13.6 years, whereas it was 14.5 years for males. Mean BMI for females and males in both groups was noted to increase (32.8, 33.0, 36, 38.9, 39.7; 2017, 2018, 2019, 2020, 2021) and (34.0, 34.2, 35.5, 38.9, 39.2). In 2019, 4 patients presented with DKA, increasing to 6 in 2020 and 9 in 2021, whereas 2 patients presented in HHS in 2020, 4 in 2021, and none in 2017, 2018, or 2019. Approximately 10% had anti-insulin antibodies across all 5 years, and around 64% presented in the fall–winter months (October–February). The mean HbA1c at diagnosis was also found to increase among both groups, from 8.6% in 2019 to 9.3% in 2020 and 10.1% in 2021, versus 8.8% in 2017 and 8.5% in 2018.

**Conclusions:** The number of new T2DM diagnoses in children has increased substantially during the pandemic, likely correlating with higher BMI scores and behavioral changes. We did not see a significant number of new diagnoses being admitted with COVID, though there were more presentations to the ICU.

## POSTER TOUR 4—LIFESTYLE & EXERCISE

### P027 | Carbohydrate versus fixed meal counting plan in Indian children with type 1 diabetes mellitus: A randomized controlled trial

R. Sharma<sup>1</sup>, B. Upadhyay<sup>1</sup>, N. Lal<sup>1</sup>, B. Kumar<sup>1</sup>, V. Jain<sup>1</sup>

<sup>1</sup>All India Institute of Medical Sciences, Department of Pediatrics, New Delhi, India

**Introduction:** There is paucity of research on optimal approach to nutritional management in children T1DM.

**Objectives:** To study the impact of carbohydrate counting vs. fixed meal plan on HbA1c, quality of life (QoL) and diabetes-related emotional distress in T1DM through an RCT.

**Methods:** Eligibility: Children aged 6–18 years with diabetes duration >1 year on multiple daily insulin injections (long-acting NPH/glargine and short-acting regular/lispro/aspart).

Exclusion: coeliac disease, hypothyroidism, chronic systemic disease, HbA1c > 13%.

Both groups had baseline diabetes education. The control arm had dietary prescription according to the recommended dietary allowance with a list of food exchanges. In the intervention arm, the study dietician taught the parent how to quantify carbohydrate content in food and modify insulin doses according to insulin-carbohydrate ratio. DAWN/WHO-5 QoL Questionnaire and DAWN Problem Areas in Diabetes Questionnaire (PAID) were used to assess the quality of life and emotional distress, respectively.

**Results:** A 125 patients were enrolled (intervention n = 61 and control n = 64). The baseline characters between the two groups were similar with respect to age, gender, socio-economic status, parent's education, and HbA1c. A 6 months follow-up was completed in 91.8% and 84.3% patients in the intervention and control arms, respectively. There was a reduction in HbA1c in both groups from baseline, however it was not statistically significant between groups (Intervention: 8.7 (1.5) vs. control: 8.8 (1.9), p = 0.6).

There was no difference in QoL or emotional distress score between the groups. However, the carbohydrate group had significantly less 'emotional burnout' compared to the control arm (burnout 4/46 vs. 12/41, p = 0.013).

**Conclusions:** Carbohydrate-counting did not lead to better HbA1c, QoL or lesser diabetes distress compared to fixed meal plans in children with T1DM over a 6-month period. However, patients in the carbohydrate-counting group demonstrated lesser emotional burnout compared to controls.

### P028 | Lifestyle parameters in young adults with type 1 diabetes mellitus: differences by type of insulin regimen

M.-S. Karipidou<sup>1</sup>, S. Liatis<sup>2</sup>, A. Kyrkili<sup>1</sup>, A. Skoufi<sup>1</sup>, A. Bampagianni<sup>2</sup>, S. Driva<sup>1</sup>, E. Papachristoforou<sup>2</sup>, P. Charalampakis<sup>2</sup>, V. Lampadiari<sup>3</sup>, M. Kontogianni<sup>1</sup>

<sup>1</sup>Harokopio University, Department of Nutrition and Dietetics, Athens, Greece, <sup>2</sup>Laiko General Hospital, First Department of Propaedeutic Medicine, Athens, Greece, <sup>3</sup>University General Hospital Attikon, Second Department of Internal Medicine and Research Institute, Athens, Greece

**Introduction:** Most of young adults with type 1 diabetes mellitus (T1DM) are treated by either continuous subcutaneous insulin infusion (CSII) or multiple daily insulin injections (MDI).

**Objectives:** The purpose of the present study was to evaluate and compare lifestyle habits in this population according to the type of insulin therapy.

**Table:** Descriptive characteristics, glycemic control and sleep parameters in total sample and by type of insulin regimen

Characteristics	Total sample (n = 75)	CSII (n = 41)	MDI (n = 34)	P (CSII vs. MDI)
Sex (female), %(n)	51 (38)	56 (23)	44 (15)	0.302
Age, years	22 (19, 25)	22 (19, 25)	22 (18.8, 25)	0.839
Duration of DM, years	11.9 ± 6.3	13.6 ± 6.0	9.9 ± 6.1	<b>0.009</b>
HbA1c %	7.6 ± 1.1	7.5 ± 1.1	7.6 ± 1.1	0.733
AIS score (0–24)	4 (2, 6)	5 (4, 7)	3 (1, 5)	<b>0.011</b>
Night sleep duration (h)	7 (6, 8)	7 (6, 8)	7.5 (6.9, 8.3)	<b>0.028</b>
Insomnia, % (n)	32 (24)	42 (17)	21 (7)	0.054

Note: DM, diabetes mellitus, AIS (Athens Insomnia Scale) Score 0–24, greater scores reflect poorer sleep quality ( $\geq 6$  diagnosing insomnia). P value was calculated by Mann–Whitney Test for non-parametric, t-test for parametric and Chi square for categorical variables. Data are presented as mean  $\pm$  SD, median (quartile 1, quartile (3) or frequency (%).

**Methods:** Young adults (15–29 years) with T1DM attending a diabetes outpatient clinic were consecutively enrolled and cross-sectionally evaluated. Three 24-h recalls and a food frequency questionnaire were used to assess participants' dietary habits. Physical activity and sleep were assessed through validated questionnaires, the Athens Physical Activity Questionnaire and Athens Insomnia Scale, respectively. Adherence to the Mediterranean Diet (MD) was assessed by the MedDiet Score.

**Results:** A 55% of the sample used CSII and did not differ from the MDI group in terms of age, sex, body mass index and HbA1c (all  $p > 0.05$ ), however, had more years of T1DM ( $13.6 \pm 6$  vs.  $9.9 \pm 6.1$ ,  $p = 0.009$ ). Physical activity levels did not differ significantly between the two groups. Regarding macronutrients intake, the CSII group tended to consume more carbohydrates ( $40.5 \pm 8.4\%$  vs.  $37.1 \pm 7.3\%$ ,  $p = 0.066$ ) and less protein ( $17.1 \pm 3.7\%$  vs.  $18.8 \pm 3.9\%$ ,  $p = 0.057$ ) as percentage of total energy intake compared to the MDI group. The CSII group had better adherence to MD than the MDI group ( $34.2 \pm 5.8$  vs.  $30.9 \pm 5.7$ ,  $p = 0.022$ ) and consumed more cereals ( $p = 0.033$ ) and fish ( $p = 0.013$ ). Additionally, the CSII group had significantly lower quality of sleep ( $p = 0.011$ ) and sleep duration ( $p = 0.028$ ) compared to the MDI group.

**Conclusions:** Although macronutrients distribution, physical activity levels and glycemic control did not differ significantly between young adults receiving CSII and those on MDI, those treated with CSII reported better diet quality, as reflected by higher adherence to the MD, but worse sleep habits.

#### P029 | Adherence to ISPAD nutritional guidelines: A food-diary based study

E. Sakellari<sup>1</sup>, S. Giza<sup>1</sup>, E. Efstratiou<sup>1</sup>, A. Kleisarchaki<sup>1</sup>, S. Douma<sup>1</sup>, A. Galli-Tsinopoulou<sup>1</sup>

<sup>1</sup>2nd Department of Pediatrics, School of Medicine, Faculty of Health Sciences, Aristotle University of Thessaloniki, AHEPA University General Hospital, Thessaloniki, Greece

**Introduction:** The International Society for Pediatric and Adolescent Diabetes (ISPAD) dietary guidelines promote the adoption of healthy eating habits. However, discrepancies can be recorded.

**Objectives:** The aim of the study was to investigate the compliance of T1D patients receiving care in our SWEET Collaborative Center with ISPAD guidelines and the impact of dietary composition on glycemic control.

**Methods:** We conducted a cross-sectional study, including 79 T1D patients aged <18 years. Parents completed a 3-day weighed food diary. Age, diabetes duration, body mass index (BMI) z-score, glycated hemoglobin (HbA1c) were recorded. Food diary analysis for total energy (E) and macro-, micro-nutrient intake and statistical analysis were performed with Athlisis software and IBM SPSS for Statistics 26.0 software, respectively.

**Results:** A 79 (58.2% male) T1D patients aged  $12.7 \pm 4.1$  years with  $4.4 \pm 3.5$  year disease duration were included. They were characterized by a BMI z-score of  $0.46 \pm 0.89$  and HbA1c of  $7.1 \pm 0.9\%$ . Food analysis, expressed as % E intake, revealed  $47.3 \pm 3.76$ ,  $17.4 \pm 3.0$ , and  $35.2 \pm 3.8$  carbohydrate (CHO), protein and fat,  $10.5 \pm 1.88$ ,  $4.7 \pm 0.98$ , and  $16.6 \pm 2.6$  saturated, polyunsaturated and monounsaturated fatty acids, and  $14.6 \pm 3.1$  g/1000 kcal fibers, respectively. HbA1C did not differ significantly in the subgroups of CHO (<40, 40–45, 45–50, >50%E) and fat intake (<30, 30–35, >35%E). Only CHO had a trend to be correlated with HbA1c ( $r = -0.243$ ,  $p = 0.031$ ). By dividing patients according to optimal glycemic control (HbA1c  $\leq 7\%$ ,  $n = 36$ ) in 2 groups, those consuming less fibers were more likely to have HbA1c > 7% ( $13.0 \pm 2.99$  vs.  $15.5 \pm 3.1$ ,  $p = 0.02$ ).

**Conclusions:** T1D children and adolescents, having received dietary guidance in our Center, are in good compliance with ISPAD guidelines, even years after the diagnosis, ensuring an optimal glycemic control. This good outcome may be also served by increased fiber consumption.

#### P030 | The effect of night snack options on nocturnal blood glucose variability in children and adolescents with type 1 diabetes

D. Gunes Kaya<sup>1</sup>, H. Turan<sup>2</sup>, M. Bař<sup>3</sup>

<sup>1</sup>Istanbul University-Cerrahpařa, Cerrahpařa Faculty of Medicine, Department of Pediatric, Istanbul, Turkey, <sup>2</sup>Istanbul University-Cerrahpařa, Cerrahpařa Faculty of Medicine, Department of Pediatric



Endocrinology, Istanbul, Turkey, <sup>3</sup>Acibadem Mehmet Ali Aydinlar University, Nutrition and Dietetics, Istanbul, Turkey

**Introduction:** Despite intensive insulin therapy, nocturnal hypoglycemia and glucose variability still an important problem, especially in diabetics who do not use glucose monitoring systems.

**Objectives:** The aim of this study is to investigate whether night snacks containing different nutrients have an effect on nocturnal hypoglycemia and glucose variability in children and adolescents with Type 1 diabetes (T1DM).

**Methods:** The study, which was planned as a randomized single-blind crossover nutrition intervention study, included a total of 12 patients, 4 girls and 8 boys, aged 6–17, using intensive insulin therapy. The subjects were given 4 night snack alternatives (Carbohydrate [CH], CH + protein, CH + fat, CH + fiber) to be consumed. Subjects consumed total of 12 test meals, with all test meals given 3 times. The blood glucose monitoring of the cases was made with a closed loop continuous glucose-monitoring device.

**Results:** Time in range for blood glucose is evaluated; CH and CH + protein TIR were statistically higher than CH + Fat and CH + Fiber values ( $p = 0.014$ ). When all snacks were evaluated, the highest TIR was the CH + protein snack for 58.3% of 12 patients. CH + fat does not the best TIR for any case. CH + protein area under the curve (AUC) values were statistically lower than CH + fat values ( $p = 0.08$ ). When the %CV was evaluated, there was no statistical difference between the snacks, but the snack with the lowest average coefficient of variation was determined as CH + protein. Although the CH + fat meal was not statistically significant, the time spent in hyperglycemia was found to be longer than other snacks. Although the CH + fiber meal was not statistically significant, it was the snack with the longest hypoglycemia time. There are differences between individuals in the results.

**Conclusions:** As a conclusion; creating healthy and individually planned snack alternatives for children and adolescents with T1DM can help improve glycemic control and may affect positively blood glucose during the night especially in diabetics who cannot use CGMS and SIIP.

#### P031 | Assessing the difference in time taken to establish insulin to carbohydrate ratios (ICR's) following diagnosis of type 1 diabetes

K. Sparrow<sup>1</sup>

<sup>1</sup>University Hospitals of Leicester, Pediatric Diabetes, Leicester, United Kingdom

**Introduction:** Insulin to carbohydrate ratios (ICR's) are considered important in enabling flexible insulin doses to optimize glycaemic control and quality of life following a diagnosis of type 1 diabetes. There are numerous factors and barriers which can delay successfully initiating this therapy and it is well known the time taken to do so can differ hugely among patients and families.

**Objectives:** To quantify the difference in time taken (weeks post diagnosis) to establish ICR's. Once understood, to analyzing qualitative data associated with this process to help identify barriers and further support which may be required and how the diabetes service can be developed accordingly.

**Methods:** Our online diabetes record system was used to retrospectively identify the date which ICR's were set against a patient's diagnosis date and corresponding qualitative information. Patients diagnosed with Type 1 Diabetes were audited between September 2016 and January 2020 ( $n = 115$ ).

**Results:** There is a clear difference in the time taken to establish ICR's between different ethnic groups. The average time taken to establish ICR's was 4 weeks and 5 days and the median time 2 weeks and 3 days. The groups taking on average, the least amount of time (0–3 weeks) to establish ICR's were; 'White British' (73%) and 'Other ethnic groups including mixed ethnic' (60%). The ethnic groups which were found to, on average, take the longest amount of time (>7 weeks) were 'White ethnic' (70%), and 'Black African' (60%). Reasons for delay in completion were divided into categories. Of these, the most common included 'more dietetic education required' (62%), 'problems completing the food diary'; (33%), and 'more time / practice required' (29%).

**Conclusions:** Attention is required to reduce the variation in difference taken to establish ICR's among different ethnic groups. More frequent educational opportunities and tailored resources to prevent further delay should be considered in addition.

#### P032 | Comparison of feeding patterns and mealtime behaviors of children with type 1 diabetes with age and gender matched controls

L. Helena<sup>1</sup>, V. McDarby<sup>2</sup>, E. Somers<sup>2</sup>, C. Ella<sup>1</sup>, L. Hobbs<sup>1</sup>, D. Barry<sup>1</sup>, R. Ward<sup>1</sup>, A. Martin<sup>1</sup>, B. McGuire<sup>1</sup>, D. Cody<sup>2</sup>

<sup>1</sup>National University of Ireland, Galway, Ireland, <sup>2</sup>Children's Health Ireland, Dublin, Ireland

**Introduction:** Research has found that children with T1D are at a greater risk of developing poor eating habits, which can affect their health in later life.

**Objectives:** The study aimed to identify the relationship between child feeding patterns and mealtime behaviors and to examine the impact of parental stress and self-efficacy on the management of T1DM.

**Methods:** Parents of children (aged 4 to 18 years) attending their regular diabetes clinic in a tertiary hospital ( $n = 143$ ) completed a psychological and feeding questionnaire battery that included the Behavioral Pediatrics Feeding Assessment Scale, the Parenting Stress-Index, the Self-Efficacy for Diabetes Scale, a food inventory, a demographic questionnaire and a questionnaire that assessed disruptive behavior at mealtimes. The same questionnaire battery was completed by the parents of a group of age and gender matched children ( $n = 143$ ).

**Results:** Results of the study found that children with T1D consumed relatively healthy diets, which were significantly influenced by their families. The findings indicated that the younger children (4–8 years) displayed more feeding problems and problematic mealtime behaviors than older children (9–13 years; 14–18 years). It was also found that both the number and frequency of behavioral feeding problems significantly influenced parental stress and self-efficacy.

**Conclusions:** These findings indicate a need for the development of targeted intervention strategies for young children with T1D and their families, to aid with effective management and treatment of their T1DM.

#### P034 | Factors associated with glycemic control in children with type 1 diabetes from a specialized diabetes center

S. Qabazard<sup>1</sup>, D. Khalifa<sup>2,1</sup>, D. Al-Abdulrazzaq<sup>3</sup>, H. Al-Kandari<sup>4,1</sup>

<sup>1</sup>Dasman Diabetes Institute, Population Health, Dasman, Kuwait, <sup>2</sup>Yarmouk Clinic, Ministry of Health, Kuwait City, Kuwait, <sup>3</sup>Kuwait University, Pediatrics, Kuwait City, Kuwait, <sup>4</sup>Al-Farwaniyah Hospital, Ministry of Health, Pediatrics, Sabah Al-Naser, Kuwait

**Introduction:** Dasman Diabetes Institute (DDI) is a specialized center caring for adult and pediatric patients with diabetes. We systematically collect data to assess treatment and optimize outcomes. We used our database to investigate the factors such as body mass index (BMI), gender, age and treatment modality associated with glycemic control in children with type 1 diabetes mellitus in the center.

**Objectives:** We used our database to investigate the factors such as body mass index (BMI), gender, age and treatment modality associated with glycemic control in children with type 1 diabetes mellitus in the center.

**Methods:** Data were collected from pediatric patients (under 18 years of age) visiting DDI clinics for routine follow up. Patients with at least 1 visit were included. Patients were divided into 4 groups according to WHO BMI z-scores: underweight (<−2), normal weight (−2 to ≤1), overweight (>1 to ≤2) and obese (>2). Glycemic control was defined as HbA1c <7%. Treatment modalities were either multiple daily injections (MDI) or continuous subcutaneous insulin infusion (CSII). Student t-test, chi squared, and ANOVA were used for statistical analysis. P-value was set to <0.05 for statistical significance.

**Results:** BMI, gender, age, HbA1c, and treatment modalities were analyzed in 128 pediatric patients. The study included 66 boys and 62 girls with a median (interquartile range) for age 14.46 (12.12; 16.30), BMI z-score 0.81 (−0.09; 1.66), 57% were categorized as under/ normal weight and 48% were on CSII. Median HbA1c was 8.4 (8.4; 8.4). There were no factors associated with glycemic control in this population.

**Conclusions:** In this population, glycemic control is not affected by weight, type of treatment, age, or gender. A larger sample size might warrant more inclusive results. Consistent follow-ups with physicians

and diabetes educators at DDI may also contribute to these results. It remains to be investigated whether maintaining or reducing weight in children with type 1 diabetes improves HbA1c.

#### P035 | Beneficial effect contributors of exercise in type 1 diabetes: Irisin and sestrin

E. Ceyhun<sup>1</sup>, S. Devran<sup>2</sup>, K.C. Demirbaş<sup>3</sup>, A. Çikikçi<sup>4</sup>, E. Bayramoğlu<sup>5</sup>, D.G. Kaya<sup>1</sup>, M.G. Günver<sup>2</sup>, M. Quinn<sup>6,7</sup>, B. Bayraktar<sup>2</sup>, S.O. Evliyaoglu<sup>5</sup>

<sup>1</sup>Istanbul University - Cerrahpasa, Cerrahpasa Medical Faculty, Pediatrics, Istanbul, Turkey, <sup>2</sup>Istanbul University, Sports Medicine Department, Istanbul, Turkey, <sup>3</sup>Istanbul University - Cerrahpasa, Cerrahpasa Medical Faculty, Istanbul, Turkey, <sup>4</sup>Marmara University, Faculty of Sports Sciences, Istanbul, Turkey, <sup>5</sup>Istanbul University - Cerrahpasa, Cerrahpasa Medical Faculty, Department of Pediatric Endocrinology, Istanbul, Turkey, <sup>6</sup>Harvard Medical School, Department of Pediatrics, Boston, United States, <sup>7</sup>Boston Children's Hospital, Division of Endocrinology, Boston, United States

**Introduction:** Type 1 Diabetes (T1DM) is a chronic metabolic disease characterized by hyperglycemia due to absolute insulin deficiency because of autoimmune damage of pancreatic  $\beta$  cells. In its treatment, insulin, medical nutrition therapy, and exercise is recommended. Although it is known that exercise contributes to disease control, the mechanism of these effects has not been fully clarified. It is thought that myokines such as irisin and sestrin, can be effective by secreting white fat tissue from the tissue by exercise, turning white fat tissue into brown.

**Objectives:** In this study, to determine the changes in clinical and laboratory findings with the exercise program applied in patients with T1DM; it is aimed to determine the relationship of these changes with the levels of irisin and sestrin.

**Methods:** A 33 patients with T1DM diagnosis and 36 control groups were identified. Exercise capacities were determined in both groups. A moderate-to-high intensity exercise program was applied 3 days a week for 3 months with T1DM patients. At the end of the exercise program, serum irisin, sestrin were evaluated. Their examinations were obtained from file data and computer records. Changes in laboratory and clinical findings were compared.

**Results:** Sestrin level was found to be high compared to the control group in the T1DM-diagnosed group. No significant difference in irisin level was detected. With exercise, sestrin levels decreased and irisin levels increased. HbA1c and basal insulin doses were found to decrease in the exercised group.

**Conclusions:** Irisin levels increased and sestrin levels decreased with the exercise program structured and under observation according to age group and T1DM. Our findings suggest that irisin and sestrin may contribute to the beneficial effects of exercise in children with type 1 diabetes.

## POSTER TOUR 5—PSYCHOLOGY # 2

**P036 | Sleep characteristics in a Danish pediatric type 1 diabetes population: A pilot study**

C. Paulsruud<sup>1</sup>, S. Ullitz Thorsen<sup>1</sup>, A. Ranjan<sup>1</sup>, K. Nørgaard<sup>1</sup>, N. Mol Debes<sup>2</sup>, J. Svensson<sup>1</sup>

<sup>1</sup>Steno Diabetes Center Copenhagen, Diabetes Technology, Herlev, Denmark, <sup>2</sup>Herlev Gentofte Hospital, Department of Pediatrics, Herlev, Denmark

**Introduction:** Sleep disturbances are increasing in the population and may be even more pronounced in adolescents with type 1 diabetes (T1D) compared to healthy peers.

**Objectives:** We aimed to investigate sleep and the association to glycemic parameters.

**Methods:** This is a pilot study with repeated questionnaire and actigraphy data from 45 patients age 6–17 years old; 19 with T1D and 26 controls (15 with Tourette syndrome and 11 healthy individuals). All recruited from a large pediatric department in Denmark. Questionnaires were answered two times with 3 weeks in between, and an actigraphy (AG) watch (wGT3X-BT) worn for 7 days and nights including fulfillment of a sleep diary. Data was analyzed in two steps: (1) correlated exposure reduction using principal component analysis (PCA) (questionnaire and AG data were analyzed separately); and (2) linear regression with principal components (PCs). Six main sleep quality questions were included in PCA1 and mean and SD of the AG measures (sleep duration, latency, and sleep efficiency) was included in PCA2.

**Results:** 96.5% of the participants had on average insufficient sleep duration according to AASM guideline. Children with T1D had a median (range) age of 11 (6–17); HbA1c 59.00 (39–87) mmol/mol; Time-in-range (TIR) 60.2 (25–97)%; Time-below-range (TBR) 3.5 (0–16)%. No difference in sleep duration or sleep quality between T1D and controls. The PC that captured insufficient perceived sleep, was associated with a 4.3 mmol/mol increase in HbA1c (95% CI: 1.5 to 7.1 mmol/mol, p-value = 0.005) and a decreased TIR (–4.7%, 95% CI: –9.6 to 0.2%, p-value = 0.06). The PC that captured poor objective sleep was positively associated with HbA1c (3.9 mmol/mol, 95% CI: –0.7 to 8.5 mmol/mol, p-value = 0.09). All estimates were robust after adjustment for sex or age.

**Conclusions:** These results highlight the importance for further in-depth investigation of the association between sleep and glycemic outcomes in children and adolescents with T1D.

**P037 | Exploring trust, satisfaction, and other patient-reported outcomes in children and adults with type 2 diabetes using insulin pumps: Real-world observations**

H. Singh<sup>1</sup>, G. Alencar<sup>1</sup>, M. Manning<sup>1</sup>, S. Habif<sup>1</sup>

<sup>1</sup>Tandem Diabetes Care, San Diego, United States

**Introduction:** Recent publications have noted a sharp rise in the prevalence of youth-onset type 2 diabetes (T2D). Glucose control is reported to be especially compromised in this cohort leading to a high prevalence of diabetes complications.

**Objectives:** Automated insulin delivery systems have demonstrated successful outcomes in people with type 1 diabetes however, little is known about their use and patient experience in T2D management, especially for pediatric patients.

**Methods:** People with T2D from the customer base of Tandem Diabetes Care responded to an email invitation and completed an online survey in October 2021 exploring their experiences with their Tandem insulin pump. For purposes of this study, we analyzed demographics, self-reported glycemic data (HbA1c), continuous glucose sensor based glycemic metrics, and patient-reported outcomes (PROs) from US participants.

**Results:** Analysis included 2310 T2D participants (White = 77%, female = 49%, private health insurance = 62%, MDI [prior therapy] = 61%). Most participants had been using their insulin pump for a year or less (61%) and the majority were on the t: slim X2 insulin pump with Control-IQ technology (76%). Self-reported HbA1c was <8% for the majority (84%). Median sensor time in range by age cohort was: <18 years (n = 12) = 51% (IQR = 31.2), 18–30 years (n = 17) = 73% (IQR = 35.6), 31–45 years (n = 178) = 71% (IQR = 28.6), 46–64 years (n = 1034) = 71% (IQR = 22.3), ≥65 years (n = 1069) = 73% (IQR = 19.8). Sensor time below <70 mg/dl was <1% for all groups. In terms of PROs, participants reported high satisfaction that is, endorsed “satisfied” or “very satisfied” with their insulin pump (<18 years = 83%; ≥18 years = >85%). Pump-related “trust” (<18 years = 92%; ≥18 years = >80%) and “ease of use” (<18 years = 84%; ≥18 years = ≥82%) also trended high. The majority in each age cohort reported “reduction in their burden to manage diabetes” (<18 years = 100%; ≥18 years = ≥90%) and being able to “manage their diabetes effectively” (<18 years = 92%; ≥18 years = ≥77%) while using their insulin pump.

**Conclusions:** Despite a small pediatric cohort, this study identifies valuable real-world implications of using advanced insulin therapies with an otherwise challenging patient group. Future, in-depth studies exploring onboarding to and use of these technologies in this cohort are encouraged.

**P038 | Impact of youth worker in reducing health inequalities and improving outcomes**

S. Hulikere<sup>1</sup>, C. Cunliffe<sup>1</sup>

<sup>1</sup>Warrington and Halton Teaching Hospitals NHS Foundation Trust, Pediatrics, Warrington, United Kingdom

**Introduction:** Youth worker participation in the young persons Diabetes MDT team contributes to enhancing the care. By working closely, youth worker may be able to get insight into the pressure experienced by children and young people in managing their Diabetes.

**Objectives:** To assess the impact of a youth worker in improving outcomes in Children and Young people (CYP) with Type 1 Diabetes Mellitus.

**Methods:** The RCPCH annual NPDA 2018–2019 data reported 41% of Children and Young people with Diabetes live in either most deprived or least deprived areas. Researches have shown the Diabetes patients living in deprived areas have poorer short and long-term outcomes the youth worker in the Diabetes MDT team helps to develop the service and supports the MDT team by contributing to the care and understanding of young people. A proposal was submitted and funding was approved to employ a youth worker from the Diabetes Health Inequalities Program. A youth worker was employed at the Warrington and Halton Hospitals Teaching NHS Foundation trust (WHHFT) in June 2021. The role encouraged positive engagement through forming relationships and encouraging Young People to communicate effectively with the Clinical Team. The youth worker engaged CYP in community activities. Young People choose what types of activities they would benefit, or activities will be set from frequent topics spoken about with Young People. The Youth Worker encouraged and supported Young People with High HbA1c and poor Diabetes Management through 1:1 community visits.

**Results:** In the year, 2021–2022 there were 7 Diabetes related admissions and 2 were DKA compared to 13 admissions in the previous year of which 6 were DKA.

6.7% patents DNAed clinic in year 2021–2022 and in November 2021–March 2022 DNA rate was 4.48%.

There was reduction in HbA1c in 7 patients out of 10 targeted transition age patients.

**Conclusions:** Youth worker support improved patient engagement, reduced DNA admissions and reduced HbA1C in select group of patients.

#### P039 | A self-compassion chatbot (COMPASS) to improve the wellbeing of adolescents with type 1 diabetes: Findings from qualitative research

A. Boggiss<sup>1</sup>, N. Consedine<sup>1</sup>, S. Hopkins<sup>1</sup>, C. Silvester<sup>2</sup>, C. Jefferies<sup>3</sup>, P. Hofman<sup>3</sup>, A. Serlachius<sup>1</sup>

<sup>1</sup>University of Auckland, Department of Psychological Medicine, Auckland, New Zealand, <sup>2</sup>Proactive Rehabilitation, Tauranga City, New Zealand, <sup>3</sup>Liggins Institute, University of Auckland, Auckland, New Zealand

**Introduction:** Adolescents with Type 1 Diabetes (T1D) experience far greater rates of psychological distress than their peers and consequently an increased risk of suboptimal glycemic control and diabetes complications. Chatbots are an interventional approach which offer unique advantages to deliver psychological support over face-to-face therapies and other digital tools, with 24-h availability, scalability, and the capability to provide personalized responses in real-time. However, the acceptability of a chatbot to deliver self-compassion coping tools for this population remained unknown.

**Objectives:** A qualitative focus group study was conducted with adolescents with T1D and their healthcare professionals to examine the acceptability of a novel self-compassion chatbot (COMPASS) for adolescents aged 12 to 16-years-old with T1D.

**Methods:** Qualitative Zoom interviews were conducted with 19 adolescents and 11 diabetes team healthcare professionals in March and April 2022 to explore their views on existing wellbeing apps and our newly developed self-compassion chatbot. Transcripts were analyzed using directed content analysis to examine likes and dislikes regarding both current apps and the COMPASS chatbot and what they would want added to a future improved version of COMPASS.

**Results:** Findings offer an early understanding of what adolescents and their healthcare professionals dislike and also their desired content and feature additions, such as a moderated discussion board to ask and answer questions, a problem-solving feature for blood sugars, integration with diabetes technology, and the ability to personalize chatbot content and features.

**Conclusions:** Qualitative data suggest that chatbot interventions for this population should include an appropriate peer support element, integrate with diabetes technologies, and include significant elements of personalization to make the chatbot more relevant to their everyday lives. These results are currently informing design and content adaptations ahead of a fully powered RCT.

#### P040 | Diabetes-related distress for parents and its association to glycemic outcome in adolescents with type 1 diabetes

H.J. Min<sup>1</sup>, J. Wong<sup>2</sup>, T. Hoffman<sup>3</sup>, A. Alkon<sup>1</sup>, Y. Fukuoka<sup>4</sup>, J.-I. Chen<sup>1</sup>  
<sup>1</sup>UC San Francisco, Department of Family Health Care Nursing, San Francisco, United States, <sup>2</sup>UC San Francisco, Department of Pediatrics, Division of Endocrinology, San Francisco, United States, <sup>3</sup>UC San Francisco, School of Medicine, San Francisco, United States, <sup>4</sup>UC San Francisco, Department of Physiological Nursing, San Francisco, United States

**Introduction:** The current gap in the literature is the lack of best practices in screening for psychosocial factors across the aforementioned four domains.

**Objectives:** The purpose of this study is to determine the association of factors in the individual and family domains with glycemic outcomes in adolescents with type 1 diabetes (T1D).

**Methods:** In this cross-sectional study, glycemic outcomes were hemoglobin A1c (A1C) and time in range (TIR) from 70–180 mg/dl based on continuous glucose monitoring (CGM) data. Adolescents with T1D and one caregiver were recruited from telehealth visits at a tertiary, multidisciplinary pediatric diabetes center to complete a self-report survey. Factors included diabetes self-management, diabetes technology use, diabetes distress, parenting stress, and family functioning from the individual and family domains. Age, gender, BMI, insurance type, daily insulin dose, insulin regimen, and A1C were collected by medical chart review. CGM data were collected from device software. Univariate and multivariable



regression models were conducted for association with glycemic outcomes (A1C and TIR).

**Results:** A 35 adolescents with T1D and their caregivers participated in this study. The mean (SD) A1C was  $8.48\% \pm 2.6\%$  and the mean (SD) TIR was  $60.5\% \pm 19.5\%$ . Multivariable analysis showed higher parent diabetes-related distress was associated with higher A1C, and family income greater than US \$100,000/year was associated with lower A1C. Similarly, multivariable analysis showed higher parent diabetes-related distress was associated with lower TIR, and parent education higher than a bachelor degree was associated with higher TIR.

**Conclusions:** Only the association of variables in the family domain with glycemic outcomes was statistically significant. Future interventions aiming to optimize glycemic control of adolescents with T1D must consider the family domain.

#### P042 | Promotion of successful hybrid closed loop utilization via targeted bolusing behavioral intervention among adolescents with type 1 diabetes (T1D) and their families

E. Escobar<sup>1</sup>, H. O'Donnell<sup>1</sup>, S. Lange<sup>1</sup>, T. Vigers<sup>1,2</sup>, A.J. Karami<sup>1</sup>, C. Berget<sup>1</sup>, L. Messer<sup>1</sup>, R.P. Wadwa<sup>1</sup>, L. Pyle<sup>1,2</sup>, G.P. Forlenza<sup>1</sup>

<sup>1</sup>University of Colorado School of Medicine, Barbara Davis Center for Diabetes, Aurora, United States, <sup>2</sup>Colorado School of Public Health, Department of Biostatistics and Informatics, Aurora, United States

**Introduction:** Despite improvements in diabetes technologies, many adolescents with T1D struggle with recommended self-management behaviors contributing to higher A1Cs. User-administered boluses continue to be an important predictor of achieving the target time in range 70–180 mg/dl of  $\geq 70\%$ . Previously, we developed a model to identify which adolescents starting Hybrid Closed Loop (HCL) therapy

may need more support to be successful with these new technologies.

**Objectives:** We aim to enroll and randomize 40 adolescents (12–18 years) starting HCL and predicted to have suboptimal use into a pilot behavioral intervention to increase adherence to the recommended user-administered insulin boluses (Figure 1).

**Methods:** The study will utilize a previously validated algorithm to identify adolescents not likely to meet glycemic targets after 12 months using data from the first 1 month of HCL use. Those predicted to have suboptimal use will be randomized 1:1 to either a behavioral intervention or enhanced standard of care. All adolescents will participate in 3 sessions with a trained interventionist over 3 months.

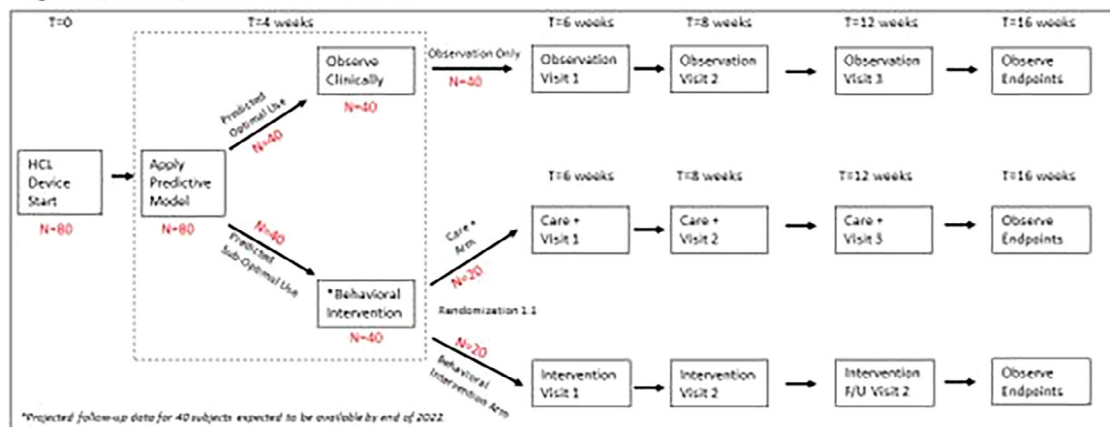
**Results:** The behavioral intervention arm will participate in family-centered problem-solving sessions. The interventionist will work with the adolescent and a caregiver to generate behavioral goals related to bolusing behaviors, brainstorm strategies for working toward the goal, and set a specific plan for how this goal will be achieved with participation from both the adolescent and caregiver. The enhanced standard of care will meet with an interventionist who will provide additional education on the HCL system.

**Conclusions:** Although HCL technologies improve glycemic control, user engagement with devices remains essential for success. This study will provide pilot data on a brief family-centered problem-solving intervention to increase user-administered boluses, which are strongly correlated with glycemic outcomes.

#### P043 | Quality of life and psychological wellbeing among children with diabetes using open-source automated insulin delivery systems: findings from a global survey

C. Knoll<sup>1</sup>, K. Braune<sup>1,2</sup>, J. Schipp<sup>3</sup>, H. Ballhausen<sup>4</sup>, S. O'Donnell<sup>5</sup>, M. Wäldchen<sup>5</sup>, K. Gajewska<sup>5</sup>, B. Cleal<sup>6</sup>, K. Raile<sup>1</sup>, T. Skinner<sup>7</sup>

Figure 1: Bolus Intervention RCT Timeline





<sup>1</sup>Charité - Universitaetsmedizin Berlin, Berlin, Germany, <sup>2</sup>Berlin Institute of Health, Berlin, Germany, <sup>3</sup>The Australian Center for Behavioral Research in Diabetes, Melbourne, Australia, <sup>4</sup>#dedoc<sup>o</sup> Diabetes Online Community, Berlin, Germany, <sup>5</sup>University College Dublin, Dublin, Ireland, <sup>6</sup>Steno Diabetes Center Copenhagen, Copenhagen, Denmark, <sup>7</sup>University of Copenhagen, Copenhagen, Denmark

**Introduction:** Open-source automated insulin delivery (AID) systems have shown to be safe and effective in clinical and real-world studies and to increase quality of life (QoL) in adult users. However, there is a lack of evidence on the effect on health-related QoL and general well-being in children and their caregivers.

**Objectives:** The aim of this study was to assess the QoL of children and adolescents with diabetes using open-source AID systems using validated measures.

**Methods:** In this cross-sectional, population-based global online survey, we examined the caregiver-reported QoL and psychological well-being of users and non-users of open-source AID. Validated questionnaires assessed general emotional wellbeing (WHO-5 Well-being Index), diabetes-specific QoL (Problem Areas in Diabetes Survey—Parent Revised version (PAID-PR), Pediatric Quality of Life Inventory (PedsQL)), and subjective sleep quality (Pittsburgh Sleep Quality Index [PSQI]).

**Results:** A 188 caregivers from 27 countries completed at least one questionnaire on behalf of their children, including 132 children with type 1 diabetes using open-source AID (mean age 11.5 [SD 3.5], 48% female) and 56 children with type 1 diabetes who were non-users at the time of the survey (mean age 10.4 [SD 3.3], 41% female). All questionnaire scores showed significant between-group differences with the AID users reporting higher general (WHO-5:  $p < 0.001$ ), diabetes-related (PAID:  $p = 0.029$ ; PedsQL:  $p = 0.016$ ), and sleep-related QoL (PSQI:  $p < 0.001$ ).

**Conclusions:** The results show the beneficial impact that open-source AID systems have on the QoL and psychological well-being of children and adolescents, and can therefore help to inform academia, regulatory decision, and policymakers about the potential that open-source AID systems hold. Further research is needed to examine the reasons for the differences between the groups.

#### P044 | Metabolic and psychological correlates of disordered eating and insulin restriction behaviors among diabetic adolescents and young adults in Taiwan

M.-C. Tsai<sup>1</sup>, W.-C. Chou<sup>1,2</sup>, Y.-Y. Chou<sup>1</sup>, Y.-W. Pan<sup>1</sup>, T.-Y. Ou<sup>1,3</sup>

<sup>1</sup>National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Division of Genetics Endocrinology and Metabolism, Department of Pediatrics, Tainan, Taiwan, <sup>2</sup>Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Department of Pediatrics, Hualien, Taiwan, <sup>3</sup>Dalin Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Department of Pediatrics, Hualien, Taiwan

**Introduction:** Diabetic adolescents and young adults (AYAs) face many psychological challenges. Eating disorders are common in this life stage and are of particular concern because of their association with poor metabolic control. Moreover, there is evidence relating drastic fluctuations in glycemic levels to emotional perturbation among diabetic patients. Unfortunately, there is scarce research on eating behavior among diabetic AYAs in Taiwan.

**Objectives:** This study aimed to investigate the prevalence and correlates of disordered eating/insulin restriction (DE/IR) behavior in diabetic AYAs.

**Methods:** We enrolled 142 AYAs obtaining a diagnosis of diabetes mellitus (DM) and insulin treatment in a tertiary medical center that received referrals from a catchment area of nearly 3 million residents in southern Taiwan. In addition to various HbA1c measures (e.g., single updated value, yearly mean, SD, coefficient of variation, and HbA1c variability score) indicating glycemic control, we assessed the DE/IR behavior using the modified SCOFF questionnaire and anxious and depressive symptoms using the Hospital Anxiety and Depression Scale (HADS). Multivariate regression analyzes were applied to examine the association between DE/IR behavior and clinical and psychosocial factors.

**Results:** We found that 17.6% restricted insulin use in this cohort and 6.3% self-medicated for weight control. These two behaviors were more prevalent in patients with type 2 DM than those with type 1 DM. In bivariate analysis, the mSCOFF score was correlated with both subscales of HADS. In multivariate analysis, only the SD of the HbA1c values was associated with an mSCOFF score greater than two ( $\beta = 3.44$ , 95% confidence interval = 1.38–8.57).

**Conclusions:** DE/IR behavior is not uncommon, particularly among AYAs with type 2 DM, and may be associated with anxiety and depressive symptoms. In addition, HbA1c variability seems to be correlated with DE/IR behavior, and its clinical implication may further need to be explored.

#### P045 | A brief psychological intervention with an emotional health booklet for children and young people newly diagnosed with type 1 diabetes

A. Lose<sup>1</sup>

<sup>1</sup>LNWH (Ealing) Pediatric Diabetes Team, NHS, London, United Kingdom

**Introduction:** Being diagnosed with type 1 diabetes brings with it a multitude of tasks and challenges to be overcome by the children and young people diagnosed, as well as their families. It requires adaptations in most aspects of their lives and often can lead to related anxieties and other emotional difficulties.

**Objectives:** A pediatric diabetes team in England attempted to support the children and their families with the initial stages post-diagnosis using a brief intervention from a psychologist, utilizing an emotional health booklet, designed within the team. The aim of the intervention is to normalize the emotional reactions experienced by many families following diagnosis, to offer space for expression of these feelings, and to provide strategies and tools for coping with the diagnosis and related feelings.

Key comparison points between 2020 and 2022 patient surveys:	June/July 2020	March/April 2022
No. responses	100	100
Average age patient (in years)	Mean 12.23 Median 12 Range 1–19	Mean 12.16 Median 13 Range 3–18
Type of appointment participated in during the last 6 months:	Video 8% Telephone 92%	Video 63% Telephone 10% Both 26% Face to Face 1%
Percentage of responders who had experience in downloading data prior to clinic:	69%	59%
Percentage of responders who downloaded the patient's data prior to clinic:	66%	56%
Appointments that were attended by the patient – either alone or in addition to parent:	84%	90%
Overall satisfaction score with virtual appointments (1 being poor, 5 being good):	4.6 out of 5	4.59 out of 5
Parent/patient preference on whether they would like access to virtual appts as part of ongoing follow-up?	Yes 51%, No 26%	Unsure 23% Yes 77%: - Telephone 12% - Video 65% No - FtF only 23%

**Methods:** The newly designed emotional health booklet is delivered alongside brief input from a clinical psychologist either during or following the initial outpatient appointment with the multidisciplinary team. This brief intervention will be evaluated using a feedback questionnaire designed for this study, using ideas from Waldron and Hall's (2020) service evaluation of a brief psychology intervention for children newly diagnosed with diabetes. Participants will be asked to complete the feedback questionnaire within 3 months following diagnosis, after obtaining consent. Qualitative aspects of the questions will be summarized into themes, and quantitative data will be presented using descriptive statistics.

**Results:** Last year, 23 patients were seen by the team. It is, therefore, estimated that a similar number will be available to participate this year.

**Conclusions:** It is hoped that participants will find the booklet and brief intervention useful in supporting them with coping with initial challenges of being diagnosed with Type 1 Diabetes, possibly reducing anxiety common for this difficult stage of a diabetes journey. Study findings will be used to improve the intervention and future evaluations of the project.

## POSTER TOUR 6—DIGITAL DIABETES & TELEMEDICINE

### P046 | Are virtual appointments still wanted in the post lockdown era? A follow-up survey of patient and caregiver views on virtual pediatric diabetes clinic appointments

L. Wade<sup>1</sup>, P. Bamal<sup>1</sup>, V. Alexopoulou<sup>1</sup>, E. Clarke<sup>1</sup>, M. Deakin<sup>1</sup>, F. Mehta<sup>1</sup>, P. Paul<sup>1</sup>, A. Ghatak<sup>1</sup>

<sup>1</sup>Alder Hey Children's NHS Foundation Trust, Liverpool, United Kingdom

**Introduction:** COVID-19 brought about a rapid change in the way diabetic follow up services were run in our local pediatric unit.

Appointments were initially made via telephone with the introduction of video clinics a short time later. A survey of caregiver and patient views of virtual clinics in 2020 showed high satisfaction scores with these appointments. Face-to-face (FtF) appointments have restarted but virtual appointments have continued to run alongside.

**Objectives:** A repeat survey in 2022 aimed to re-assess families' experience of virtual clinics and their views on the use of virtual clinics as part of their long-term follow-up.

**Methods:** Two surveys were carried out between June to July 2020 and March to April 2022. Caregivers were selected at random from the patient list and contacted by telephone. An oral survey was completed with responses collated on a Microsoft form.

**Results:** A 100 responses were collected in both surveys. This covered a range of patient ages and treatment modalities. Satisfaction with virtual appointments remained high with a rating of 4.6 and 4.59 out of 5 respectively for the 2020 and 2022 survey. Virtual appointments requests as part of follow-up increased from 51% to 77%, with video preferred to telephone (65% vs. 12%). Pump and CGM data downloading pre-clinic dropped from 66% to 56%.

**Conclusions:** The majority of patients and caregivers found virtual clinic appointments a positive experience and are keen to see them continue even though COVID-19 restrictions have lifted. This will have significant impact and potentially substantial savings in the way follow-up services are designed. Digital poverty (access to devices/ IT knowledge) remains a barrier to some patients accessing virtual appointments. Patient/caregiver preferences and individual circumstances must be taken into account when redesigning follow-up services.

**P047 | The ENDORSE feasibility pre-pilot trial: Assessing an innovative integrated platform, implementing serious games strategy and artificial intelligence-based telemedicine for glycemic control improvement**

I.-A. Vasilakis<sup>1</sup>, I. Kosteria<sup>1</sup>, G. Papavasileiou<sup>1</sup>, K. Zarkogianni<sup>2</sup>, L. Kalafatis<sup>2</sup>, K. Mitsis<sup>2</sup>, M. Athanasiou<sup>2</sup>, K. Perakis<sup>3</sup>, A. Taliou<sup>1</sup>, N. Nicolaidis<sup>1</sup>, V. Chioti<sup>1</sup>, I. Tokou<sup>1</sup>, D. Vergeti<sup>3</sup>, D. Antonopoulou<sup>4</sup>, E. Papachristou<sup>4</sup>, V. Meklis<sup>2</sup>, K. Nikita<sup>2</sup>, C. Kanaka-Gantenbein<sup>1</sup>

<sup>1</sup>Diabetes Center, Division of Endocrinology, Diabetes and Metabolism, First Department of Pediatrics, National and Kapodistrian University Athens, Medical School, "Aghia Sophia" Children's Hospital, Athens, Greece, <sup>2</sup>National Technical University of Athens, School of Electrical and Computer Engineering, Athens, Greece, <sup>3</sup>UBITECH, Research and Development Department, Chalandri, Greece, <sup>4</sup>Inspiring Earth, PEGNEON, Athens, Greece

**Introduction:** Following the trend of digital health applications, implemented especially during the COVID-19 pandemic, the "ENDORSE" project, is designed as an innovative integrated platform for supporting clinical decision making and telemedicine in children with Type 1 Diabetes Mellitus (T1DM), utilizing explainable artificial intelligence along with gamification and mobile technologies.

**Objectives:** Assessment of preliminary data from the prepilot phase of the ENDORSE feasibility trial.

**Methods:** ENDORSE platform utilizes various data sources such as glucose sensors (Flash Glucose Monitoring-FGM), smart insulin pen caps, activity trackers, mobile apps, Electronic Health Records and a newly developed serious game. A 13 T1DM children and adolescents (8 females, on multiple daily injections, mean diabetes duration 2, 57 years, mean HbA1c 7, 6%, mean Body Mass Index +1, 2 SDS, mean monitoring days: 151), followed in our Diabetes Center, were assessed regarding adherence to the study protocol. They all had internet access and only one has used a diabetes mobile application before.

**Results:** As shown in Table 1, most of the patients used the "Smart Insulin Pen Cap" to document insulin and food data and many performed mobile FGM scanning, while the engagement to the ENDORSE serious game, aiming at training in self-disease management, along with the activity trackers is highly variable.

**Conclusions:** ENDORSE platform along with changes in daily diabetes care practices like CGM usage, is expected to improve diabetes management through facilitating training, monitoring and feedback to the patients and their caregivers. In order to further improve its

adherence and acceptance, factors such as the level of digital literacy and the need of a personalized experience to improve usability, should be also taken into consideration.

**Acknowledgements:** Supported within the framework of the ENDORSE project, which is funded by the NSRF (Grant agreement: T1EΔK-03695).

**P048 | WhatsApp for diabetes self-management education (DSME) in type 1 diabetes mellitus (T1DM): randomized controlled trial**

P. Gupta<sup>1</sup>, V. Ganakumar<sup>1</sup>, V. Vyas<sup>2</sup>, M. Mittal<sup>1</sup>, M.K. Garg<sup>1</sup>, R. Shukla<sup>1</sup>

<sup>1</sup>All India Institute of Medical Sciences, Department of Endocrinology & Metabolism, Jodhpur, India, <sup>2</sup>All India Institute of Medical Sciences, Department of Pediatrics, Jodhpur, India

**Introduction:** WhatsApp is a free to use mobile application used for personal communication but there is no data on its use in DSME of T1DM patients.

**Objectives:** Single-center RCT to study the effect of WhatsApp based DSME on glycemic status (HbA1c), knowledge, quality of life (QOL) & coping skills of T1DM patients at 16 & 28 weeks.

**Methods:** A 56 T1DM patients (15–40 years) with WhatsApp were randomized into two groups: "Intervention" (n = 28) who received weekly educational WhatsApp messages & "Sham" (n = 28) who received weekly greeting messages. Patients without access to WhatsApp formed "Control" group (n = 10). HbA1c, Diabetes Knowledge Test (DKT), Diabetes Quality of life (DQOL) & Coping with disease (CODI) questionnaires were administered at baseline, 16 & 28 weeks. Structured offline diabetes education was given at 0, 4, 16, 28 weeks in all patients.

**Results:** The mean baseline HbA1c was 10.69 ± 2.74%. At 28 weeks, there was significant reduction in HbA1c in WhatsApp trial group (Intervention plus Sham) compared to Control group (mean ± SE 9.144 ± 0.27% vs. 11.66 ± 0.731%, P = 0.003). There was improvement in knowledge score, coping skills, & QOL in WhatsApp trial group as compared to Control group. Among the two WhatsApp groups, there was significant increase in knowledge score with WhatsApp based DSME (P = 0.001) in Intervention group. The mean HbA1c decreased in both Intervention & Sham WhatsApp group but difference between them was not significant (P = 0.262). There was no significant difference in QOL & coping skills in Intervention versus Sham WhatsApp group.

**Conclusions:** WhatsApp group formation led to improvement in glycaemic control, coping skills & QOL if treating team stayed in touch with the patients through a WhatsApp group, irrespective of whether WhatsApp based DSME was provided in the group or not. WhatsApp based DSME however did improve the knowledge score in the Intervention group. Hence, WhatsApp group with treating doctor can provide a cost-effective platform for T1DM patients in resource limited settings.

Table 1: Patients' adherence to the ENDORSE clinical protocol

ENDORSE device/ application	Mean (%days) ± SD; (Max, Min)
Activity trackers	32.00% ± 32.37%; (0.00%, 99.06%)
Serious game	9.00% ± 7.80%; (0.00%, 23.58%)
Mobile phone FGM scanning	43% ± 38%; (0.00%, 100.00%)
"Smart" insulin pen cap	54% ± 40.87%; (3.87%, 100%)

**P049 | The IDEAL (ISPAE diabetes education and learning) virtual pediatric diabetes educator training model is affordable and accessible in limited-resource settings. Can it be sustainable and replicable as well?**

P. Singh<sup>1</sup>, S. Salis<sup>2</sup>, S.K. Boddu<sup>3</sup>, S. Bhattacharyya<sup>4</sup>, S. Olety<sup>5</sup>, A. Irani<sup>6</sup>, R. Kumar<sup>7</sup>, G. Jevalikar<sup>8</sup>, A. Virmani<sup>9</sup>

<sup>1</sup>Lady Hardinge Medical College, Pediatrics, New Delhi, India, <sup>2</sup>Nurture Health Solutions, Nutrition, Mumbai, India, <sup>3</sup>Rainbow Children's Hospital and Perinatal Care, Pediatric Endocrinology, Hyderabad, India, <sup>4</sup>Manipal Hospital, Pediatric Endocrinology, Bangalore, India, <sup>5</sup>Karnataka Institute of Endocrinology and Research, Pediatric Endocrinology, Bangalore, India, <sup>6</sup>Nanavati Max Super Speciality Hospital, Pediatrics, Mumbai, India, <sup>7</sup>Postgraduate Institute of Medical Education and Research, Pediatric Endocrinology, Mumbai, India, <sup>8</sup>Max Hospital, Pediatric Endocrinology, Delhi, India, <sup>9</sup>Max Hospital, Saket and Rainbow Hospital, Malaviya Nagar, Pediatric Endocrinology, Delhi, India

**Introduction:** Structured diabetes education (DE) is vital to manage pediatric diabetes (PD) but educators are scarce in developing countries. Due to familiarity with virtual teaching in the COVID pandemic, a virtual PDE course was planned for India.

**Objectives:** Evaluate outcomes of a virtual PDE course in a limited-resource (LR) setting.

**Methods:** A 9-member ISPAE (Indian Society for Pediatric & Adolescent Endocrinology) committee, with 47 experienced volunteer faculty planned a 12-week comprehensive curriculum (delivered in English, fee INR 5000 = US\$65) basic & advanced skills: diagnosis, pathophysiology, insulin, SMBG, CGMS, CSII, MNT, exercise, psychology, toddlers, adolescents, type 1&2, other special situations: 17 teaching +5 feedback sessions, exit exam; practical assignments for each session.

**Results:** Trainees working with T1D selected from across India: semi-urban were preferred. Lengthy course with 90%–95% attendance (highly motivated) possible as no leave, travel, or stay costs needed. Easier for women to join. Significant rise in post-test scores that is,

Total applicants (n = 102)/ selected	Batch 1 52/ 24	Batch 2 50/30
Nurse/ dietician/ DE (n)	3/4/17	6/6/18
Female	79%	93%
Self or parent T1D	17%	17%
Working in metro city	84%	73%
Mean attendance % (SD)	90 (9.9)	95.5 (5.9)
Mean pre-test score % (SD)	67.3 (8.2)	64.1 (9.3)
Mean post-test score % (SD)	78.5 (8.3)	74.8 (9.4)
p value (Pre/Post)	< 0.001	0.002
Eligible for exam <sup>a</sup>	21 (87.5%)	27 (90%)
Mean exam score % (SD)	75.2 (7.4)	71.7 (9.4)
Certified %	83.3	76.7

<sup>a</sup> 80% attendance + completed assignments.

knowledge improved. Certification was based on stringent criteria. Other advantages: intense interaction, personal commitment, continued networking, and awareness of resources. Challenges: widely varied resource, language, and social settings: language barriers, limited resources, variable baseline knowledge.

**Conclusions:** The IDEAL PDE training model being virtual & intensive is an affordable & accessible alternative to a physical program in LR settings. We hope to make it high quality, sustainable, and replicable.

**P050 | Caregiver competence with the child's type 1 diabetes management: Results from an occupation based coaching telehealth intervention**

J. Shin<sup>1</sup>, V. Jewell<sup>1</sup>, Y. Qi<sup>1</sup>, A. Valdez<sup>1</sup>

<sup>1</sup>Creighton University, Occupational Therapy, Omaha, United States

**Introduction:** Occupation based coaching (OBC) is a collaborative, family-centered intervention where interventionists and clients collaboratively engage in reflection and problem solving to achieve self-identified goals. The interventionists strategically employ four types of reflective questioning to increase clients' awareness of resources and contexts, encourage problem solving, and facilitate formation of action plans. OBC allows clients to develop long-term capacity and competence with managing the health of their child diagnosed with type 1 diabetes.

**Objectives:** The audience will.

(a) appraise the caregiver competence outcomes from a novel telehealth intervention and.

(b) evaluate the utility of occupation based coaching and Evidence of Independent Capacity Rating Scale.

**Methods:** A 10 rural-dwelling caregivers with a child (2–12 years) diagnosed with type 1 diabetes received 1-h weekly OBC sessions across 12 weeks. Two verbatim transcriptions were randomly selected from the beginning, middle, and end phases per family, yielding 60 transcriptions for a retrospective analysis. Repeated measures ANOVA were used to analyze the data collected on the Evidence of Independent Capacity Rating Scale to evaluate the progression of the caregiver's developing competence with managing the health of their child diagnosed with type 1 diabetes.

**Results:** The word count for “Caregiver Talk” increased significantly from 67.2% at the beginning and 67.9% at the middle phase to 72.4% at the end phase ( $p = 0.034$ ). The average rating on the Evidence of Independent Capacity Rating Scale (“A” indicates high level of independence and “C” indicates low level of independence from the interventionist) increased from the average rating close to “B” at the beginning and middle phases to a rating close to “A” at the end phase ( $p < 0.001$ ).

**Conclusions:** OBC can supports rural-dwelling families to develop problem-solving skills and autonomy in caring for their child diagnosed with type 1 diabetes.



### P051 | Model of remote medical control in the management of type 1 diabetes mellitus in children using systems of continuous glucose monitoring

A. Kiiiaev<sup>1,2</sup>, I. Promin<sup>2</sup>, M. Slovak<sup>2</sup>, E. Astashova<sup>2</sup>, K. Vyantzlovaite<sup>2</sup>

<sup>1</sup>Ural Medical University, Yekaterinburg, Russian Federation, <sup>2</sup>Regional Children's Clinical Hospital, Yekaterinburg, Russian Federation

**Introduction:** The widespread introduction into clinical practice of preferential provision of children with DM1 with CGMS against the background of insufficient assessment by parents of the dynamics of glycaemia and timely correction of insulin therapy predetermined the creation of a model of remote medical control in the management of DM1.

**Objectives:** Prevention of diabetic ketoacidosis and severe hypoglycemia in children with DM1.

**Methods:** As of April 1, 2022, 54% (910 out of 1683) of children with DM1 living in the Sverdlovsk region are provided with «Freestyle Libre» sensors. 95% (868 out of 910) of children are connected to the account of the Regional Center for Pediatric Endocrinology of the «LibreView» platform. In a weekly mode, signal parameters are unloaded and analyzed, selecting by us: TAR > 17.0 mmol/L; TBR < 3.0 mmol/L; TIR: 3.9–10.0 mmol/L; % sensor activity. At TAR/TBR >10% during the last 2 weeks, the patient is informed of the high risk of developing acute complications and parents are offered emergency telemedicine consultation or visit to doctor.

**Results:** For 4 months since the introduction of the model, 76 emergency consultations were held for children at high risk of developing DKA and 28 for children at risk for developing severe hypoglycemia. None of these patients developed any emergency conditions.

**Conclusions:** Further optimization of the signal parameters and the analytics mode within the framework of the developed model of remote medical control will improve the efficiency of DM1 management in children, prevent the development of acute complications, and reduce the number of emergency hospitalizations.

### P052 | “ANA WA SOUKARI” application: A revolutionary approach of self-management in type 1 diabetes

I. Rami<sup>1</sup>, N. Derkaoui<sup>1</sup>, S. Benyakhlef<sup>1</sup>, O. El Mehraoui<sup>1</sup>, S. Rouf<sup>2</sup>, H. Latrech<sup>2</sup>

<sup>1</sup>Mohammed VI University Hospital, Medical School, Mohammed the First University, Endocrinology-Diabetology-Nutrition, Oujda, Morocco, <sup>2</sup>Mohammed VI University Hospital, Medical School, Mohammed the First University, Laboratories of Epidemiology, Clinical Research and Public Health, Faculty of Medicine and Pharmacy, Endocrinology-Diabetology-Nutrition, Oujda, Morocco

**Introduction:** The management of type 1 diabetes (T1D) especially during childhood and adolescence is a challenge, not only for health professionals but also for the patients themselves. Thus, the free access to mobile technology has changed the vision of the basic

therapeutic education process and enhanced diabetes self-management. Therefore, our medical team developed «Ana wa Soukari» as a newly designed Moroccan smartphone application for therapeutic education and insulin doses management for type 1 diabetes.

**Objectives:** Describe the effectiveness of «ANA WA SOUKARI» application in management and glycemic control of (T1D) in children and adolescents.

**Methods:** “Ana wa soukari” is a smartphone application designed and developed by a team led by the medical staff of our Endocrinology Diabetology department of university hospital center Oujda–Morocco. Our medical team had elaborate the medical content of therapeutic education that suits T1DM patients of all ages, particularly children and adolescents. The work was supported by the valuable help of both communication and computer technology departments. The application can be used on all android devices including tablets.

**Results:** We included in the study 32 patients using the application, among them, a number of 26 cases of children and adolescents, aged between 3 years and 18 years with a mean age of  $11.5 \pm 4.4$  years, sex ratio H/F was 1.8. Mean HbA1c level initial was 8,  $5\% \pm 2.3\%$ . Hypoglycemic episodes was noted in 12 patients between 2 and 10 episodes/week. At 3 months' follow-up, the mean HbA1c level dropped to 7,  $6\% \pm 1.6\%$ . And, hypoglycemic episodes decreased to a mean of 1.5 episodes/week.

**Conclusions:** Our study sheds the light on the impact of this revolutionary technological approach and artificial Intelligence applications in enhancing the basic education and facilitating diabetes self-management, which can be considered as an adjuvant intervention to the standard diabetes care.

### P053 | Preparing for risk-based management of type 1 diabetes (T1D): Integrating biomarkers of performing diabetes self-management habits into a population health dashboard

C. Vandervelden<sup>1</sup>, B. Lockee<sup>1</sup>, S. Carrothers<sup>1</sup>, S.R. Patton<sup>2</sup>, R. McDonough<sup>1</sup>, J.M. Lee<sup>3,4</sup>, M. Clements<sup>1</sup>

<sup>1</sup>Children's Mercy Hospital, Endocrinology, Kansas City, United States, <sup>2</sup>Nemours Children's Health, Center for Healthcare Delivery Science, Jacksonville, United States, <sup>3</sup>University of Michigan, Pediatric Endocrinology, Ann Arbor, United States, <sup>4</sup>University of Michigan, Susan B. Meister Child Health Evaluation and Research Center (CHEAR), Ann Arbor, United States

**Introduction:** Recent publication of the six pediatric type 1 diabetes (T1D) self-management habits [J. M. Lee et al., *JAMA Netw Open*. 2021; 4(10)], aka “the 6 habits”, offers a new evidence-based measure for a population health dashboard.

**Objectives:** To create an interactive population health management tool that displays data related to “the 6 habits” for providers, and to propose new habits, which align with the seven pillars of diabetes self-management.

**Methods:** Diabetes device data and electronic medical records for 4293 youth ages 1–26 with T1D from a pediatric diabetes care





Figure 1. Six habits dashboard which reports counts of habit performance by habit for our patient population (a), relates mean HbA1c to habit score for our patient population (b), relates mean time in range to habit score (c), and relates an individual's HbA1c to habit score over time (d).

network in the Midwest USA were imported into a novel Microsoft Azure-based data warehouse developed by our team (the "D-Data Dock"). We designed population health dashboards in Power BI to display performance of "the 6 habits" plus a 7th habit ("consumes a healthy diet") by youth and their relationship to HbA1c% and time in range (TIR). Providers can examine habit performance in the population by various demographics (race, age, insurance class, etc.), and at the individual patient level in real-time through electronic health record interface.

**Results:** Provider documentation of habit performance and habit performance by individual varied significantly by habit (Figure 1a). Higher habit scores (the total number of habits performed) were associated with stepwise improvements in both HbA1c% and TIR (1b and 1c). Performance of a 7th (healthy eating) habit was associated with further reduction in HbA1c% (1b). We prototyped a dashboard displaying changes to an individual's habit score and HbA1c% longitudinally (1d). **Conclusions:** We have validated "the 6 habits" as a composite biomarker of engagement in T1D self-management and identified a

7th habit that associates with glycemic control. Future research should examine whether tracking these habits can aid providers when selecting interventions to improve glycemic control among youth.

#### P054 | Comparing points in target range assessed by blood glucose monitoring (BGM) using a vacuum-based lancing device and a conventional lancing device

J. Kesavadev<sup>1</sup>, G. Beena Chandran<sup>1</sup>, G. Krishnan<sup>1</sup>, A. Basanth<sup>1</sup>, A. Shankar<sup>1</sup>, S. Jothydev<sup>1</sup>

<sup>1</sup>Jothydev's Diabetes Research Center, Diabetology, Trivandrum, India

**Introduction:** Blood glucose monitoring (BGM) using the fingertip prick method has always been a tool to monitor blood glucose, but the pain associated has been an impediment to the process.

**Objectives:** We compared the points in range (PIR) in people with type 1 diabetes (T1D) using Genteel, a commercially available lancing that applies vacuum after lancing and a non-vacuum conventional

lancing device. PIR measures how often blood glucose levels of an individual are within the target range (PIR: 70–180 mg/dl), above range (PAR: >180 mg/dl) and below range (PBR: <70 mg/dl).

**Methods:** A post hoc analysis of BGM data of 58 T1D (age = 17.70 ± 10.18; 29 female) from an open-label, 24-week crossover trial (NCT04214704) was performed. The participants used Genteel for 12 weeks and then switched to a conventional lancing device for additional 12 weeks or vice versa during the trial. Instead of Time in Range (TIR), we calculated PIR, since the participants used glucose meters and not Continuous Glucose Monitoring (CGM).

**Results:** In people with T1D, PIR was found to be significantly higher ( $p = 0.03$ ) and PAR was significantly lower ( $p = 0.05$ ) while using Genteel (PIR: 56.07% ± 13.76%; PAR: 37.44% ± 13.87%) in comparison to the conventional lancing device (PIR: 52.61% ± 15.69%; PAR: 40.48% ± 13.91%) along with HbA1c reduction from 8.94% ± 1.77% to 8.25% ± 1.67%. (Figure 1).

**Conclusions:** Newer metrics like PIR, calculated from a glucose meter, could be an alternative to TIR in resource-limited settings. Increased monitoring frequency facilitated by Genteel may have contributed to higher PIR and lower PAR compared to the conventional lancing device. Reduction in pain may have contributed to this and subsequently contributed to a higher PIR and lower levels of HbA1c. Vacuum-based painless lancing has proven to improve testing frequency compared to conventional lancers.

#### P055 | Glucose monitoring techniques

B. Saboo<sup>1</sup>, M. Saiyed<sup>1</sup>, M. Pancholi<sup>1</sup>

<sup>1</sup>Diacare-Diabetes Care and Hormone Clinic, Ahmedbad, India

**Introduction:** Flash glucose monitoring device provides glucose reading for 14 consecutive days by measuring reading every 15 min. Above that wearing, a flash glucose-monitoring device with a smart reader gives an opportunity to look at the BG at any time of the day.

**Objectives:** To compare the glucose values obtained using an AGP and an AGP with a smart reader.

**Methods:** Age: above 15 years, willingness to wear the device.

**Exclusion:** Individuals with a history of frequent hypoglycemia, with complications. AGP was applied to 22 no. of individuals for 14 days. Their reading was scanned on the 3rd, 5th, 7th, and 14th day at the clinic. On the other hand, 9 individuals wore AGP with a miaomia reader, and they were getting their BG into their mobile phones.

**Results:**

**Conclusions:** AGP with a smart reader helps to achieve HbA1c target more accurately as it tracks the glucose reading constantly and gives the chance to the individual to act promptly.

#### POSTER TOUR 7—PSYCHOLOGY # 1

#### P056 | Delivery of wellbeing education in the ‘Deapp’ (Diabetes Education Application) structured education program

K. Sparrow<sup>1</sup>, S. Lockwood-Lee<sup>1</sup>, L. Paxman-Clarke<sup>2</sup>, E. Robinson<sup>1</sup>, L. Brittenden<sup>1</sup>, J. Greening<sup>1</sup>

<sup>1</sup>University Hospitals of Leicester, Pediatric Diabetes Department, Leicester, United Kingdom, <sup>2</sup>De Montfort University, Leicester, United Kingdom

**Introduction:** A diagnosis of type 1 diabetes can be psychologically burdening. The prevalence of psychological conditions such as anxiety and depression are significantly higher in children and young people with diabetes and poor emotional wellbeing is often associated with poor glycemic control. It is known that there is a lack of effective wellbeing support around this time.

**Objectives:** We aimed to use the Deapp structured education program, established by the Children and Young People with Diabetes East Midlands Network, to protect mental health and wellbeing from diagnosis and to teach effective coping skills, whilst considering mounting pressure on psychology services.

**Methods:** Newly diagnosed and existing patients were surveyed to understand the extent of the psychological issues they encounter and to understand the level of support required. This formed the basis of a working group to develop a curriculum, lesson plans, and resources for targeted structured education. User response was assessed by qualitative questionnaires, user feedback, and metric of usage.

**Results:** Collection of user feedback remains in process; however, initial patient testimonials support the need and benefit of psychological support and education from diagnosis. The emotional wellbeing session contains 6 short videos ranging in topics to include; accepting a new diagnosis, navigating difficult conversations and coping skills. All patients are encouraged to complete the session soon after diagnosis where it is known that implementation of knowledge is achieved most successfully. Alongside this, ‘Deapp Thinking’ activity booklets have been created, designed to get young people involved about their emotional health in a hands on and creative way.

**Conclusions:** We have effectively developed a wellbeing resource which is currently embedded within the Deapp education program for all centers using this application (N = 71). This has been well received with high level of user satisfaction. User feedback will continue to shape and develop this session.

	Avg. time in target (%)	Avg. time below target (%)	Avg. time above target (%)	Average HbA1c
AGP	47	11.6	31.7	7.3
AGP with a smart reader	61	12	2	6.7

**P057 | Returning to fun: Reflections on activity reengagement from youth and parents after T1D diagnosis**

N.D. Smith<sup>1</sup>, K. Howard<sup>2</sup>, K. Garza<sup>2</sup>, J. Weissberg-Benchell<sup>2</sup>, M. Feldman<sup>1</sup>

<sup>1</sup>Johns Hopkins All Children's Hospital, St. Petersburg, United States, <sup>2</sup>Lurie Children's Hospital, Chicago, United States

**Introduction:** Youth and their caregivers navigate many challenges following a T1D diagnosis, including how to safely return to activities.

**Objectives:** This study explored reflections of youth and parents as they reengage in extracurricular activities during the first-year post diagnosis.

**Methods:** A series of focus groups were completed via videoconferencing to examine families' experiences during the first-year post diagnosis. Participants were 1 to 3 years post T1D diagnosis and included youth (8–12 years old;  $n = 10$ ), teens (13 and above;  $n = 11$ ), and parents of children (8–12 years old;  $n = 15$ ) and teens (13 and above  $n = 12$ ). Transcript analysis was conducted using deductive coding and thematic analysis.

**Results:** Parents and youth emphasized the importance of taking steps to prepare for diabetes management prior to returning to activities and that any activity can be completed as long as time is devoted to diabetes tasks prior to and during participation. Parents and teens both reported that keeping a “diabetes supplies go bag” eases return to activities. Youth emphasized the importance of recognizing that parents also experience a learning curve, and that working together can ease initial difficulties. Youth normalized worries about low glucose levels negatively impacting activity participation. With regard to sports, youth and parents identified the benefits of ensuring coaches possess knowledge of diabetes. Parents recommended discussing potential challenges when integrating diabetes into sports, such as missing playtime while treating low glucose levels. Youth highlighted the importance of recognizing physiological symptoms of low glucose to ensure appropriate diabetes management during activities, and of sharing diagnosis with teammates.

**Conclusions:** Parent and youth perspectives emphasize that returning to extracurricular activities post diagnosis requires preparation, communication, and teamwork. Findings may inform approaches to education and clinical care.

**P058 | Development of the diabetes health management and distress scale-parents of children**

V. Jewell<sup>1</sup>, J. Shin<sup>2</sup>, M. Russell<sup>2</sup>, S. Fellman<sup>2</sup>, A. Thompson<sup>3</sup>, E. Pyatak<sup>4</sup>

<sup>1</sup>University of North Carolina, Occupational Therapy, Chapel Hill, United States, <sup>2</sup>Creighton University, Omaha, United States, <sup>3</sup>Creighton University, Rapid City, United States, <sup>4</sup>University of Southern California, Los Angeles, United States

**Introduction:** The importance of parental psychosocial well-being, coping and adaptation skills, and competence and confidence with

diabetes health management tasks is critical to lower the risks of diabetes distress for both parents and children and improve long-term health outcomes for the children living with type 1 diabetes. It is imperative that healthcare professional have an increased understanding of parents' diabetes distress and health management routines for their children with T1D to provide quality care. Therefore, the development and testing of novel assessments are critical.

**Objectives:** The aim of this project was to complete psychometric testing of a novel occupational therapy diabetes-specific assessment, which will in turn provide key information that can further prepare occupational therapy practitioners to develop and implement novel occupational therapy interventions aimed to improve child health outcomes, health management, and family quality of life.

**Methods:** Utilizing a nonexperimental, methodological design, two phases of assessment development and testing were completed. Stakeholders ( $n = 27$ ) provided feedback on the content validity, ecological validity, and response format through a focus group, individual interview, or written comments. All interviews were transcribed verbatim and coded with the written comments. Researchers integrated feedback into the assessment using an iterative process.

**Results:** Assessment revisions improved the overall format and validity. Overall, stakeholders reported good content validity, preferred response format, and ecological validity, for the *Diabetes Health Management and Distress Scale- Parents of Children*.

**Conclusions:** Accurate evaluation of the effectiveness of novel interventions is imperative to advance the provision of diabetes care. Therefore, the development and testing of this novel occupational therapy diabetes assessment is critical to the advancement of health-care practices and improved child health outcomes.

**P059 | Diabetes in institutional settings: A qualitative study of needs, worries and experiences**

D. Grabowski<sup>1</sup>, K. Kristensen<sup>2</sup>, M. Madsen<sup>3</sup>, L. Skov Høst<sup>4</sup>, A. Korsholm Mouritsen<sup>5</sup>, M. Sørensen Iken<sup>6</sup>, L. Bro Johansen<sup>1</sup>, KIDS Study Group

<sup>1</sup>Steno Diabetes Center Copenhagen, Health Promotion Research, Herlev, Denmark, <sup>2</sup>Steno Diabetes Center Aarhus, Aarhus, Denmark, <sup>3</sup>Steno Diabetes Center Nordjylland, Aalborg, Denmark, <sup>4</sup>Steno Diabetes Center Odense, Odense, Denmark, <sup>5</sup>Steno Diabetes Center Zealand, Holbæk, Denmark, <sup>6</sup>Danish Diabetes Association, Research, Glostrup, Denmark

**Introduction:** Children spend a large part of their daily life in institutional settings (daycare, kindergarten, and primary school). Children with T1D need special attention and extra resources in these settings and this is often a source of constant worry and frustration for the child, the institutions, and the parents.

**Objectives:** It is the objective of this current project is to study how these needs; worries and frustrations are experienced and dealt with from the point of view of the municipal authorities responsible for granting and administrating support and resources.

**Methods:** We reached out to all 98 municipalities in Denmark, asking if we could interview a person with knowledge about municipal diabetes support in relation to daycare, kindergarten, and primary school. A 74 municipalities agreed to participate in semi-structured online interviews. The interviews were analyzed and interpreted using thematic analysis and radical hermeneutics.

**Results:** The analysis revealed two main overarching themes:

(1) The institutional staff feel insecure about diabetes management and this is a significant barrier for supplying diabetes care in institutions. The staff members basically feel overwhelmed when dealing with children with diabetes, which results in challenges in relation to taking responsibility for giving the necessary support to the children and their families,

(2) The parents are seen as the most important resource for the municipal and institutional staff members. Parents are expected to be available at any time if there are any questions regarding diabetes management and they often end up adopting a role as mediators between the institution, hospital, and other municipal staff members.

**Conclusions:** Children with T1D in institutional settings is an area with complex challenges regarding tasks, roles, and responsibilities. Further research is needed to: produce guidelines for the how to balance mutual involvement and responsibilities.

#### P060 | Coachable or uncoachable? A qualitative study of a life-coaching intervention for young adults with diabetes 1

J. Thomsen<sup>1</sup>, T. Gregersen<sup>2</sup>, K.Y. Waidtløw<sup>2</sup>, C.B. Juhl<sup>3</sup>, J. Ammentorp<sup>2</sup>, P.-E. Kofoed<sup>4</sup>, C. Timmermann<sup>5,5</sup>

<sup>1</sup>University Hospital of Southern Denmark, Kolding, <sup>3</sup>Department of Pediatrics and Adolescent Medicine, Kolding, Denmark, <sup>2</sup>University of Southern Denmark, Department of Clinical Research, Odense, Denmark, <sup>3</sup>University Hospital South West Jutland, Department of Endocrinology, Esbjerg, Denmark, <sup>4</sup>University Hospital of Southern Denmark, Kolding, Department of Pediatrics and Adolescent Medicine, Kolding, Denmark, <sup>5</sup>Odense University Hospital, Center for Research in Patient Communication, Odense, Denmark

**Introduction:** Young adults living with diabetes are especially challenged. They are in a transitional stage of life, which often involves emotional, social, and developmental challenges, consequently, diabetes self-management can be increasingly difficult in these patients.

Life coaching can be a way to cope with challenges in life, however, a review of exiting research shows a lack of knowledge of the influence of life coaching on health and well-being.

**Objectives:** We aimed to study the experience of life coaching in young adults living with poor regulated type 1 diabetes.

**Methods:** We applied a qualitative study design to explore the experiences of the patients. We used the methods described by Steiner Kvale to conduct individual interviews with patients. Furthermore, focus group interviews with the coaches were conducted to

supplement to the patients' experiences. Data were analyzed through meaning condensation.

**Results:** Three main themes were uncovered.

(1) Talking about life to cope with the disease

(2) Successful coaching processes, and

(3) Unsuccessful coaching processes, revealing that talking about troubling life issues empowered them to take responsibility and action regarding the diabetes. A successful coaching process depended on a good relationship between coach and patient. Patient motivation for self-reflection was essential.

**Conclusions:** Life-coaching can be a way to manage life with diabetes. It is important to adjust the coaching methods and communication to the patients' preferences and their ability to self-reflection to facilitate a successful coaching experience. Based on our findings we suggest that no one is actually uncoachable. With coaching approaches tailored to the individual patient and coaches capable of establishing a confident and trusting relationship all young people with diabetes can benefit from being coached.

#### P061 | A diabetic girl mystery: A case report

S. Raafat<sup>1</sup>, D. Fawzy<sup>1</sup>, Y. Abdelmeguid<sup>1</sup>

<sup>1</sup>Alexandria Faculty of Medicine, Department of Pediatrics, Alexandria, Egypt

**Introduction:** Diabetic patients with cerebral disorders have been demonstrated at an electrophysiological, structural, and cognitive level. However, the pathogenesis is still not clear.

**Objectives:** Episodes of hypoglycemia and poor metabolic control may be some of the factors affecting the cerebral function. Moreover, peripheral neuropathy is a common long-term complication of diabetes. However, there is a growing appreciation to the presence of peripheral neuropathy with the onset of diabetes or even in the pre-diabetes. Besides, Peripheral neuropathy is one of a long list of the causes of cachexia. Thus, diabetic neuropathic cachexia is rarely reported in diabetic patients. It is a diagnosis of exclusion that may improve by non-specific treatment besides a good glycemic control.

**Methods:** We herein report a girl diagnosed with diabetes and associated peripheral neuropathy and cachexia.

**Results:** An 8 years old girl with a rare presentation of newly diagnosed diabetes associated with cerebral dysfunction, peripheral neuropathy and cachexia was admitted in Alexandria University Children Hospital. The girl was diagnosed with diabetes 1 month before referral to the hospital. During this period, she developed abnormal behavior, disorientation, and progressive rapid weight loss. Malignancy, infectious, endocrinological (thyroid) or gastrointestinal disorders were excluded. Brain imaging and nerve conduction concluded that there was cerebral dysfunction besides peripheral neuropathy.

**Conclusions:** Peripheral neuropathy and cerebral dysfunction are not always late complications of diabetes. Although rare, they may be acute complications or even associations with diabetes in pediatric population. Moreover, diabetic neuropathic cachexia is a diagnosis of exclusion needing high index of suspicion.



**P062 | Mothers' study satisfaction correlates with study visit compliance: The TEDDY study**

J. Melin<sup>1</sup>, K. Lynch<sup>2</sup>, H. Elding Larsson<sup>1</sup>, S. Bennett Johnson<sup>3</sup>, TEDDY Study Group

<sup>1</sup>Lund University, Department of Clinical Sciences Malmö, Malmö, Sweden, <sup>2</sup>University of South Florida, Health Informatics Institute, Tampa, United States, <sup>3</sup>Florida State University College of Medicine, Department of Behavioral Sciences and Social Medicine, Tallahassee, United States

**Introduction:** Compliance with a study protocol is central to meeting its research goals.

**Objectives:** The aim of this study was to examine mothers' study satisfaction in relation to her child's study visit compliance in The Environmental Determinants of Diabetes in the Young (TEDDY).

**Methods:** Children with high genetic risk for type 1 diabetes (T1D) are followed quarterly from birth and semiannually thereafter in four different countries (US, Finland, Germany, and Sweden) as part of the TEDDY study. Mothers of children who had participated in TEDDY from 3 months to 4 years of age were included ( $n = 5023$ ). Demographics, lifestyle variables, study related variables, maternal depression, and maternal reactions to the child's T1D risk were collected at child-age 15 month by questionnaire. Multiple linear regression was used to examine maternal study satisfaction in relation to the number of attended visits, with adjustment for other significant covariates.

**Results:** Over 5000 children remained in the TEDDY study at 4 years of age; of these, 2716 (54%) children had completed all 16 scheduled study visits. Higher maternal study satisfactions was associated with a greater number of completed study visits independent of other predictors of visit compliance including: country of residence (highest participation in Sweden,  $p < 0.001$ ), maternal age (older age, greater compliance,  $p < 0.001$ ), the TEDDY child is the mother's first child (greater compliance,  $p < 0.001$ ), maternal smoking (poorer compliance  $p < 0.001$ ), and participating through a long distance protocol (poorer compliance,  $p < 0.001$ ).

**Conclusions:** Greater maternal study satisfaction correlated positively with study visit compliance. These findings suggest that greater attention to mothers' study satisfaction may be one important way to improve study visit compliance in longitudinal pediatric studies.

**P063 | Depressive and anxiety symptoms among adolescents with diabetes in Hong Kong**

I. Poon<sup>1</sup>, C. Chan<sup>1</sup>, C. Poon<sup>2</sup>, S. Lee<sup>1</sup>, G. Pang<sup>1</sup>, J.Y.-I. Tung<sup>1</sup>

<sup>1</sup>Hong Kong Children's Hospital, Endocrine Division, Department of Pediatrics and Adolescent Medicine, Hong Kong, Hong Kong, SAR of China, <sup>2</sup>Hong Kong Children's Hospital, Clinical Psychology Team, Integrated Rehabilitation Center, Hong Kong, Hong Kong, SAR of China

**Introduction:** Screening on mental health comorbidities has been recommended in adolescents with diabetes. There is a paucity of data on mental health comorbidities among adolescents with diabetes in Hong Kong.

**Objectives:** This study aimed to.

(a) assess the prevalence of adolescents with diabetes with depressive and anxiety symptoms, using two well-validated screening questionnaires; and

(b) to explore correlates of such symptoms.

**Methods:** This is a retrospective study. As part of the routine clinical workflow, patients aged  $\geq 10$  years were invited to fill out the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder 7-item Scale (GAD-7) to identify depressive and anxiety symptoms respectively. Patients who (a) attended the Diabetes Clinic at the Hong Kong Children's Hospital and (b) completed the two questionnaires between December 2020 and March 2022 were included in this study. Correlates of their depressive and anxiety symptoms were explored.

**Results:** A 98 patients were included (male: 39, female: 59). A 82 had type 1 and 16 had type 2 diabetes. The median age was 15.0 years, and their median duration of diabetes was 4.6 years. Their median HbA1c was 7.5%. A 35 (35.7%) scored  $>4$  in PHQ-9 (mild depressive symptoms: 27, moderate: 3, severe: 5) and 26 (26.5%) scored  $>4$  in GAD-7 (mild anxiety symptoms: 18, moderate: 6, severe: 2). PHQ-9 score was significantly correlated with GAD-7 score ( $p < 0.0001$ ; Spearman's correlation coefficient = 0.7900). Both depressive symptoms ( $p = 0.0347$ ) and anxiety symptoms ( $p = 0.0129$ ) were associated with female gender, but not age, HbA1c, diabetes types nor duration of diabetes.

**Conclusions:** A significant proportion of adolescents with diabetes were screened to have at least mild depressive and anxiety symptoms, with female gender being a risk factor. Mental health comorbidities among adolescents with diabetes are common and should be underscored. Early detection by routine screening is highly recommended.

**P064 | Early detection of disordered eating (DE) among adolescents with type 1 diabetes (T1D): Preliminary development of a holistic screening tool combining clinical, technology and self-report items**

A. Cristello Sarteau<sup>1</sup>, D. Igudesman<sup>1</sup>, T. Smith<sup>2</sup>, M. Hart<sup>3</sup>, B. King<sup>2</sup>, C. Smart<sup>2</sup>, E. Mayer-Davis<sup>1,4</sup>

<sup>1</sup>University of North Carolina at Chapel Hill Gillings School of Global Public Health, Chapel Hill, United States, <sup>2</sup>John Hunter Children's Hospital, Newcastle, Australia, <sup>3</sup>University of Newcastle, Nutrition and Dietetics, Newcastle, Australia, <sup>4</sup>University of North Carolina at Chapel Hill School of Medicine, Chapel Hill, United States

**Introduction:** Current DE screening practices among adolescents with T1D miss opportunities for early intervention and extant tools risk incidental learning.

**Objectives:** To facilitate objective and early DE detection, our ongoing research seeks to develop a tool with clinician assessed (including from T1D technologies), parent, and adolescent items that is brief enough for consistent use, highly sensitive and minimally suggestive.

**Methods:** Extant literature and tools, pilot work, and clinical expertise drove initial definition of the tool construct, dimensions and items. We conducted surveys and interviews among T1D and DE clinicians (n = 12) to evaluate content validity and identify additional dimensions or items. Item clarity was also preliminarily assessed by clinicians (n = 10), adolescents (n = 7) and parents (n = 6). We used a rapid analysis of interviews followed by a triangulation protocol to systematically integrate quantitative and qualitative results along with scale development guidelines to refine the tool.

**Results:** Findings support a multi-dimensional construct (Binge Eating; Dysglycemia; Exercise; Insulin Reduction and Omission; Nutritional Status; Restrictive Eating; Social Behavior; Weight, Body Size and Shape Concern), initially reflected by 44 items. Items perceived highly relevant for detecting early-stage DE were: social eating avoidance; carbohydrate restriction; distracted, irritable, withdrawn mood; internalization of parent/peer body ideals; insulin omission and restriction; meal skipping; and in boys, exercise preoccupation. Change in items over time and parent input were deemed key for early detection.

**Conclusions:** Preliminary analyzes support administration at regular intervals of a tool combining novel self-report and technology-facilitated clinical items to detect early-stage DE in adolescents with T1D. Next steps include cognitive testing, preliminary construct validity, and quantitative item evaluation to reduce and improve items before further field tests.

#### P065 | Six months in advanced hybrid closed loop system in the real world: Psychosocial outcomes in children and adolescents with type 1 diabetes

A. Jalilova<sup>1</sup>, B. Şentürk Pılan<sup>2</sup>, G. Demir<sup>1</sup>, B. Özbaran<sup>2</sup>, S.G. Köse<sup>2</sup>, S. Özen<sup>1</sup>, Ş. Darcan<sup>1</sup>, D. Gökşen<sup>1</sup>

<sup>1</sup>Ege University Faculty of Medicine, Department of Pediatric Endocrinology, Bornova, Turkey, <sup>2</sup>Ege University Faculty of Medicine, Department of Child and Adolescent Psychiatry, Bornova, Turkey

**Introduction:** Advanced hybrid closed-loop systems (a-HCLS) only automate some aspects of diabetes care, psychosocial and human factors remain an important consideration in their use.

**Objectives:** We examined psychosocial and human factors of a-HCLS.

**Methods:** Patients with type1 diabetes (T1D) (8–18 years) and the parents starting on a-HCLS were enrolled. Prospective data collection occurred during routine clinical care and included Pediatric Quality ofLife InventoryTM (PedsQL) diabetes module; Strengths and

Difficulties Questionnaire (SDQ); Hypoglycemia FearSurvey (HFS) for Children, The Revised Child Anxiety Depression Scale (R-CADS) and a-HCLS specific expectation and satisfaction survey. Surveys were completed before initiation of the a-HCLS and on 6th month. Patients were evaluated to exclude psychiatric disorders.

**Results:** Out of 55 subjects enrolled, 37(67%) completed 6th month follow-up. 4of the patients refused to fill 6th month survey and were excluded. 13 boys and 20girls with a mean age of  $12.7 \pm 3.3$  years (8–18 years), and diabetes duration of  $6.6 \pm 5.0$  years completed the questionnaires. None of the children were on psychotropic medications at the time of the evaluation. TIR (70–180 mg/dl) increased from  $75.6\% \pm 13\%$  at baseline to  $78.5\% \pm 7\%$ . There was no significant difference between baseline and 6th month data in both child and parent PedsQL and SDQ. Significant differences were observed in the parents at 6 month, they reported increased positive affect at follow-up inSDQ of Conduct problems and Prosocial behavior ( $p = 0.012$ ;  $p = 0.011$  respectively). All scores on the HFS, RCADS, and a-HCLS specific expectation and satisfaction survey were in the normal range.

**Conclusions:** To our knowledge, this is the first study to compares the psychological characteristics of T1D patients starting on a-HCLS. Although these technologies provide patients with more flexibility in their daily life and information about glucose fluctuations the use of the a-HCLS in our practice resulted in aTIR above the recommended target without a change in QOL, HFS, SDQ, and anxiety of children.

#### POSTER TOUR 8—ACUTE COMPLICATIONS

##### P066 | Predictive indicators and temporal trends of diabetic ketoacidosis in the pediatric intensive care unit

M. Moudatsaki<sup>1</sup>, S. Ili<sup>2</sup>, D. Mamoulakis<sup>1</sup>, G. Briassoulis<sup>2</sup>

<sup>1</sup>University of Crete, University General Hospital, Department of Pediatrics, Heraklion, Greece, <sup>2</sup>University of Crete, University General Hospital, Pediatric Intensive Care Unit, Heraklion, Greece

**Introduction:** Diabetic ketoacidosis (DKA) is one of the most common complications of type 1 diabetes mellitus (T1DM) and is associated with potentially life-threatening consequences. Early identification of clinically significant parameters could enhance the rate of correction of DKA and its complications.

**Objectives:** We sought to investigate patients with DKA, determine clinical and laboratory markers and their association with severity, time correction of acidosis, complications, and length of stay (LOS) and outcome.

**Methods:** All children <18 years old admitted with DKA in the Pediatric Intensive Care Unit (PICU) between 2004 and 2020 were retrospectively enrolled. Subjects were divided into two groups according to: a) the severity of DKA characterized by the degree of acidosis (severe DKA – pH <7.1 vs moderate DKA – pH ≥7.1) and b) the history of T1DM (newly diagnosed vs known). The resolution of DKA

Patient	Current Age (years)	T1D Onset (years)	Duration of T1D at Reaction Onset	Presenting Symptoms	Hypersensitivity Reaction Type	Current Management	Total Daily Insulin Dose (units/kg/day)	Most Recent A1c
A	16	4	Within days of diagnosis	- Anaphylaxis, with respiratory distress - Generalized urticaria	-Type I with anaphylaxis -Type IV, possibly due to polysorbate 20	- 3.8 years s/p pancreas transplant - Tacrolimus - Everolimus - Prednisone	Not currently requiring insulin therapy	5.3%
B	14	7	2 years	-Bruising -Erythema -Leg pain	- Type III	-Subcutaneous insulin injections Lispro, Detemir -Methotrexate - IVIG - Rituximab	2.26	9.5%
C	6	1.2	1.8 years	- Eczematous, erythematous plaques	-Type IV, possibly due to acrylate	- Aspart via insulin pump -Methotrexate	0.64	7.8%
D	13	2	6 years	Erythematous, firm, tender nodules	Type III vs. IV	- Aspart via insulin pump (site changes every 36-48 hours)	1.7	9.0%

was assessed by four parameters: pH, bicarbonate levels, onset of oral intake and initiation of subcutaneous insulin. The outcome of DKA was assessed by three parameters: length of hospital stay, length of PICU stay and manifestation of complications during treatment.

**Results:** Out of 1969 patients admitted in PICU during the last 16 years, only 2.5% of them (N = 49) concerned DKA cases (mean age  $8.5 \pm 4.3$ , 49% boys). The prevalence of DKA in new-onset T1DM patients admitted to PICU was 84%. The recorded complications were thrombophlebitis (4%), renal impairment (2%), cerebral edema, and death (2%). Patients at the diagnosis of T1DM had more severe acidosis with  $\text{pH} < 7.1$  ( $p < 0.01$ ). Initial fluid bolus was not related to the severity of acidosis or outcome. Younger patients newly diagnosed with T1DM and adolescents with known T1DM were more likely to have higher Pediatric Risk of Mortality Score (PRISM) but this severity correlation was not statistically significant. Admission  $\text{pH} < 7.1$  was associated with delayed  $\text{pH} > 7.3$  ( $p = 0.007$ ) and bicarbonate levels  $> 15$  mmol/L ( $p = 0.001$ ) restoration and subcutaneous insulin or oral feeding initiation ( $p < 0.01$ ). DKA severity and younger age were positively associated with PICU and hospital LOS ( $p < 0.001$ ).

**Conclusions:** Severity of DKA is associated with younger age, time of acidosis restoration and LOS. The rate of complications in PICU is low.

#### P067 | Insulin hypersensitivity case series in youth with type 1 diabetes

E. Alkhatib<sup>1</sup>, J. Grundman<sup>1</sup>, J. Brooks<sup>2</sup>, A. Adamusiak<sup>3</sup>, E. Janssen<sup>4</sup>, K. Mc Nerney<sup>5</sup>, B. Polk<sup>6</sup>, M. Kitcharoensakul<sup>6</sup>, M. Bellin<sup>7</sup>, K. Buckley<sup>8</sup>, T. Pfeifer<sup>9</sup>, M. Quinn<sup>10</sup>, B. Marks<sup>1</sup>

<sup>1</sup>Children's National Hospital, Pediatric Endocrinology, Washington, United States, <sup>2</sup>Children's National Hospital, Pediatric Allergy/

Immunology, Washington, United States, <sup>3</sup>University of Minnesota, Surgery, Minneapolis, United States, <sup>4</sup>Boston Children's Hospital, Rheumatology and Immunology, Boston, United States, <sup>5</sup>Washington University School of Medicine, Pediatric Endocrinology, St. Louis, United States, <sup>6</sup>Washington University School of Medicine, Pediatric Allergy and Pulmonary Medicine, St. Louis, United States, <sup>7</sup>University of Minnesota, Pediatric Endocrinology, Minneapolis, United States, <sup>8</sup>Atrium Health, Levine Children's Hospital, Hematology/Oncology and Infectious Disease, Charlotte, United States, <sup>9</sup>Atrium Health, Levine Children's Hospital, Pediatric Endocrinology, Charlotte, United States, <sup>10</sup>Boston Children's Hospital, Pediatric Endocrinology, Boston, United States

**Introduction:** Immediate, type I IgE, and delayed, type III and IV, insulin hypersensitivity reactions are rare but serious complications of type 1 diabetes (T1D) treatments. Type I reactions are often to insulin itself, while type IV are from additives such as protamine and cresols<sup>1</sup>. Diagnostic testing, including skin prick, patch, biopsy, and insulin IgG and IgE antibodies are often inconclusive.

**Objectives:** We present four cases of insulin hypersensitivity, ages 6–16 years.

**Methods:** -

**Results:** Patient A had anaphylaxis to glargine days after T1D diagnosis, then generalized urticaria to detemir and glulisine. Polysorbate 20 was a suspected trigger; urticaria persisted with lispro. After failing various insulins via pump, antihistamines, steroids, and immunosuppressants, she became the youngest pancreas transplant recipient at age 12. She remains euglycemic off insulin 3.8 years later.

Patient B reacted to lispro at initial pump start. Aspart and glargine injections led to type III reactions, with bruising and pain. She is now on lispro and detemir (2.26 units/kg/day), methotrexate, IV immune globulin, and rituximab. Reactions persist, and A1c is 9.5%.

Patient C reacted to lispro, then had erythematous, eczematous plaques to all insulins. Methotrexate improved A1c from 8.3% to 7.8%; however, plaques persist on pump (0.64 u/kg/day). Patient D tolerated glulisine for 6 years but developed erythematous, firm, tender nodules on aspart. He failed cyclosporine, dapsone, and IVIG. He is on 1.7 u/kg/day of aspart via pump. A1c is 9.0%. Testing for autoimmune lymphoproliferative syndrome is pending.

**Conclusions:** In summary, insulin hypersensitivity is rare; however, given insulin's life sustaining nature, it is crucial to learn from these cases. Although several tolerated IV insulin desensitization, reactions persisted on injections. Treatment remains elusive despite various insulins, antihistamines, and even pancreas transplantation. Further studies to elucidate this are needed.

#### P068 | Risk factors for cerebral edema in 256 children with diabetic ketoacidosis

N. Yaneva<sup>1</sup>

<sup>1</sup>Medical University of Sofia, Bulgaria, University Children's Hospital - Sofia, Department of Diabetes, Clinic of Endocrinology, Diabetes and Clinical Genetics, Sofia, Bulgaria

**Introduction:** Cerebral edema (CE) is one of the most devastating complications of diabetic ketoacidosis (DKA). It is the main cause for mortality and residual morbidity in children with DKA. Although many risk factors of both diabetic ketoacidosis and its treatment have been identified during the last 70 years, the causes and pathogenesis of this life-threatening complication have not been clearly defined yet.

**Objectives:** To study the risk factors for cerebral edema in children with diabetic ketoacidosis.

**Methods:** A retrospective review of 256 children, aged from 8 months to 18 years, hospitalized for DKA at the University Pediatric Hospital, Sofia was performed. The demographic characteristics, biochemical variables, and therapeutic interventions were compared between the patients with and without cerebral edema.

**Results:** Cerebral edema was observed in 22 (8.6%) of the 256 subjects studied. One of the patients (5%) had died and 2 (9%) had sur-

vived with permanent neurological consequences. Cerebral edema was significantly associated with severe DKA: lower initial pH (pH ≤ 7.0) and lower initial bicarbonate (<4 mmol/L), higher initial blood glucose, higher urea level and higher serum osmolality. Low serum phosphate level during the treatment of DKA was found significantly associated with CE. We also found dependence between the development of cerebral edema and the bicarbonate application, the higher fluid volume infused during the first 4 h and the delayed potassium substitution – after the 4 h (p = 0.003).

**Conclusions:** Severe ketoacidosis, hyperglycemia, and dehydration at presentation, as well as low serum phosphate during treatment (<0.6 mmol/L) are significantly related to cerebral edema development in children with DKA. The initial severe acidosis and hyperglycemia probably cause brain injury that progresses to cerebral edema in the course of developing hypophosphatemia and iatrogenic cerebral hypervolemia.

#### P070 | A case of brachial plexus neuritis associated with a severe diabetic ketoacidosis in a female adolescent with new-onset type 1 diabetes

N. Blauensteiner<sup>1</sup>, B. Rami-Merhar<sup>1</sup>, M. Tauschmann<sup>1</sup>, K. Nagl<sup>1</sup>, S. Siegert<sup>1</sup>

<sup>1</sup>Medical University of Vienna, Department of Pediatrics and Adolescent Medicine, Vienna, Austria

**Introduction:** Reports of acute neuropathy associated with ketoacidosis in children are scarce.

**Objectives:** Here, we report a case of plexus neuritis in a 13-year-old female adolescent, who was admitted to the pediatric intensive care unit due to a new-onset type 1 diabetes and severe diabetic ketoacidosis (glucose level 53,8 mmol/L; pH 7.030; serum bicarbonate 7,6 mmol/L).

**Methods:** The patient was in a serious medical condition with a massive dehydration and a cerebral edema. Fluid administration, insulin infusion (up to 3,7 IU/kg/d) and anti-edematous treatment with Mannitol were started and the patient's condition stabilized.

**Results:** Focal neuropathy was not overt on the first days of admission. Notably, when regaining consciousness, the patient presented proximal

Baseline variable	Children without cerebral edema			Children with cerebral edema			p value
	n	$\chi$	SD	n	$\chi$	SD	
Venous pH	234	7.10	0.12	22	6.93	0.09	<0.001
Bicarbonate (mmol/L)	231	5.35	2.64	21	3.29	1.32	<0.001
Blood glucose (mmol/L)	232	22.46	5.75	22	26.3	5.76	0.003
Serum urea (mmol/L)	135	5.2	2.44	13	6.51	2.49	0.036
Serum osmolality (mOsm/kg)	134	322.48	16.23	13	331.59	15.45	0.036
Volumes of fluid, infused during the first 4 h (ml/kg)	229	23.89	9.94	20	32.29	14.77	0.005
Time of initiation of potassium substitution (h)	231	2.57	1.51	22	4.27	2.58	0.003
Serum phosphate at 10th–12th during treatment (mmol/L)	48	0.90	0.43	8	0.57	0.41	0.027



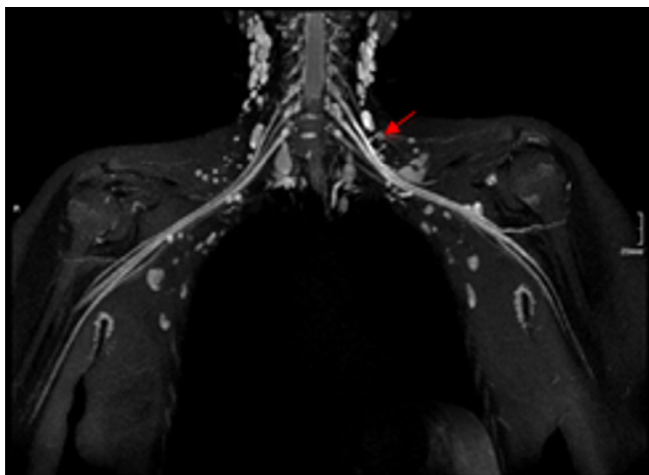


Figure 1. Magnetic resonance imaging of the left and the right brachial plexus, 3D Nerve View. Plexus neuritis with contrast enhancement of the nerve roots of the superior trunci on the left (red arrow), and to a lesser extent on the right.

weakness of the left upper limb, unilateral hyporeflexia (triceps, biceps), and paresthesia (dermatomes C5 and C6). Brain and cervical spine imaging showed residuals of cerebral edema and mild subarachnoid hemorrhage but no hints of radiculopathy. However, nerve conduction velocity studies revealed radial neuropathy in the left upper limb. Vitamin B supplementation, physiotherapy and occupational therapy were started. One month later, magnetic resonance imaging of the brachial plexus revealed bilateral plexus neuritis. At that time, the patient presented with symptoms of a radiculopathy of the left upper limb and right-sided Horner's syndrome. High-dose intravenous corticosteroid treatment gradually improved the neurological symptoms.

**Conclusions:** Acute neuropathy associated with ketoacidosis is a rare complication with unclear pathogenesis. This case underlines the need to monitor neurological functions in patients with diabetic ketoacidosis.

#### P071 | The risk of developing acute kidney injury in diabetic children with diabetic ketoacidosis: An experience from a resource limited setting

S. Musa<sup>1,2</sup>, G. Fadalbari<sup>3</sup>, S. Hassan<sup>2</sup>, O. Al-Hassan<sup>4</sup>, M. Ali<sup>2</sup>, A. Hagahmed<sup>2</sup>, M. Mohamed<sup>5</sup>, M. Abdullah<sup>6,2</sup>

<sup>1</sup>Faculty of Medicine, Al-Neelain University, Department of Pediatrics and Child Health, Khartoum, Sudan, <sup>2</sup>Gaafar Ibn Auf Pediatric Tertiary Hospital, Department of Pediatric Endocrinology and Diabetes, Khartoum, Sudan, <sup>3</sup>Sidra Medicine, Pediatric Endocrinology Department, Doha, Qatar, <sup>4</sup>Sudan Childhood Diabetes Center, Pediatric Endocrinology and Diabetes, Khartoum, Sudan, <sup>5</sup>Braah Children Hospital, Pediatric, Khartoum, Sudan, <sup>6</sup>Faculty of Medicine, University of Khartoum, Department of Pediatrics, Khartoum, Sudan

**Introduction:** Acute kidney injury (AKI) is a known complication of diabetic ketoacidosis (DKA). There are few studies on the frequency and risk factors of developing AKI in hospitalized children with DKA.

**Objectives:** This study aimed to report the frequency, risk factors clinical, and biochemical features of children who develop AKI as a complication of DKA.

**Methods:** Medical records of all hospitalized patients under 18 years of age with diabetic DKA admitted to Gaafar Ibn Auf (GIA) Hospital from 2006 to 2021 were reviewed. Those with AKI were identified and furtherly classified according to the Kidney Disease/Improving Global Outcome (KDIGO) criteria comparing their serum creatinine levels during the hospital stay to the calculated estimated baseline creatinine (EBC) as the previous creatinine was not known. Data related to demographics, indicators of glycemic control, physical and laboratory findings and the outcome were collected and represented as appropriate.

**Results:** Out of 317 admissions with DKA, 62 (19.6%) patients fulfilled the clinical and biochemical criteria for this study, of whom 63% were known diabetics. According to KDIGO criteria, half of them (50%) were classified as.

Stage 1, 15 (24%),

Stage 2, and 16 (26%),

Stage 3.

Male to female ratio was 1:1.4 and the majority of patients (42%) were between 6–12 years of age. Infection was the most common precipitating factor in 55% of patients and most of them (61%) had clinical features of severe DKA at presentation. Recovery to conservative management was noted in 87% of patients while 13% underwent dialysis, out of which 87.5% required more than 2 sessions of dialysis and 25% deceased.

**Conclusions:** Management of AKI in patients with DKA can be very challenging in resource-limited countries. The severity of DKA and associated Infection are considered the major risk factors for developing AKI. To the best of our knowledge, this is the first study of its kind in African countries.

#### P072 | Risk factors, outcomes, and predictors of resolution of acute kidney injury in children with diabetic ketoacidosis

G. Ahmed<sup>1,2,3</sup>, R. Al Khalifah<sup>4</sup>, A. Al-Eyadhy<sup>5</sup>, K. Alhasan<sup>6</sup>, A. Alhaboob<sup>5</sup>, M.-H. Temsah<sup>5</sup>, N. Musibeeh<sup>7</sup>, A. Alshalawi<sup>7</sup>, N. Alanzi<sup>7</sup>, A. Alhaboob<sup>7</sup>, R. Raina<sup>8</sup>

<sup>1</sup>Sheikh Shakhboub Medical City, Pediatrics, Abu Dhabi, United Arab Emirates, <sup>2</sup>Assiut University Children Hospital, Faculty of Medicine, Pediatrics, Assiut, Egypt, <sup>3</sup>King Saud University Medical City, Pediatric, Riyadh, Saudi Arabia, <sup>4</sup>King Saud University Medical City, Pediatrics-Endocrine Unit, Riyadh, Saudi Arabia, <sup>5</sup>King Saud University Medical City, Pediatrics-PICU, Riyadh, Saudi Arabia, <sup>6</sup>King Saud University Medical City, Pediatrics-Pediatric Nephrology, Riyadh, Saudi Arabia, <sup>7</sup>King Saud University Medical City, Riyadh, Saudi Arabia, <sup>8</sup>Akron Children's Hospital, Nephrology, Akron, United States

**Introduction:** Acute kidney injury (AKI) is a common complication in patients with diabetic ketoacidosis (DKA) (incidence 35%–77%). AKI evolution during DKA treatment/recovery is poorly understood.

**Objectives:** Our aim was to assess children with DKA for prevalence, short-term kidney outcomes, severity, and predictors of AKI development and resolution.

**Methods:** This retrospective cohort study included children aged 2–14 years admitted with DKA between January 2016 and May 2020 in a Saudi tertiary care hospital. We defined AKI as an increase in serum creatinine of >1.5 times baseline or >3 mg/dl (26 mmol/L) within 48 h.

**Results:** Of 213 patients admitted with DKA, 172 (80.75%) developed AKI: stage 1 in 83 (38.96%), stage 2 in 86 (40.37%), and stage 3 in 3 (1.4%). No patient required dialysis. Multivariate analysis showed an increased risk of developing AKI with male gender (OR = 2.85) and lower serum bicarbonate (OR = 0.83) when adjusted for initial heart rate, hematocrit, new onset diabetes, and recurrent AKI. The mean time to AKI resolution was  $13.21 \pm 6.78$  h. Factors leading to prolonged recovery from AKI in linear regression analysis were older age (B coefficient = 0.44,  $p = 0.01$ ), recurrent DKA episodes (B coefficient = 3.70,  $p$  value 0.003), increased acidosis severity (B coefficient = -0.44,  $p = 0.04$ ), increased time to anion gap normalization (B coefficient = 0.44,  $p = 0.019$ ), and increased initial glucose (B coefficient = 0.01,  $p = 0.011$ ).

**Conclusions:** In our cohort, AKI was a common, but mostly transient complication in children presenting with DKA, and its severity is associated with longer intensive care stays and time for acidosis resolution. AKI was associated with male gender, and lower serum bicarbonate. Proper consideration of such risk factors is needed for AKI assessment and management in future DKA clinical practice guidelines.

#### P073 | Acute complications of patients with combined diabetic ketoacidosis and hyperosmolar hyperglycemic state in type 2 and type 1 diabetes

J. Lee<sup>1</sup>, M. Kim<sup>1</sup>, C.K. Cheon<sup>1</sup>

<sup>1</sup>Pusan National University Children's Hospital, Pediatrics, Yangsan-si, Korea, Republic of

**Introduction:** Diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS) are life-threatening emergencies of diabetes. The implications of combined DKA/HHS in children are not yet well known.

**Objectives:** We investigated the clinical outcomes of adolescents with combined DKA/HHS.

**Methods:** Combined DKA/HHS was defined based on blood glucose  $\geq 600$  mg/dl, effective serum Osm  $\geq 320$  mOsm/kg,  $\text{pH} \leq 7.3$ , ketonuria, and/or ketonemia.

**Results:** A 13 years-old girl (Case1) presented with altered mental status. Her BMI was 26.97. Initial serum glucose was 1956 mg/dl and urine ketone was negative. Her effective serum osmolality was 402 mOsm/kg. VBGA was  $\text{pH} 7.08$  and  $\text{HCO}_3^- 10.1$  mmol/L. She was admitted to the ICU due to thrombocytopenia-associated multiple organ failure (TAMOF), rhabdomyolysis, and coma status. On hospital day 3, she had compartment syndrome resulting in left leg redness and edema. On hospital day 10, she showed massive hematochezia (3171 g). Ligation of arteries and ileostomy for prevention of bleeding was done due to multiple deep ulcerative lesions around the rectum. She was diagnosed with type 2 diabetes and required 75 days of hospital stay and 66 days of rehabilitation therapy. A 11 years-old girl (Case2) presented with mental status. Her BMI was 17.9. Initial serum glucose was 1115 mg/dl and urine ketone was trace. Her effective serum osmolality was 333 mOsm/kg. VBGA was  $\text{pH} 6.77$  and  $\text{HCO}_3^- 5$  mmol/L. She had a hypovolemic shock and respiratory failure. She was admitted to ICU due to TAMOF, rhabdomyolysis, and semi-comal status. On hospital day 12, she had ischemic optic neuropathy. On hospital day 12, sudden weight loss (-6 kg) occurred due to diabetic amyotrophy resulting in severe left leg pain. On hospital day 30, brain MR revealed multifocal microbleeds. Finally, she was diagnosed with type 1 diabetes and required 100 days of hospital stay and 90 days of rehabilitation therapy.

**Conclusions:** Combined DKA-HHS can accompany acute complications and is associated with longer hospital stays and poor outcomes.

Parameter	Patient 1	Patient2	Patient 3
Age and Sex	9 Year Female	7 year Male	10-year male
Years of type 1 diagnosis	One year	Four	Four
HBA1c	16.2%	9%	17.2%
Diabetes Ketoacidosis	Severe	Severe	Severe
Rhino sinusoidal involvement	Yes	Yes	Yes
CNS involvement	Yes, Right eye involvement, multiple brain abscesses, Cavernous sinus and carotid artery thrombosis	Yes Left eye involvement, multiple brain abscesses, Cavernous sinus and carotid artery thrombosis and hydrocephalus	No
Treatment received	Sinus debridement, Antifungal Liposomal Amphotericin B for 6 weeks. Went LAMA	Sinus debridement, Antifungal Liposomal Amphotericin B for 6 weeks., VP shunt, left eyeball removal	Patient had pulmonary. Underwent left lower lobectomy. Received antifungal for 6 weeks
Outcome	Alive with limited mobility	Alive on nasogastric feeds awaiting reconstruction	Alive and doing well

### P074 | Disseminated mucormycosis in poorly controlled type 1 diabetes: A series of three patients

J. Yadav<sup>1</sup>, D. Dayal<sup>1</sup>, R. Kumar<sup>1</sup>, A. Yadav<sup>1</sup>, P. Mahasweta Nanda<sup>1</sup>, A. George<sup>1</sup>

<sup>1</sup>Post Graduate Institute of Medical Education and Research, Pediatric Endocrinology Unit, Department of Pediatrics, Chandigarh, India

**Introduction:** Mucormycosis is a Angio invasive and fatal fungal infection which affects immunocompromised host such as poorly controlled type 1 diabetes. Early diagnosis based on clinical clues and biopsy findings is highly recommended to prevent mortality and morbidity for this debilitating infection.

**Objectives:** To describe the clinical profile, risk factors and outcome of three patients with invasive mucor infection with multisystem involvement.

**Methods:** The clinical details were obtained from the hospital records. All three patients were admitted in our hospital for clinical care.

**Results:** Two boys and girls with poorly controlled diabetes presented with Rhin sinusoidal Mucor mycosis. Two patients had central nervous system invasion and third patient had pulmonary involvement. The details are presented in table.

**Conclusions:** Invasive Mucor mycosis is a severe infection, which require prolonged hospitalization, surgical debridement and prolonged antifungal therapy. Early identification and prompt medical and surgical treatment improves outcome.

### P075 | New-onset DKA complicated by hypertriglyceridemia and acute pancreatitis, case report

M. Mustafa<sup>1</sup>, M. Saleh<sup>2</sup>

<sup>1</sup>Al Jalila Children's Hospital, Pediatric Endocrinology, Dubai, United Arab Emirates, <sup>2</sup>Al Jalila Children's Hospital, Dubai, United Arab Emirates

**Introduction:** DKA is one of the most common diagnoses in the Pediatric Intensive Care Unit. Non-fatal complications of DKA such as hypertriglyceridemia and pancreatitis are very rare.

**Objectives:** We present a 9-year-old female with new-onset DKA who developed acute pancreatitis and hypertriglyceridemia within 24 h after admission and resolved on follow up.

**Methods:** A previously healthy, non-obese, 9-year-old female presented with breathing difficulty and abdominal pain. In the emergency department, she was found to have DKA (serum glucose 499 mg/dl, urine glucose >1000 mg/dl, urine ketone 3+, capillary PH 6.85, bicarbonate undetectable). She was in severe dehydration and received two IV fluid boluses (10 ml/kg). She was admitted to PICU and started on DKA management protocol.

Her initial blood sample was "too thick and milky". Her initial serum triglyceride level was 988 mg/dl, total cholesterol 115 mg/dl, amylase 239unit/L (28–100) and lipase 1982 unit/L (13–60). Abdominal ultrasound was consistent with acute pancreatitis.

Approximately 12–36 h after admission, her mental status, and appetite improved along with the downward trend of serum TG (604 mg/dl), lipase (273 unit/L), and amylase 173 unit/L. A 48 h after admission, she started on oral feeds and subcutaneous insulin and shifted to the pediatric ward.

**Results:** Acute pancreatitis in DKA can be attributed to severe hypertriglyceridemia if the serum TG level is >1000 mg/dl. The insulin deficiency in type I diabetes mellitus causes hypertriglyceridemia as it decreases the activity of lipoprotein lipase. The triad of DKA, hypertriglyceridemia, and acute pancreatitis have been well described in adult literature but rarely in the pediatric population.

**Conclusions:** The recognition of acute pancreatitis in DKA has important implications in the management as insulin requirements and the tempo of recovery can be altered. Lipemic blood can be a clue to hypertriglyceridemia as a cause of acute pancreatitis and resultant worsening of DKA despite standard insulin therapy.

### POSTER TOUR 9—CHRONIC COMPLICATIONS # 1

#### P077 | The evaluation of bone metabolic status in patients with childhood-onset type 1 diabetes mellitus in Kuwait

D. Alhomaidah<sup>1</sup>, T. Alqaisi<sup>1</sup>, F. Alajmi<sup>2</sup>, A. Al-Tararwa<sup>2</sup>, D. Mohammed<sup>2</sup>, H. Al Kandari<sup>1</sup>

<sup>1</sup>Dasman Diabetes Institute, Kuwait City, Kuwait, <sup>2</sup>Farwaniya Hospital, Kuwait City, Kuwait

**Introduction:** Type 1 diabetes (T1D) and its complications may significantly impact skeletal and bone health which could lead to bone disease later in life.

**Objectives:** The aim of this study is to assess the bone metabolic profile and renal function of patients diagnosed with T1D in Kuwait.

**Methods:** This is the pilot phase of a cross-sectional study including Kuwaiti subjects diagnosed with T1D onset between 2011 and 2021 registered in the Childhood-Onset Diabetes electronic Registry (CODeR) and receiving care at Farwaniya Hospital. Eligible subjects and/or their parents completed a questionnaire regarding demographics and diabetes history. Subject clinical assessment and laboratory investigations were carried out after consent was given. Descriptive statistical analysis was performed.

**Results:** A total of 37 patients with T1D were enrolled in the study (median age 11.0 [IQR 8–15] years and 41% males). Nine (24%) subjects had a diabetes duration of less than 1 year, 17 (46%) between 1 and 5 years, and 11 (30%) more than 5 years. Insulin was administered by multiple daily injections in most patients (n = 35, 94.6%) while only 2 (5.4%) used continuous subcutaneous insulin infusion. Family history of T1D and history of osteoporosis were found in 7 (19.4%) and 8 (22.2%) of the patients, respectively. A 10 patients (27%) showed low levels of alkaline phosphatase and 25 (71%) had levels of 25(OH)D below 50 mmol/L. Majority of the patients had normal levels of albumin, phosphorus, and magnesium (88.9%, 89.2%,

and 97.3%). Nearly half of the patients showed high calcium levels ( $n = 17, 46\%$ ) and high adjusted calcium levels ( $n = 22, 61\%$ ). Mean values of parathyroid hormone and urine calcium/creatinine ratio were  $6.0 \pm 2.9$  pmol/L and  $0.28 \pm 0.2$ , respectively.

**Conclusions:** In patients with T1D, a balanced diet and regular physical activity is necessary to maintain bone health. Consistent screening for deficiencies in calcium, vitamin D, and other indicators may allow patients with T1D to avoid complications related to metabolic bone disease.

#### P078 | Cognitive function in early-onset type 1 diabetes mellitus in children

K. Swaminathan<sup>1</sup>, J. Yadav<sup>1</sup>, D. Dayal<sup>1</sup>, P. Malhi<sup>2</sup>

<sup>1</sup>Postgraduate Institute of Medical Education and Research, Pediatric Endocrinology, Chandigarh, India, <sup>2</sup>Postgraduate Institute of Medical Education and Research, Child Psychology, Chandigarh, India

**Introduction:** Early-onset type 1 diabetes mellitus (T1DM) is associated with cognitive dysfunction but scarcely studied in the developing world.

#### Objectives:

1. Assessment and comparison of cognition scores in various domains in early-onset T1DM and healthy controls.
2. To study the association of T1DM associated factors with cognition.

**Methods:** This was a case-control study involving 60 children with T1DM (age 6–15 years) who had disease onset at less than 6 years and a minimum disease duration of 2 years. The neurocognitive assessment was done using MISIC (Malin's Intelligence Scale For Indian Children) tool and compared with age and sex-matched healthy controls ( $n = 60$ ). The effects of disease-associated factors like glycaemic control, DKA episodes, and hypoglycemic episodes on cognition were also studied.

**Results:** The T1DM group had lower score in verbal tests ( $p = 0.01$ ), performance tests ( $p = 0.01$ ) and overall IQ ( $0.01$ ) than controls. Among the various cognitive domains, processing speed and attention

were same in both groups. Early age of onset, poor glycaemic control, DKA episodes and severe hypoglycemia episodes had negative effect on overall IQ.

**Conclusions:** Children with T1DM had lower IQ affecting multiple cognitive domains. Early age of onset, poor glycaemic control, DKA episodes, and severe hypoglycemia had negative effects on cognitive functions.

#### P079 | Association of dyslipidemia and type 1 diabetes mellitus among children up to 16 years of age presenting in low middle income country

V. Rai<sup>1</sup>, S. Akhtar<sup>2</sup>, Z. Khoso<sup>1</sup>, M. Riaz<sup>1</sup>, S. Chachar<sup>1</sup>, M.N. Ibrahim<sup>1</sup>, P.J. Raza<sup>1</sup>

<sup>1</sup>National Institute of Child Health, Pediatric Endocrinology and Diabetes, Karachi, Pakistan, <sup>2</sup>National Institute of Child Health, Karachi, Pakistan

**Introduction:** Children with type 1 diabetes mellitus (T1DM) are at an increased risk of developing subclinical & clinical cardiovascular disease early in life.<sup>1–3</sup>

When diabetes is controlled in children over the age of 10 years, the Global ISPAD Guideline for Childhood & Adolescence diabetes of 2014 advised screening for fasting blood lipids.

There are several international studies, which demonstrate association between dyslipidemia and T1DM. The present study is designed in order to ascertain the local perspective as there is scarcity of local data.

**Objectives:** To determine the association of dyslipidemia and type 1 diabetes mellitus among children up to 16 years of age.

**Methods:** Study design: Case-control study.

Study setting: Outpatient department, National Institute of Child Health (NICH).

Duration of study: A 6 months from 26 February 2018 to 28th August 2018.

Material and methods: All patients age 9 to 16 years of either gender were included. Cases were defined as presence of fasting plasma

Test	Cases <sup>a</sup>	Controls <sup>a</sup>
Information <sup>b</sup>	100.32 ± 4.717	103.67 ± 2.433
Comprehension <sup>b</sup>	100.27 ± 3.896	103.88 ± 2.552
Arithmetic <sup>b</sup>	99.67 ± 5.885	103.58 ± 3.766
Vocabulary <sup>b</sup>	98.95 ± 5.010	102.62 ± 2.912
Digit span <sup>b</sup>	99.05 ± 5.879	102.32 ± 3.291
Picture completion <sup>b</sup>	102.82 ± 5.087	105.45 v 1.917
Mazes	104.93 ± 5.285	105.95 ± 2.789
Block design <sup>b</sup>	100.20 ± 4.793	103.13 ± 2.397
Coding	102.87 ± 3.908	103.32 ± 2.855

<sup>a</sup> Mann-Whitney U test was used.

<sup>b</sup> p value < 0.05.



glucose of  $\geq$  to 126.0 mg/dl (7.0 mmol/L) for more than 1 year whereas all patients with fasting plasma glucose of less than 126 mg/dl (7.0 mmol/L) were *P a g e | 2* defined as controls. The blood sample was collected in a sterile manner after an overnight fasting of 8 h and was sent to hospital laboratory and verified by pathologist.

**Results:** Out of total 60 patients, the mean age of the patients was  $11.23 \pm 1.76$  years. Dyslipidemia was found to be significantly higher ( $n = 26$ , 86.7%) among diabetic patients as compared to non-diabetic patients ( $n = 18$ , 60%). ( $p$ -value 0.020) Moreover, the risk of dyslipidemia was 4.33 times higher among diabetic patients than that of non-diabetics (OR 4.33). Patients having  $>10$  years of age and diabetes were 8.01 times more likely (OR 8.01,  $p$ -value 0.042) and diabetic males were 8.40 times more likely (OR 8.40,  $p$ -value 0.008) to have dyslipidemia.

**Conclusions:** Highly significant association of dyslipidemia and type 1 diabetes mellitus was found among children up to 16 years of age.

#### P080 | A child with poorly controlled type 1 diabetes mellitus (T1DM) presented with hepatic glycogenosis

M. Saleh<sup>1</sup>, L. Al Marzooqi<sup>2</sup>, M. Mustafa<sup>2</sup>

<sup>1</sup>Al Jalila Hospital, Dubai, United Arab Emirates, <sup>2</sup>Al Jalila Hospital, Pediatric Endocrinology, Dubai, United Arab Emirates

**Introduction:** Hepatic glycogenosis is the liver response to poor blood glucose control in children, adolescents, and adults with type 1 diabetes, it is a rare complication in children.

**Objectives:** We report 12 years old boy with poorly controlled with hepatomegaly presented with hepatomegaly as a possible consequence of glycogenic hepatopathy, to raise attention of physicians to such complication.

**Methods:** Clinical case: A 12 years old boy a known case of diabetes mellitus diagnosed 1 year previous to his presentation to the emergency department complaining of abdominal pain for 1 day associated with abdominal bulging. His Growth percentiles based below third centile for the weight and on the 20th centile for the height. There was a hepatomegaly of 8 cm below the costal margin.

**Results:** The laboratory investigations revealed a very high HbA1C of 15.0. Other parameters such as blood hemoglobin level, C - reactive protein, ESR, Liver function test, coagulation factors, urea and electrolytes, On the other and liver enzymes were elevated, other infectious causes of liver enlargement, were ruled out. Ultrasound abdomen was done for further evaluation and was reported as: Enlarged liver, measuring 17.9 cm showing coarse parenchyma, with no sizeable focal mass lesion. His liver enzyme reduced within 1 week with regular insulin injection. Liver size regressed to normal size with his HBA1C reaching 8.6%.

**Conclusions:** Although rare complication, of poorly glycemic control of type 1 Diabetes mellitus in children, hepatic glycogenosis, it should not be misdiagnosed and for the prompt and early management of these patients.

#### P081 | Risk factors for pre-clinical atherosclerosis in youth with type 1 diabetes: The contribute of oxidative stress, oxidized lipoproteins and glycemic variability

A. Morandi<sup>1</sup>, C. Piona<sup>1</sup>, M. Corradi<sup>1</sup>, C. Zusi<sup>1</sup>, S. Costantini<sup>1</sup>, M. Marigliano<sup>1</sup>, C. Fava<sup>2</sup>, C. Maffei<sup>1</sup>

<sup>1</sup>University and Azienda Ospedaliera Universitaria Integrata of Verona, Department of Surgery, Dentistry, Pediatrics and Gynecology, Section of Pediatric Diabetes and Metabolism, Verona, Italy, <sup>2</sup>University and Azienda Ospedaliera Universitaria Integrata of Verona, Section of General Medicine C, Department of Medicine, Verona, Italy

**Introduction:** The inter-individual variance in pre-clinical markers of vascular damage/atherosclerosis in youth with T1D is only partially explained by traditional risk factors (RFs).

**Objectives:** To test the hypothesis that, besides HbA1c and other traditional RFs, overall oxidative stress, oxidized lipoproteins and glycemic variability may contribute to explain part of the risk of early macro-vascular damage.

**Methods:** Circulating markers of oxidative stress (derivatives of reactive oxygen metabolites [d-ROMs], serum total antioxidant capacity [TAC] and oxidized LDLc[LDLox]), markers of early vascular damage/atherosclerosis (Carotid intima-media thickness [cIMT], pulse wave velocity [PWV], Lipoprotein-associated phospholipase A2 [Lp-PLA2]), CGMmetrics of 4-weeks preceding the visit, current and past HbA1c, blood pressure (BP) and lipids values longitudinally measured since T1D onset were evaluated in 267 children/adolescents with T1D (130girls, age 9.1–23.0 years). To investigate the predictors of early vascular damage three general linear models were built (Lp-PLA2, z-cIMT, z-PWV as independent variables).

**Results:** Results of univariate analysis are shown in table 1. Z-cIMT, z-PWV, and Lp-PLA2 were not predicted by any CGM metrics. Multivariate analysis of variance showed that z-cIMT was predicted by male gender ( $B = 0.491$ ,  $h^2 = 0.029$ ,  $p = 0.005$ ), cSBP ( $B = 0.023$ ,  $h^2 = 0.026$ ,  $p = 0.008$ ) and LDLox ( $B = 0.022$ ,  $h^2 = 0.022$ ,  $p = 0.014$ ). z-PWV was predicted by follow-up duration ( $B = 0.054$ ,  $h^2 = 0.024$ ,  $p = 0.016$ ), dROMs ( $B = 0.003$ ,  $h^2 = 0.037$ ,  $p = 0.004$ ), daily insulin dose ( $B = 0.523$ ,  $h^2 = 0.018$ ,  $p = 0.045$ ) and follow-up mean z-SBP ( $B = 0.180$ ,  $h^2 = 0.018$ ,  $p = 0.037$ ). Lp-PLA2 was predicted by age ( $B = 0.221$ ,  $h^2 = 0.079$ ,  $p = 3 \times 10^{-6}$ ), TAC ( $B = -1.06$ ,  $h^2 = 0.015$ ,  $p = 0.045$ ), oxLDL ( $B = 0.081$ ,  $h^2 = 0.050$ ,  $p = 2 \times 10^{-4}$ ), follow-up mean LDL-cholesterol ( $B = 0.031$ ,  $h^2 = 0.043$ ,  $p = 0.001$ ) and male gender ( $B = -1.62$ ,  $h^2 = 0.10$ ,  $p = 1.3 \times 10^{-7}$ ).

**Conclusions:** Oxidative stress and red-ox balance contributed to the inter-individual variability of early vascular damage in young patients with T1D, independently of traditional RFs.

Table 1

	z-cIMT	z-PWV	Lp-PLA2
Age	0.08	0.21*	0.34*
Follow-up duration	0.004	0.19*	0.18*
d-ROMs (U-Carr)	-0.074	0.15*	0.15*
TAC (Trolox)	0.13*	0.017	-0.12*
oxLDL	0.13*	0.05	0.41*
cSBP	0.18*	0.38*	0.19*
z-cSBP	0.17*	0.14*	0.001
cDBP	0.047	0.48*	0.14*
Daily insulin dose (U/kg)	-0.040	0.145*	-0.019
eIS	-0.067	-0.185*	-0.088
Follow-up mean z-BMI	0.073	0.04	0.04
Follow-up-mean HbA1c	0.002	0.07	-0.08
Follow-up-mean Cholesterol	0.003	0.07	0.25*
Follow-up-mean LDL-cholesterol	0.041	0.13*	0.35*
Follow-up-mean HDL-cholesterol	-0.08	-0.14*	-0.10
Follow-up-mean triglycerides	0.07	0.19*	0.04
Follow-up-mean ALT	0.08	-0.10	-0.04
Follow-up-mean z-SBP	0.15*	0.25*	0.01
Follow-up-mean z-DBP	0.10	0.16*	-0.05
Follow-up-mean ACR (mg/mmol)	0.048	0.125*	-0.120*
4 week-CGM mean glucose	0.09	-0.02	0.03
4 week-CGM SD	0.08	0.02	0.10
4 week-CGM CV	0.04	0.06	0.13*
4 week-CGM TBR <sub>70</sub>	-0.03	0.05	0.11
4 week-CGM TBR <sub>54</sub>	-0.03	0.03	0.14*
4 week-CGM TIR	-0.07	0.01	-0.09
4 week-CGM TAR <sub>180</sub>	0.08	-0.03	0.04
4 week-CGM TAR <sub>250</sub>	0.12	0.002	-0.007
4 week-CGM MAGE	-0.06	-0.008	0.025
4 week-CGM CONGA	0.08	-0.042	-0.013

**P082 | The relationship between selected inflammation and oxidative stress biomarkers of cardiovascular disease and IMT value in youths with diabetes type 1 co-existing with early microvascular complications**

B. Glowinska-Olszewska<sup>1</sup>, J. Peczyńska<sup>1</sup>, B. Klonowska<sup>2</sup>,  
B. Żelazowska-Rutkowska<sup>3</sup>, A. Bossowski<sup>1</sup>

<sup>1</sup>Medical University of Białystok, Department of Pediatric, Endocrinology, Diabetology with Cardiology Division, Białystok, Poland, <sup>2</sup>University of Warmia and Mazury in Olsztyn, Department of Clinical Pediatrics, Faculty of Medical Sciences, Olsztyn, Poland, <sup>3</sup>Medical University of Białystok, Department of Pediatric Laboratory Diagnostics, Białystok, Poland

**Introduction:** Recent years have confirmed the importance of oxidative stress and inflammation biomarkers in estimating the risk and explaining not fully understood pathogenesis of cardiovascular disease (CVD). In Type 1 diabetic patients (T1D), vascular complications develop extremely early, resulting in reduced life expectancy.

**Objectives:** We aimed to assess intima-media thickness (cIMT) of common carotid arteries and the occurrence of classical atherosclerosis risk factors together with selected new biomarkers (hsCRP, adiponectin, myeloperoxidase [MPO], NT-proBNP peptide, vitamin D) in

youths with T1D, recognized in screening tests to present early stages of microvascular complications (VC).

**Methods:** The study included 50 adolescents and young adults with T1D, aged mean 17.1 years, including 20 T1D patients with VC(+), and 30 T1D without complications, VC(-). A 22 volunteers formed control group (C).

**Results:** In the group with T1D VC (+) higher BMI was found: 23.07 ± 4 vs. 21.28 ± 2.9 in T1D VC(-) group and 19.65 ± 2.4 kg/m<sup>2</sup> in group C (p = 0.002). HbA1c was higher in group T1D VC(+): 9.8% compared to T1D VC(-): 8.6% (p < 0.001). Lipids and blood pressure values were highest in VC(+) group. MPO level was higher and vitamin D lower in both diabetic groups vs C. Significantly higher concentration of hsCRP, NT-proBNP were observed in T1D VC(+) in comparison to T1D VC(-) and the controls. IMT in the T1D VC(+) group was 0.50 mm and was significantly higher than in T1D VC(-) group (0.46 mm), and in controls: 0.41 mm (p < 0.001). IMT correlated significantly positively with HbA1c, hsCRP, NT-pro-BNP, and negatively with vitamin D level.

**Conclusions:** Youths with T1D coexisting with microvascular complications present many abnormalities in classical of cardiovascular risk factors and new CVD biomarkers. The most important for estimating the risk of future macroangiopathy seem hsCRP and MPO. NT-proBNP may present a possible new marker of early myocardial injury in this population.

**P083 | Diabetic nephropathy in children in Bobo-Dioulasso (Burkina Faso)**

W.P.A.H. Bagbila<sup>1</sup>, Y. Sagna<sup>1</sup>, C.G. Kyelem<sup>1</sup>, T.M. Yameogo<sup>1</sup>, S.M. Ouedraogo<sup>1</sup>, Y.J. Drabo<sup>2</sup>

<sup>1</sup>Universite Nazi BONI, Bobo-Dioulasso, Burkina Faso, <sup>2</sup>Universite Joseph Ki Zerbo, Ouagadougou, Burkina Faso

**Introduction:** Diabetic nephropathy has become the most frequent cause of end-stage renal failure and dialysis management in most countries. This chronic complication is more frequent in type 1 diabetic patients.

**Objectives:** The aim of this study was to screen for diabetic nephropathy in children and adolescents with type 1 diabetes.

**Methods:** This was a prospective cross-sectional study with a survey of type 1 diabetic patients under 18 years of age followed in the Internal Medicine Department of the Sourô Sanou University Hospital (CHU-SS) in Bobo-Dioulasso. Albuminuria and creatinuria were measured on the first morning sample of the patients followed by the calculation of the albuminuria/creatinuria ratio on sample. Albuminuria on sample was considered pathological if it was higher than 200 mg/L and an A/C ratio higher than 25 mg/mmol of creatinine in men and 35 mg/mmol of creatinine in women. A 24-h proteinuria was performed when the microalbuminuria/creatinine ratio was pathological.

**Results:** A total of 21 patients were included in the study. The mean age of the patients was 15.5 years  $\pm$  2 years with extremes of 11 and 17 years. The sex ratio was 2. The mean age of onset of diabetes was 13  $\pm$  3.2 years with extremes of 6 and 17 years. The duration of diabetes was 3.4 years. Diabetes was unbalanced in 19 patients. The mean microalbuminuria was 40.1 mg/L. One patient had positive microalbuminuria. The microalbuminuria/creatinuria ratio was pathological in 4 patients. Renal failure was noted in one patient. Diabetic retinopathy was present in one patient.

**Conclusions:** Screening for diabetic nephropathy in diabetic children is of paramount importance as this is a potentially long-lasting form of diabetes.

**P084 | Early cataract in children and adolescents living with type 1 diabetes: An insight from a single center in North India**

R. Shukla<sup>1</sup>, S. Shukla<sup>2</sup>, N. Agarwal<sup>1</sup>, M. Gupta<sup>1</sup>, A. Bajpai<sup>1</sup>, M. Khattri<sup>2</sup>

<sup>1</sup>Regency Hospital Private Limited, Endocrinology, Kanpur, India, <sup>2</sup>Regency Hospital Private Limited, Ophthalmology, Kanpur, India

**Introduction:** Cataract is the leading cause of visual impairment in adults living with type 1 diabetes (T1D). Unfortunately, data on early diabetic cataract among children and adolescents is limited. Further, majority of this data is available from the developed countries, which cannot be generalized.

**Objectives:** To report the characteristics and surgical outcome of early cataract in Indian children and adolescents living with T1D.

**Methods:** It is a retrospective observational study (January 2005–December 2020). The medical records of children and adolescents diagnosed with T1D over the last 15 years were retrieved and analyzed.

**Results:** Of 150 T1D patients, a total of 10 patients (five boys; 19 eyes) were diagnosed with cataract. The mean age at diagnosis of T1D was 8.6  $\pm$  3.2 years (range, 3–12 years) and cataract was 13.2  $\pm$  4.1y (range, 6–18 years). Mean HbA1c at the time of cataract diagnosis was 7.99%  $\pm$  0.98%. History of DKA was documented in six patients (60%). Nearly 70% (n = 7) patients belonged to the lower socio-economic strata. Cortical cataract (12/19 eyes; 63%) was the most common morphology identified. These patients were operated after a mean duration of 0.5  $\pm$  0.7 years. Phacoemulsification (PE) was done in 5 patients (10 eyes), small-incision cataract surgery in 4 patients (seven eyes), and micro-incision cataract surgery in 1 patient (two eyes). The best corrected visual acuity remained good after a mean follow-up duration of 3.2  $\pm$  2.7 years (range 0–8 years). Four patients developed non-proliferative retinopathy after a mean diabetes duration of 8.9  $\pm$  1.3 years (7–10 years). PCO was not observed in patients who underwent hydrophobic, heparin-coated, and multi-focal IOL implantation. It was observed in eight eyes that were treated by Nd-YAG capsulotomy.

**Conclusions:** Our study reinforce the need for early cataract screening in the pediatric diabetes population, especially in those, belonging to lower socio-economic strata, and/or with history of DKA. Age of the patient and diabetes duration do not predict the risk of cataract formation.

**P085 | Investigating the role of inflammation on early CVD development in youth with type 1 diabetes: The CARDEA study**

N. Silva Navarro<sup>1</sup>, M. Masse<sup>1</sup>, V. McNealis<sup>1,2</sup>, S. Harnois-Leblanc<sup>1,3,4</sup>, J.-C. Lavoie<sup>1,5</sup>, M.G Friedrich<sup>6,7</sup>, A. Van Hulst<sup>8</sup>, A.M. Nuyt<sup>1,9</sup>, J.-L. Bigras<sup>1,9</sup>, T.A Barnett<sup>1,10</sup>, A. Benedetti<sup>2</sup>, M.-È. Mathieu<sup>1,11</sup>, V. Drapeau<sup>12</sup>, M. Henderson<sup>1,3,9</sup>

<sup>1</sup>Research Center of CHU Sainte-Justine, Montréal, Canada, <sup>2</sup>McGill University, Department of Epidemiology, Biostatistics and Occupational Health, Montréal, Canada, <sup>3</sup>Université de Montréal, School of Public Health, Montréal, Canada, <sup>4</sup>Research Center of Center Hospitalier Universitaire de Montréal, Montréal, Canada, <sup>5</sup>Université de Montréal, Department of Nutrition, Montréal, Canada, <sup>6</sup>McGill University Health Center, Montréal, Canada, <sup>7</sup>McGill University, Department of Medicine and Diagnostic Radiology, Montréal, Canada, <sup>8</sup>McGill University, Ingram School of Nursing, Montréal, Canada, <sup>9</sup>Université de Montréal, Department of Pediatrics, Montréal, Canada, <sup>10</sup>McGill University, Department of Family Medicine, Montréal, Canada, <sup>11</sup>Université de Montréal, School of Kinesiology and Physical Activity Sciences, Montréal, Canada, <sup>12</sup>Université Laval, Department of Physical Activity, Québec, Canada

**Introduction:** Youth with type 1 diabetes (T1D) display early signs of cardiovascular disease (CVD), but underlying mechanisms remain poorly understood.

**Objectives:** We examined the association between markers of inflammation and early CVD markers in youth with and without T1D.

**Methods:** Cross-sectional study of 100 adolescents and 97 age- and sex-matched healthy controls from Sainte-Justine Hospital Diabetes Clinic. Cardiac MRI measured left ventricular mass indexed by height (LVMH), papillary mass, wall thickness, and ejection fraction. We measured aortic stiffness with pulse-wave velocity (PWV) and brachial artery endothelial function with a flow-mediated dilation test (velocity time integral [VTI] and acceleration). Leptin, adiponectin, tumor necrosis factor  $\alpha$  (TNF- $\alpha$ ), TNF receptor 1 (TNFR1), TNF receptor 2 (TNFR2), interleukin-6 (IL-6) and C-reactive protein were measured by ELISA. Multivariable regression models were estimated adjusting for age, sex, BMI z-score, Tanner stage, physical activity (accelerometer), ethnicity, and heart rate in stratified analyses.

**Results:** In youth with T1D: Higher TNFR1 was associated with a greater papillary mass ([95%CI]: 0.16% [0.02, 0.29]) and higher TNFR2 with a decreased wall thickness ( $-6 \times 10^{-4}$  mm [ $-11.7 \times 10^{-4}$ ,  $-0.3 \times 10^{-4}$ ]).

In healthy controls: Higher levels of IL-6 and adiponectin were associated with unfavorable markers: higher PWV (0.26 m/s [0.04, 0.48]) and lower VTI ( $-0.57$  cm/s [ $-1.07$ ,  $-0.09$ ]), respectively. Lower leptin and higher TNFR2 were associated with a greater LVMH ( $-0.48$  g/m [ $-0.73$ ,  $-0.24$ ] and 0.004 g/m [0.0002, 0.007], respectively) and higher TNFR2 was associated with greater wall thickness ( $6.2 \times 10^{-4}$  mm [ $0.3 \times 10^{-4}$ ,  $12.3 \times 10^{-4}$ ]).

**Conclusions:** Results suggest that inflammation contributes to early CVD, with marked effects on vascular function and cardiac structure differing based on T1D presence. The paradoxical association between adiponectin and endothelial function calls for further exploration.

## POSTER TOUR 10—CHRONIC COMPLICATIONS # 2

### P086 | Oxidative stress and early cardiovascular disease in youth with type 1 diabetes: The CARDEA study

N. Silva Navarro<sup>1</sup>, M. Masse<sup>1</sup>, V. McNealis<sup>1,2</sup>, S. Harnois-Leblanc<sup>1,3,4</sup>, J.-C. Lavoie<sup>1,5</sup>, M.G Friedrich<sup>6,7</sup>, A. Van Hulst<sup>8</sup>, A.M. Nuyt<sup>1,9</sup>, J.-L. Bigras<sup>1,9</sup>, T.A Barnett<sup>1,10</sup>, A. Benedetti<sup>2</sup>, M.-È. Mathieu<sup>1,11</sup>, V. Drapeau<sup>12</sup>, M. Henderson<sup>1,3,9</sup>

<sup>1</sup>Research Center of CHU Sainte-Justine, Montréal, Canada, <sup>2</sup>McGill University, Department of Epidemiology, Biostatistics and Occupational Health, Montréal, Canada, <sup>3</sup>Université de Montréal, School of Public Health, Montréal, Canada, <sup>4</sup>Research Center of Center Hospitalier Universitaire de Montréal, Montréal, Canada, <sup>5</sup>Université de Montréal, Department of Nutrition, Montréal, Canada, <sup>6</sup>McGill University Health Center, Montréal, Canada, <sup>7</sup>McGill University, Department of Medicine and Diagnostic Radiology, Montréal, Canada, <sup>8</sup>McGill University, Ingram

School of Nursing, Montréal, Canada, <sup>9</sup>Université de Montréal, Department of Pediatrics, Montréal, Canada, <sup>10</sup>McGill University, Department of Family Medicine, Montréal, Canada, <sup>11</sup>Université de Montréal, School of Kinesiology and Physical Activity Sciences, Montréal, Canada, <sup>12</sup>Université Laval, Department of Physical Activity, Québec, Canada

**Introduction:** Cardiovascular disease (CVD) is evident as early as adolescence among individuals with type 1 diabetes (T1D). Oxidative stress plays a crucial role in the pathophysiology of CVD, but little is known about mechanisms in youth.

**Objectives:** We examined associations between oxidative stress and early markers of CVD in youth with and without T1D.

**Methods:** Cross-sectional study of 100 adolescents and 97 age- and sex-matched healthy controls from Sainte-Justine Hospital Diabetes Clinic (Montreal, Canada). Oxidized glutathione (GSSG), reduced glutathione (GSH), total glutathione (GSt) were measured by capillary electrophoresis and represent hydrogen peroxide metabolism. We measured aortic stiffness with pulse-wave velocity (PWV) and endothelial function with a brachial artery flow-mediated dilation test (velocity time integral [VTI] and acceleration). Left ventricular mass indexed by height (LVMH), papillary mass, wall thickness, and ejection fraction were determined by cardiac magnetic resonance. Multivariable regression models were estimated adjusting for age, sex, BMI z-score, Tanner stage, physical activity (accelerometer), ethnicity, and heart rate. Interaction terms for the presence of T1D were tested and results stratified by groups.

**Results:** Youth with T1D had lower GSSG, GSH, and GSt compared with controls (previously reported). Greater levels of GSSG were associated with higher PWV ([95%CI]: 1.12 m/s [0.18, 2.04]) in the T1D group, but not in controls ( $-0.11$  m/s [ $-0.91$ , 0.62]). GSSG levels were positively associated with wall thickness in the T1D group (2.38 mm [ $-0.21$ , 5.07]), without reaching statistical significance. No other associations between oxidative stress markers and CVD markers were noted.

**Conclusions:** Our findings suggest that the dysregulation in hydrogen peroxide metabolism in youth with T1D could accelerate arterial stiffness development and alter cardiac structure, making oxidative stress a potential target for CVD prevention in this population.

### P087 | Prevalence and associated factors of chronic complications among outpatients with type 2 diabetes mellitus: A case of Nyeri County Referral Hospital, Kenya

R. Ireri<sup>1</sup>, G. Waweru<sup>2</sup>

<sup>1</sup>Kenya Medical Training College, Clinical Medicine, Embu, Kenya, <sup>2</sup>Kenyatta University, Food Nutrition and Dietetics, Nairobi, Kenya

**Introduction:** Diabetes mellitus and its associated complications is a public health concern globally, imposing heavy burden to the health-care system.



**Objectives:** This study seeks to determine the prevalence and associated factors of chronic complications among outpatients with type 2 diabetes mellitus (T2DM).

**Methods:** A hospital based cross-sectional study survey was carried out among 340 randomly selected participants with T2DM attending outpatient clinics in Nyeri county referral hospital, Kenya. The survey was conducted between October 2021 and March 2022. All subjects were invited to have HbA1c, Albumin creatinine ratio (ACR) and Glomerular filtration rate (GFR), Lipid profile, blood pressure, comprehensive dilated eye exam, physical examination of the foot, tuning fork and monofilament assessment of reflexes.

**Results:** About 62.3% of the participants assessed had one or more complications. Prevalence of diabetes retinopathy, nephropathy, neuropathy were 36.2%, 40%, 72%, respectively while lower limb amputation, coronary artery disease and hypertension were 6.8%, 32%, 78% respectively. Poor glycemic control was associated with all the forms of complications. Coronary artery disease (CAD) and lower extremity amputations was significantly higher among Smokers while overweight patients had poorly controlled glycemic index compared to normal weight patients. Patients on Metformin and sulphonylurea's were more likely to develop complications compared to those on other drug regimens.

**Conclusions:** This study illustrates presence of major burden of chronic complications of T2DM. Future interventions should be directed at intensive glycemic control and strengthening early diagnosis and management.

#### P088 | Prevalence and management of diabetic nephropathy in Libyan type 1 diabetic patients

O. Fathalla<sup>1</sup>, I. Hadeed<sup>1</sup>, N. Algazir<sup>1</sup>, M. Ghawil<sup>1</sup>, S. Abusrewil<sup>1</sup>

<sup>1</sup>Tripoli University Libya, Pediatric Endocrine and Diabetes, Tripoli, Libya

**Introduction:** Diabetic nephropathy (DN) is the leading cause of end-stage renal disease worldwide. Chronic hyperglycemia and high blood pressure are the main risk factors for the development of DN. Poor glycemic control, hyperlipidemia, oxidative stress, environmental, genetic and epigenetic factors play an important role in the pathophysiological development of DN.

**Objectives:** The objectives of this study were to estimate the risk for nephropathy in its various phases and to assess the variable related to its onset and progression in patients who have had type I diabetes and the identification of these factors may have therapeutic implications in the follow up of these patients.

**Methods:** This retrospective study for 10 years (1990–2000). It was conducted in pediatric endocrine department, Tripoli University Hospital, Libya. A clinic-based cross-sectional study of 1209 patients with T1DM aged 10–18 years and mean duration of diabetes 12 years (8–18 years).

All patients screened by 24 h urine collections to detect microalbumin and it was considered positive, if it is more than 30 mg/day.

**Results:** The frequency of microalbuminuria 31% (374 patients), 52% were females and 48% were males. The major part of patients with microalbuminuria those with more than 8 years diabetic duration. Furthermore, most of them was with mean HbA1c 10% over last 3 years prior to develop microalbuminuria. In treatment of patient with microalbuminuria, we used angiotensin converting enzyme inhibitor drugs and only 52 (4.3%) patients with overt proteinuria were treated with combination of ACEI and angiotensin receptor blocker drugs.

**Conclusions:** High prevalence of incipient DN. Longer diabetes duration and higher HbA1c were associated with the presence of diabetic nephropathy. The therapeutic regimen of DN is usually multifactorial, which includes tight glycemic control, blood pressure control, lipid-lowering agents, weight loss, protein restriction, and smoking cessation.

#### P089 | Assessment of carotid intima media thickness in children with and without type 1 diabetes mellitus: A case control study

S. Kumar<sup>1</sup>, A. Seth<sup>1</sup>, P. Singh<sup>1</sup>, R. Solanki<sup>2</sup>, R. Singh<sup>3</sup>

<sup>1</sup>Lady Hardinge Medical College and Associated Hospitals, Pediatrics, New Delhi, India, <sup>2</sup>Lady Hardinge Medical College and Associated Hospitals, Radiology, New Delhi, India, <sup>3</sup>Lady Hardinge Medical College and Associated Hospitals, Biochemistry, New Delhi, India

**Introduction:** Children with Type 1 Diabetes mellitus (T1DM) are predisposed to endothelial dysfunction and subclinical vascular disease.

**Objectives:** Compare the carotid intima media thickness (CIMT) in children with T1DM with age, sex, and BMI matched healthy children and determine their risk factors.

**Methods:** Cross sectional study was conducted on children 8–18 years with T1DM on insulin therapy for >1 year and free from acute complications and known comorbidities. Age, sex, and BMI matched healthy children were recruited as controls. All participants underwent detailed clinical and biochemical evaluation and were screened for diabetic complications. The assessment of CIMT was done in all subjects by radiologist, who was blinded to the study groups using ultrasound in linear probe (5–12 MHz).

**Results:** A total of 100 children were enrolled with 50 in each group. The mean age and duration of diabetes among the cases was 6.96 ± 3.2 years and 5.29 ± 3.3 years respectively. A significantly increased CIMT was observed in children with T1DM as compared to controls (0.49 ± 0.06 vs. 0.43 ± 0.06 mm; p value < 0.001). Among the cases, CIMT was reported higher in males and those with a family history of cardio-vascular risk factors. No significant correlation was found between CIMT and age, BMI, duration of diabetes, lipid profile, and presence of microalbuminuria and HbA1c in children with T1DM.

**Conclusions:** Children with T1DM are susceptible to increased CIMT independent of their BMI, lipid profile, glycemic control, and duration of diabetes. Non-invasive methods for monitoring vascular changes like CIMT are useful to facilitate early detection.

**P090 | Vascular complications of type 1 diabetes in children, adolescents and young adults: Preliminary results from a global survey to assess screening, prevention and management practices across the world**

C. Piona<sup>1</sup>, T.J. dos Santos<sup>2</sup>, A. Chobot<sup>3</sup>, E. Gianì<sup>4</sup>, L. Marcovecchio<sup>5</sup>, C. Maffei<sup>1</sup>, C. de Beaufort<sup>6</sup>

<sup>1</sup>University and Azienda Ospedaliera Universitaria Integrata of Verona, Department of Surgery, Dentistry, Pediatrics and Gynecology, Section of Pediatric Diabetes and Metabolism, Verona, Italy, <sup>2</sup>Hospital Vithas Almería, Instituto Hispalense de Pediatría, Almería, Spain, <sup>3</sup>Institute of Medical Sciences, University of Opole, Poland Department of Pediatrics, University Clinical Hospital, Department of Pediatrics, Opole, Poland, <sup>4</sup>Humanitas University, Department of Biomedical Sciences, Milan, Italy, <sup>5</sup>University of Cambridge, Department of Pediatrics, Cambridge, United Kingdom, <sup>6</sup>Center Hospitalier, Department of Pediatric Diabetes and Endocrinology, Clinique Pédiatrique, Luxembourg, Luxembourg

**Introduction:** .

**Objectives:** To evaluate worldwide physicians' practices regarding screening, prevention and treatment of micro- and macro-vascular complications of Type 1 Diabetes according to ISPAD guidelines.

**Methods:** Between March and April 2022, we collected responses from pediatric diabetologist through a web-based survey to assess practices related to screening, prevention and treatment of nephropathy, retinopathy, neuropathy, and risk factors (RFs) for macrovascular diseases.

**Results:** A total of 115 physicians from 48 countries responded to date. The prevalence of screening for complications, according to the ISPAD guidelines, was 87% for nephropathy and 74% for retinopathy (74%), but lower for neuropathy (19%) and RFs for macrovascular disease (52%). Frequency of lack of screening was 19% for neuropathy, 11% for macrovascular disease and 4.3% for nephropathy and retinopathy, and this was mainly due to lack of access to screening methods. Patient's financial contribution for screening was requested for nephropathy (30%), retinopathy (28%), neuropathy (28%) and RFs for macrovascular diseases (31%). Between 30% and 40% physicians started screened from the age of 10–11 years and 20% from puberty. Half of the survey respondents was very familiar with the guideline content and reported sufficient knowledge for nephropathy (80%), RFs for macrovascular disease (80%), retinopathy (50%) and neuropathy (50%) treatments. First-line treatment recommended by ISPAD guidelines, initiated by physicians, was 55% for persistently elevated albuminuria/proteinuria, 60% for retinopathy, 63% for neuropathy, 83% for LDL-c > 100 mg/dl, 75% for elevated blood pressure, 85% for hypertension.

**Conclusions:** These preliminary results suggest that there is wide variation across the world in the adoption and implementation of the ISPAD guidelines on vascular complications. Further data collection and analysis are needed for a more comprehensive analysis of the issues limiting the implementation of the ISPAD guideline for vascular complications.

**P091 | Assessment of skin autofluorescence association with glycated hemoglobin, cardiovascular risk markers and concomitant chronic diseases in children with type 1 diabetes**

M. Jankowska<sup>1</sup>, B. Mianowska<sup>2</sup>, I. Pietrzak<sup>2</sup>, J. Chrzanowski<sup>3</sup>, J. Sotek<sup>3</sup>, A. Szadkowska<sup>2</sup>

<sup>1</sup>Polish Mothers' Memorial Institute Research Hospital, Department of Developmental Neurology and Epileptology, Łódź, Poland, <sup>2</sup>Medical University of Lodz, Department of Pediatrics Diabetology Endocrinology and Nephrology, Łódź, Poland, <sup>3</sup>Medical University of Lodz, Department of Biostatistics and Translational Medicine, Łódź, Poland

**Introduction:** Skin autofluorescence (sAF) is a non-invasive measure of tissue advanced glycation end products accumulation.

**Objectives:** Our aim was to assess sAF association with glycated hemoglobin (HbA1c) values, cardio-vascular risk markers, and comorbidity of autoimmune thyroiditis or celiac disease in children with type 1 diabetes (T1D).

**Methods:** Patients aged 3–18 years with ≥6 months T1D duration participated. sAF was measured with AGE Reader (Diagnostics BV, Netherlands). Cholesterol fractions, triglycerides, HbA1c, C-reactive protein (CRP), ambulatory blood pressure monitoring records, body mass index Z-score and body composition parameters were analyzed.

**Results:** 348 patients were included (182 boys; median age 14.3 years [IQR 11.2–17.1] with median T1D duration 5.5 years [3.1–8.8]). Median HbA1c was 7.3% [6.7%–8.1%]. Median sAF was 1.40 AU [1.27–1.53] and positively correlated with current HbA1c, mean of historical (since T1D diagnosis) HbA1cs, age, and T1D duration (respectively rho: 0.27, 0.22, 0.15, 0.14, all  $p < 0.01$ ). sAF was higher in girls than in boys (1.40 AU [1.3–1.6] vs 1.37 AU [1.27–1.50],  $p = 0.011$ ) and in patients with than without celiac disease (1.53 AU [1.43–1.63] vs 1.40 AU [1.27–1.53],  $p = 0.001$ ). sAF positively correlated with percentage of body fat, body impedance and CRP; and negatively correlated with basic metabolic rate (BMR) in kcal (respectively rho: 0.12, 0.14, 0.17 and  $-0.16$ , all  $p < 0.05$ ). In the multiple regression model parameters that remained positively correlated with sAF were: age ( $\beta = 0.40$ ,  $p < 0.0001$ ), historical HbA1c ( $\beta = 0.24$ ,  $p < 0.0001$ ), CRP ( $\beta = 0.15$ ,  $p = 0.014$ ), female sex ( $\beta = 0.26$ ,  $p = 0.034$ ) and presence of celiac disease ( $\beta = 0.11$ ,  $p = 0.062$ ); while BMR ( $\beta = -0.51$ ,  $p < 0.0001$ ) remained negatively correlated.

**Conclusions:** In young T1D patients with relatively short diabetes duration sAF reflects well previous glycemic control represented by historical average HbA1c, however its associations with classic CV-risk markers are not evident. sAF correlations with BMR and celiac disease deserve further research.

**P092 | Early markers of atherosclerosis in children and adolescents with type 1 diabetes mellitus**

C.G. Delhikumar<sup>1</sup>, P. Bharathy<sup>1</sup>, M. Rajappa<sup>2</sup>, A. Anantharaj<sup>3</sup>, J. Sahoo<sup>1</sup>

<sup>1</sup>Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Pediatrics, Pondicherry, India, <sup>2</sup>Jawaharlal Institute of

Postgraduate Medical Education & Research (JIPMER), Biochemistry, Pondicherry, India, <sup>3</sup>Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Cardiology, Pondicherry, India

**Introduction:** Type 1 Diabetes mellitus (T1DM) children with uncontrolled hyperglycemia develop endothelial damage that triggers inflammatory processes resulting in early-onset atherosclerosis.

**Objectives:** To study the early atherosclerosis changes using Flow-mediated dilation (FMD) of the brachial artery, carotid intima-media thickness (CIMT), inflammatory markers (hsCRP, IL-6), and endothelial markers (sICAM and sVCAM).

**Methods:** We recruited 4 to 18-year-old children with T1DM and age and sex-matched normal children, excluding those with familial hypercholesterolemia, syndromic disorders, and cardiovascular disease. We measured CIMT and FMD in both groups. Biomarkers hsCRP, IL-6, sICAM, and sVCAM, were analyzed in T1DM.

**Results:** We enrolled 40 T1DM children and 40 controls with 27(67.5%) girls in each group. The mean age was 9.68 years. T1DM group had 4(10%) obese and 4(10%) overweight children. Among cases, 9(22.5%) had diabetes for >5 years, 24(60%) required daily insulin between 0.8 to 1.2 IU/kg/day and 26(65%) had HbA1c >10gm/dl. The children with uncontrolled HbA1c had higher BMI ( $r = 0.40$ ,  $p = 0.01$ ). A 6(15%) had autoimmune thyroiditis. The CIMT values were significantly higher in cases (0.69 mm) than controls (0.59 mm). A 29(72.5%) cases had abnormal combined CIMT values. FMD was lesser in cases than controls but not significant. The median values of hs-CRP, IL-6, sICAM, sVCAM were 0.81 mg/L, 6.27 pg/ml, 46.33 ng/ml and 668.81 ng/ml respectively. CIMT correlated positively with hip ( $r = 0.335$ ,  $p = 0.035$ ) and waist circumference ( $r = 0.371$ ,  $p = 0.018$ ). We had significant correlation of IL-6 with CIMT ( $r = 0.543$ ,  $p = <0.001$ ) and sICAM with FMD ( $r = -0.397$ ,  $p = 0.011$ ). VCAM was low in obese and overweight children.

**Conclusions:** Children with type 1 diabetes had higher CIMT than normal children, whereas FMD did not differ. The association between elevated inflammatory markers with high CIMT and low FMD indicates inflammation plays an essential role in endothelial dysfunction.

#### P093 | The impact of tight versus less tight glycemic control on the course of type 1 diabetes in children

A. Ochocimska<sup>1</sup>, J. Świdarska<sup>2</sup>, M. Wysocka-Mincewicz<sup>2</sup>

<sup>1</sup>Children's Memorial Health Institute, Department of Biochemistry, Radioimmunology and Experimental Medicine, Warsaw, Poland, <sup>2</sup>Children's Memorial Health Institute, Department of Endocrinology and Diabetology, Warsaw, Poland

**Introduction:** Recent studies show that maintaining normal blood glucose levels is not sufficient to reduce the incidence of chronic type 1 diabetes (T1D) complications. Biochemical disturbances accompanying hyperglycemia in the asymptomatic period may induce the formation/activation of various biologically active substances, which may influence the treatment process.

**Objectives:** The aim of our study is to assess the effect of strict adherence to normoglycemia on blood levels of: amylin, catestatin, chromogranin A (ChgA), nerve growth factor (NGF), platelet activating factor (PAF), proamylin, and uromodulin.

**Methods:** The study included 156 patients with T1D aged 6–18 (mean age:  $12 \pm 4$ )—patients of The Children's Memorial Health Institute. The control group ( $n = 30$ ) consisted of age-matched children (mean age:  $9 \pm 4$ ), with no metabolic disorders and no diagnosis of T1D. The tight glycemic control group was defined as having a glycated hemoglobin concentration of  $\leq 7.5\%$ .

**Results:** Concentration of all parameters assessed in the study group differed statistically significantly from those obtained in the control group. NGF, ChgA, uromodulin and PAF, concentration levels differed between patients with a disease duration >3 years and newly diagnosed patients ( $11.2 \pm 4.22$  pg/ml,  $57.6 \pm 18.5$  ng/ml,  $164.3 \pm 175$  ng/ml,  $0.41 \pm 0.64$  ng/ml vs.  $20.2 \pm 86.0$  pg/ml,  $74.2 \pm 15.6$  ng/ml,  $304.0 \pm 126.5$  ng/ml,  $0.21 \pm 0.08$  ng/ml, respectively). In the group of children whose the disease has lasted more than 3 years, peptide levels did not differ statistically ( $p > 0.05$ ) between patients, regardless of whether or not they adhered to the strict glycemic regime.

**Conclusions:** Blood concentration of the tested proteins did not change depending on the glycemic control. There is no relationship between the risk of developing and/or severity of diabetic complications and the concentration of the studied markers in children with T1D, regardless of whether they achieve the goal of normoglycemia or not.

#### P094 | Genetic based risk prediction for the development of diabetic nephropathy in children and adolescents with type 1 diabetes

F. Evin<sup>1</sup>, T. Atik<sup>1</sup>, G. Ak<sup>2</sup>, T. Köse<sup>2</sup>, C. Kabasakal<sup>2</sup>, S. Özen<sup>1</sup>, Ş. Darcan<sup>1</sup>, D. Gökşen<sup>1</sup>

<sup>1</sup>Ege University, Pediatric Endocrinology, Izmir, Turkey, <sup>2</sup>Ege University, Izmir, Turkey

**Introduction:** The pathogenesis of diabetic nephropathy (DN) is multifactorial, however most of its development mechanisms are remain unknown.

**Objectives:** We aimed to create genetic-based clinical risk scoring.

**Methods:** Polymorphisms in AFF3, CARS, CERS2, ERBB4, GLRA3, RAET1L, TMPO, ZMIZ1 genes were investigated and the DN and non-DN(WDN) groups were compared in terms of clinical findings and biochemical laboratory data.

**Results:** Of the 43 DN cases (Girl/Boy: 22/21) included in the study, 3(6.9%) had a family history of consanguineous marriage between their parents, and 9(20.9%) had a family history of T1DM. Of the cases, 23(53.5%) were diagnosed with diabetic ketoacidosis, 14(32.6%) with diabetic ketosis, and 6(14%) with incidental T1DM. The mean age of detection of microalbuminuria (MA) in patients with diabetic nephropathy was  $13.33 \pm 3.20$ , and the duration of diabetes

	Group	Mean	p values
BMI SDS	DN	-0,29 ± 0,92	0.030
	WDN	0,20 ± 1,15	
Systolic blood pressure persantile	DN	70,54 ± 28,49	0.001
	WDN	48,64 ± 26,25	
Diastolic blood pressure persantile	DN	75,57 ± 18,24	<0.001
	WDN	46,26 ± 20,46	
Least 3 years mean HbA1c(%)	DN	8,74 ± 1,99	0.035
	WDN	7,96 ± 1,24	

was  $4.95 \pm 3.99$  years. MA was present at the time of diagnosis of T1DM in 5 cases (11.6%). The duration of diabetes in the WDN group was matched with the age at which diabetic nephropathy developed in the DN group. Table 1 summarizes a number of clinical and laboratory datas in DN and WDN groups at the time of detection of MA.

In the cases in the DN and T1DM groups; 13 polymorphisms were investigated in AFF3, CARS, CERS2, ERBB4, GLRA3, RAET1L, TMPO, ZMIZ1, FRMD3 genes. The determined results were compared with randomly assigned healthy controls. There was no difference in the frequency of polymorphism between DN, WDN, and healthy control groups.

**Conclusions:** This study is a comprehensive study revealing the clinical and molecular features of diabetic nephropathy, and clinically the risk factors previously shown in the literature were confirmed. However, in this study, no difference was found between type diabetes and healthy control groups in polymorphisms known to be associated with diabetic nephropathy.

#### P095 | Plasma levels of vitamin B12 and Neurofilament light chain in adolescents with type 1 diabetes with and without neuropathy

M.T. Jespersen<sup>1</sup>, T. Parkner<sup>2</sup>, H. Tankisi<sup>3</sup>, A.J. Terkelsen<sup>1,4</sup>, J.R. Nyengaard<sup>5,6</sup>, E.T. Vestergaard<sup>7,8</sup>, K. Kristensen<sup>8</sup>, V.F. Rasmussen<sup>4,7</sup>

<sup>1</sup>Aarhus University Hospital, Department of Neurology, Aarhus, Denmark, <sup>2</sup>Aarhus University, Department of Clinical Biochemistry, Department of Clinical Medicine, Aarhus, Denmark, <sup>3</sup>Aarhus University, Department of Neurophysiology, Department of Clinical Medicine, Aarhus, Denmark, <sup>4</sup>Aarhus University, Danish Pain Research Center, Department of Clinical Medicine, Aarhus, Denmark, <sup>5</sup>Aarhus University, Core Center for Molecular Morphology, Section for Stereology and Microscopy, Department of Clinical Medicine, Aarhus, Denmark, <sup>6</sup>Aarhus University Hospital, Department of Pathology, Aarhus, Denmark, <sup>7</sup>Randers Regional Hospital, Department of Pediatrics, Randers, Denmark, <sup>8</sup>Aarhus University Hospital, Steno Diabetes Center Aarhus, Aarhus, Denmark

**Introduction:** Neuropathy is a well-known complication to diabetes. However, still little is known about biochemical markers to detect early signs of neuropathy in younger patients.

**Objectives:** To investigate plasma levels of vitamin B12 and the nerve damage marker, Neurofilament light chain (NfL) in adolescents with type 1 diabetes (T1D) with or without neuropathy. We hypothesize that patients with neuropathy have signs of B12 deficiency and increased levels of NfL.

**Methods:** A 60 adolescents (15–18 years, diabetes duration >5 years) with T1D and 23 control subjects were included. Based on results from nerve conduction studies, the patients were divided into two groups: with (DN+) and without (DN-) diabetic neuropathy. Plasma levels of vitamin B12 (B12), vitamin B12-TC-bound (holoTC) and NfL were determined by immunoassays, while plasma methylmalonate (MMA) was analyzed by mass spectrometry.

**Results:** A 23 of the adolescents with T1D had abnormal NCS (DN+, n = 23), and 37 had normal results (DN-, n = 37). There were no significant differences in B12 parameters between DN- and DN+ (B12 p = 0.1; holoTC p = 0.2; MMA p = 0.4). Comparing DN+ with control subjects showed no significant differences in MMA- and holoTC-levels (MMA median: DN+: 0.12 vs. control subjects: 0.15 μmol/L, p = 0.6; holoTC median: DN+: 121.75 vs. control subjects: 77.40 pmol/L, P = 0.06), but revealed significantly higher B12-levels in DN+ (B12 median: DN+: 438.29 vs. control subjects: 309.95 pmol/L, P = 0.02).

No significant differences in NfL levels between the groups were found (NfL median (range): DN+: 5.16 (2.12–13.24) ng/l; DN-: 5.85 (2.35–14.31) ng/l; control subjects: 5.24 (3.07–8.00) ng/l), p = 0.5).

**Conclusions:** This study found similar plasma levels of B12 parameters and NfL in adolescents with and without diabetic neuropathy, suggesting that reduced B12 level is not contributing as cause of occurrence of neuropathy in adolescents with T1D. Furthermore, NfL is not a relevant biomarker of large nerve fiber damage in this T1D subpopulation.

#### POSTER TOUR 11—OBESITY & TYPE 2 DIABETES

#### P096 | Non-alcoholic liver disease in overweight and obese children detected by Fibroscan and its determinants

M. Fajrudheen<sup>1</sup>, A.K. Satapathy<sup>1</sup>, S. Mahapatro<sup>1</sup>, M.K. Panigrahi<sup>2</sup>  
<sup>1</sup>AllIMS Bhubaneswar, Pediatrics, Bhubaneswar, India, <sup>2</sup>AllMS Bhubaneswar, Gastroenterology, Bhubaneswar, India



Variable	Fibrosis (n=59) (Mean or number (%))	No fibrosis (n=119) (Mean or number (%))	P value
Age (years)	11.33	10.3	0.002
BMI Z score	2.12	1.56	<0.001
Sum of skinfold thickness (mm)	50.40	39.91	<0.001
Increased FBS	15 (25.4)	8 (6.7)	<0.001
CAP	252	204	<0.001
Transaminitis	49 (83.0)	32 (26.9)	<0.001

**Introduction:** Childhood obesity and NAFLD are upcoming major health issues in developing and developed nations. Early detection of NAFLD and NASH in the reversible stage and appropriate measures can prevent progression to severe disease. Even though liver biopsy is the gold standard for diagnosis, an alternate non-invasive technique to detect early fibrosis is the need of hour. Fibroscan with Controlled attenuation parameter (CAP) is a novel noninvasive modality to detect both fatty changes as well as fibrotic changes early in these children.

**Objectives:** To detect the prevalence of NAFLD and NASH in overweight and obese children. And to compare it with the existing imaging modality that is ultrasonography.

**Methods:** A cross-sectional study was done from January 2020 to October 2021 in overweight and obese children attending a tertiary care hospital. Relevant history, physical examination, anthropometric measurements, and laboratory investigations were done. NAFLD and NASH changes in the liver were assessed using USG and Fibroscan.

**Results:** Among 178 children studied, 116 were boys and 62 were girls. In these, 31% were overweight and the rest were obese. Fatty liver and fibrotic changes were observed in 46% and 33.1% children respectively using fibroscan. A good correlation was observed between Fibroscan, ultrasound, and PNFI scores in detecting fatty liver and fibrotic changes in the liver. Age, BMI, waist circumference, ALT, AST were high in children with NAFLD. There was also higher prevalence of increased fasting blood sugars in children with NAFLD. ALT value of more than 29.5 U/L was found to have a sensitivity of 78% and specificity of 81% in detecting NAFLD in children with obesity and overweight.

**Conclusions:** A high prevalence NAFLD was found in overweight and obese children. Fibroscan is a useful modality to detect early fibrotic changes in these children. Alanine transferase (ALT) and skinfold thickness were found to be significantly associated with NAFLD in overweight and obese children.

#### P097 | Dyslipidemia in young patients with type 2 diabetes and maturity onset diabetes of the young: an observational study

M. Bhat<sup>1</sup>, J. Bhat<sup>2</sup>

<sup>1</sup>Government Medical College, Medicine, Srinagar, India, <sup>2</sup>Government Medical College, Endocrinology, Srinagar, India

**Introduction:** Youth onset type 2 diabetes (T2D) is increasing. In addition more of the patients are diagnosed with maturity onset diabetes of the young (MODY). Dyslipidemia is an important modifiable cardiovascular (CVD) risk factor and most of the times untreated in youth with diabetes.

**Objectives:** To evaluate the prevalence of dyslipidemia and compare the lipid concentrations in youth with T2DM to MODY at a tertiary care institute.

**Methods:** A cross sectional study performed over 1 year period, evaluating patients with T2D or MODY, seen at least once in clinic over a period of 1 year, with age of onset of diabetes <25 years, not on the statins were included. Serum total cholesterol (TC), low density lipoprotein cholesterol (LDL), high density lipoprotein cholesterol HDL and triglyceride concentration (TG) was measured. Independent and

Table 1: Clinical characteristics and lipid concentrations in T2D and MODY

Variable	MODY	T2D	TOTAL	SIG
Sex (M:F)	18;26(40.9:59.1)	80;87(47.9:52.1)	98;113(46.4:53.6)	0.408
Current age (years)	23.66 ± 5.66	26.80 ± 4.53	26.15 ± 4.94	0.000
Diabetes Duration (years)	3.23 ± 2.89	3.23 ± 2.89	4.30 ± 3.55	0.024
BMI (kg/m <sup>2</sup> )	24.85 ± 4.02	24.51 ± 4.02	24.58 ± 4.01	0.615
HbA1c (%)	9.86 ± 2.43	8.59 ± 2.09	8.85 ± 2.21	0.001
TC (mg/dl)	157.54 ± 48.89	169.58 ± 30.17	167.07 ± 35.12	0.043
TG (mg/dl)	161.15 ± 79.46	173.53 ± 74.37	170.95 ± 75.43	0.334
LDL (mg/dl)	97.60 ± 19.23	105.22 ± 22.82	103.66 ± 22.31	0.046
HDL (mg/dl)	43.37 ± 7.95	33.64 ± 6.89	35.63 ± 8.12	0.000

multivariable linear regressions of LDL-C and HDL-C concentrations were performed.

**Results:** A total of 167 T2D and 44 MODY patients were included. Serum TC ( $169.58 \pm 30.17$  mg/dl vs.  $157.54 \pm 48.89$  mg/dl) and LDL levels ( $105.22 \pm 22.82$  mg/dl vs.  $97.60 \pm 19.23$  mg/dl) were significantly higher and HDL levels ( $33.64 \pm 6.89$  vs.  $43.37 \pm 7.95$ ) were significantly lower in T2D as compared to the MODY patients. Serum triglyceride levels were similar between the two groups. About 53.3% with T2D ( $n = 89$ ) and 36.4% with MODY ( $n = 16$ ) had LDL-C above  $\geq 100$  mg/dl. In addition 24% T2D patients and 19% with MODY had LDL  $\geq 130$  mg/dl, who likely met criteria for starting statin therapy. Higher LDL and/or lower HDL were associated with increased age, diabetes duration, higher HbA1c, obesity, and T2D.

**Conclusions:** This highlights the need for more aggressive dyslipidemia screening and treatment in youth with diabetes. The prevalence of dyslipidemia is more in youth T2D as compared to MODY.

#### P098 | Dulaglutide in youth with type 2 diabetes (T2D): Results of the AWARD-PEDS randomized, placebo-controlled trial

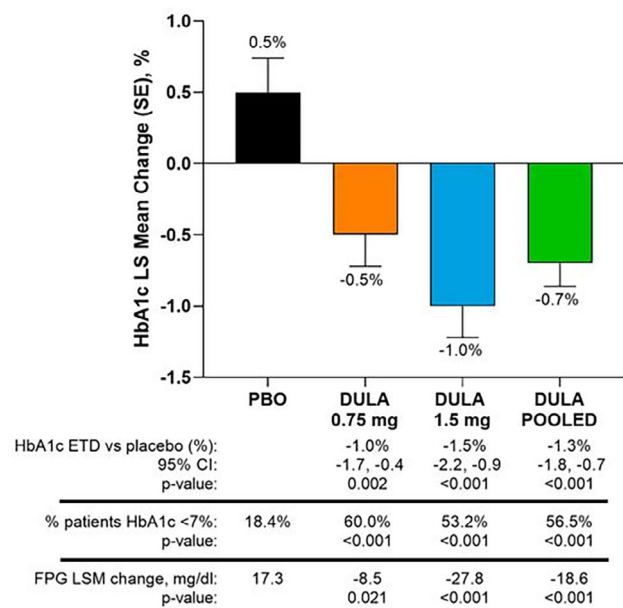
S. Arslanian<sup>1</sup>, T. Hannon<sup>2</sup>, P. Zeitler<sup>3</sup>, L. Chao<sup>4</sup>, C. Boucher-Berry<sup>5</sup>, M. Barrientos-Pérez<sup>6</sup>, E. Bismuth<sup>7</sup>, S. Dib<sup>8</sup>, J.I. Cho<sup>9</sup>, D. Cox<sup>9</sup>  
<sup>1</sup>UPMC Children's Hospital of Pittsburgh, Pittsburgh, United States, <sup>2</sup>Riley Hospital for Children, Indianapolis, United States, <sup>3</sup>Children's Hospital Colorado, Colorado, United States, <sup>4</sup>Children's Hospital of Los Angeles, Los Angeles, United States, <sup>5</sup>Children's Hospital of the University of Illinois, Illinois, United States, <sup>6</sup>Angeles Hospital of Puebla, Puebla, Mexico, <sup>7</sup>University Robert Debré Hospital, Paris, France, <sup>8</sup>Federal University of São Paulo State, São Paulo State, Brazil, <sup>9</sup>Eli Lilly and Company, Indianapolis, United States

**Introduction:** AWARD-PEDS was a Phase 3 trial to assess the efficacy and safety of dulaglutide (DU), a once-weekly GLP-1 receptor agonist, in youth (10 to <18 years old) with T2D treated with lifestyle alone or on stable metformin with or without basal insulin.

**Objectives:** The primary aim was to demonstrate superiority of DU (pooled doses) vs placebo for change in HbA1c at 26 weeks.

**Methods:** Participants (mean age, 14.5 yrs; mean BMI, 34.1 kg/m<sup>2</sup>) were randomized to placebo ( $N = 51$ ), DU 0.75 mg ( $N = 51$ ), or DU 1.5 mg ( $N = 52$ ). Analyses included all patients with  $\geq 1$  dose of study drug, excluding data after initiation of rescue therapy.

**Results:** DU was superior to placebo (figure) in improving glycemic control measured by change in HbA1c, percent of patients with HbA1c <7%, and change in fasting glucose at Week 26. No effect of DU was observed on BMI change ( $p = 0.776$ ). Fewer patients assigned to DU compared to placebo required rescue therapy (2.9% vs. 17.6% respectively,  $p = 0.003$ ). Incidence of common GI adverse events was higher in DU group versus placebo [nausea (14.6% vs. 7.8%), vomiting (15.5% vs. 3.9%), diarrhea (18.4% vs. 13.7%)] but comparable to that observed in adults.



ETD, estimated treatment difference; DU, dulaglutide; FPG, fasting plasma glucose; HbA1c, glycated hemoglobin; LSM, least-squares mean; SE, standard error. Analyses included all patients receiving at least 1 dose of study drug, excluding data after rescue therapy. Change from baseline is from MMRM; % patients with HbA1c <7% is from longitudinal logistic regression.

**Conclusions:** In conclusion, in youth with inadequately controlled T2D treated with or without metformin and/or basal insulin, once weekly DU 0.75 mg or 1.5 mg was superior to placebo in improving glycemic control without an effect on BMI through 26 weeks, with a safety profile consistent with that established in adults.

#### P099 | Course and predictors of pre-diabetes in Indian children and adolescents

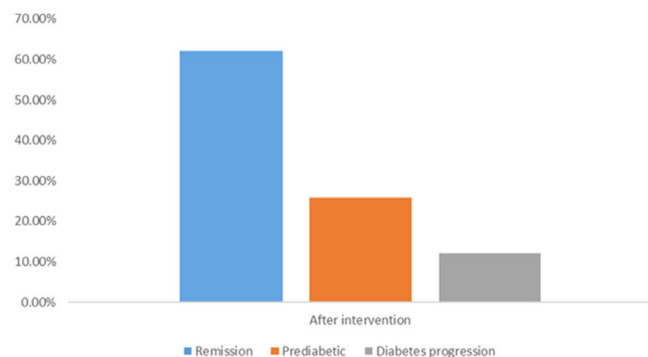
M. Agrawal<sup>1</sup>, N. R<sup>1</sup>, S. Benerjee<sup>1</sup>, P. Sen<sup>1</sup>, V. Yadav<sup>1</sup>, A. Bajpai<sup>1</sup>  
<sup>1</sup>Center of Diabetes - Endocrine Research, Regency Hospital, Pediatric Endocrinology, Kanpur, India

**Introduction:** There has been a substantial global rise in the prevalence of pre-diabetes commensurate with the obesity epidemic. There is limited information about the course and its predictors of progression/remission of pre-diabetes in Indian children.

**Objectives:** To determine the outcome and predictors of pre-diabetes in Indian children and adolescents.

**Methods:** Clinical course was followed in 58 children and adolescents (37 boys;  $13 \pm 3.6$  years of age) for  $1.9 \pm 1.2$  years. Management included lifestyle measures in all and metformin in 36. Clinical, auxological, and biochemical parameters (Glycemic status, lipid profile, alanine amino transaminase) were assessed at baseline and after two, six, and 12 months and then annually. The predictors of worsening of disease and changes in fasting and glucose tolerance were assessed on univariate analysis.

**Results:** The study showed that remission from pre-diabetes was observed in 36 (62.1%). The disease continued in 15 (25.9%) with frank Type 2 diabetes progression in seven (12.1%). The increase in BMI SDS



was the most important predictor of disease progression ( $p = 0.034$ ). The mean change in BMI SDS was  $0.17 \pm 0.82$  in diabetic children.

**Conclusions:** A substantial proportion of Indian children and adolescents with prediabetes persist to have persistent disease or progress to Type 2 Diabetes. Weight gain was the main predictor of the progression of the disease.

#### P100 | The correlation between consumption of simple carbohydrate and waist measurement in Budya Wacana Elementary School Yogyakarta students

N. Susanto<sup>1</sup>

<sup>1</sup>Duta Wacana Christian University, Faculty of Medicine, Yogyakarta, Indonesia

**Introduction:** The excessive simple carbohydrate consumption is able to increase the amount of glucose savings in the blood. The unused glucose savings in the body then synthesized into fatty acids. The fatty acids changed into fat tissue under the skin layers, one of the place to store the fatty acids is the abdomen area. Central obesity is a condition where there is an excessive amount of fat tissue in the abdomen area. Central obesity can occur both on adult and young kids.

**Objectives:** To find the correlation between simple carbohydrate consumption and waist measurement in Budya Wacana Elementary School Yogyakarta Students.

**Methods:** This study uses the *Semi Quantitative Food Frequency Questionnaire*(SQFFQ) to see the frequency of the food intake for every respondent. Every respondent of this study fill the questionnaire and having a waist measurement.

**Results:** This study has 161 students as the respondent from the 4th, 5th, and 6th graders. There are 88 (54, 7%) respondents that consumed normal amount of simple carbohydrate with normal waist measurement. There are 8 (5%) respondents that consumed normal amount of simple carbohydrate with high waist measurement. There are 28 (17, 4%) respondent who have high simple carbohydrate consumption and normal waist measurement. The rest of the respondent, 37 students (23%) have high consumption of simple carbohydrate with high waist measurement result. The correlation between the consumption of simple carbohydrate and waist measurement is intermediate correlation.

**Conclusions:** There is an intermediate correlation between simple carbohydrate consumption and waist measurement in Budya Wacana Elementary School Yogyakarta Students.

#### P101 | Rapid progression of type 2 diabetes in Indian adolescents: A cause of concern

P. Sen<sup>1</sup>, C. Dave<sup>1</sup>, R. Narayanan<sup>1</sup>, S. Banerjee<sup>1</sup>, M. Agarwal<sup>1</sup>, R. Shukla<sup>1</sup>, A. Bajpai<sup>1</sup>

<sup>1</sup>Regency Center For Diabetes and Endocrinology Research, Pediatric and Adolescent Endocrinology, Kanpur, India

**Introduction:** Adolescent type 2 Diabetes is associated with rapid beta-cell exhaustion and the need for multiple medications. There is a lack of data about the course of Type 2 Diabetes in Indian adolescents and its predictors.

**Objectives:** To study the course of Type 2 Diabetes in Indian adolescents and its predictors.

**Methods:** A 26 adolescents with Type 2 Diabetes (19 boys, age  $15.6 \pm 2.3$  years) were followed up for  $2.8 \pm 2.0$  years till an age of  $19.05 \pm 3.11$  years regarding anthropometric measures, glycemic control, treatment required, and comorbidities. Predictors for disease course were ascertained.

**Results:** The initial treatment included metformin alone ( $n = 16$ ), insulin alone ( $n = 1$ ), in combination with insulin ( $n = 7$ ), and in combination with other drugs ( $n = 2$ ). Seven patients achieved remission  $0.61 \pm 0.593$  years after diagnosis and four of these patients relapsed  $1.15 \pm 0.2$  years later. Treatment at last follow-up included metformin alone ( $n = 7$ ) or in combination with additional agents (Insulin in 2, GLP1 receptor analog in 5, and SGLT2 Inhibitor in 8, DPP4 in 6). Three patients are in remission and off medication. A decrease in BMI SDS showed a trend of persistent metformin responsiveness (a decrease of  $-0.0383 \pm 0.41$  in those responsive to metformin as against an decrease of  $0.11 \pm 0.43$  in those needing combination therapy). Complications at last follow-up included microalbuminuria in 3 (11%) and steatohepatitis in 17 (65%).

**Conclusions:** Indian adolescents with Type 2 diabetes have an aggressive course with rapid progression to metformin failure and a high prevalence of comorbidities. Timely initiation of management and weight loss is essential to retard the progression of the disease.

#### P102 | A review of type 2 diabetes mellitus (T2DM) in children and youth in Gulf Cooperation Council (GCC) countries

I. Al Alwan<sup>1</sup>, A. Babiker<sup>1</sup>

<sup>1</sup>King Saud Bin Abdulaziz University for Health Sciences, Pediatrics, Riyadh, Saudi Arabia

**Introduction:** Traditional T2DM is an adult-onset disease. Over the last two decades, the global rise in obesity in children and youth (CY) coincided with a dramatic increase in the incidence of T2DM

worldwide. SEARCH and TODAY studies aimed to explore the patterns of T2D among a US population of CY assessing the clinical characteristics and response to treatment.

**Objectives:** To determine the pattern of severity of T2D in GCC countries and the potential solutions.

**Methods:** To evaluate the current evidence of epidemiology of T2DM among CY in GCC countries by reviewing reports from countries with scale population studies and with high incidence/prevalence of obesity and risk factors of T2D. In addition, some of them have diabetes registries.

**Results:** Although it is preventable, T2DM is a grave disease due to rapidly increasing prevalence with a delayed diagnosis in 30%–40% showing no symptoms at the time of diagnosis. Its early onset leads to premature deaths, disabilities, and costly treatment locally and internationally. GCC is considered a region with high risk of this disease and an increase prevalence of T2DM in adults with projection reaching 96.2% by 2035. Reports on epidemiology of T2D in CY in GCC countries showed: prevalence of 14.1% of overweight and 15.9% obesity (Jeeluna, 2012) and a prevalence of 0.07% in Saudi Arabia (Al Rubaeen et al, in 23,523 patients 6–18 years), incidence of T2D in Qatar was 1.16 per 100,000 CY in 2012 and increased to 2.72 in 2016, incidence of T2D in Kuwait was 2.56 per 100,000 CY per year.

**Conclusions:** TODAY/SEARCH-Equivalent approach of evaluation may be required in GCC countries. Consanguinity and high prevalence of obesity in CY in GCC urge us for better assessment of the characteristics of the disease in these patients that leads to early diagnosis and appropriate management plan. This approach can also inform regional and/or country specific strategies of prevention.

### P103 | Predictive ability of Triglyceride-glucose (TyG) index and related parameters for metabolic syndrome (MetS) and insulin resistance in Greek pediatric population

E. Dikaiakou<sup>1</sup>, E.-A. Vlachopapadopoulou<sup>1</sup>, F. Athanasouli<sup>1</sup>, I. Kosteria<sup>1</sup>, M. Kafetzi<sup>2</sup>, S. Fakiolas<sup>2</sup>, S. Michalacos<sup>1</sup>

<sup>1</sup>"P&A Kyriakou" Children's Hospital, Department of Endocrinology-Growth and Development, Athens, Greece, <sup>2</sup>"P&A Kyriakou" Children's Hospital, Biochemistry Department-Hormones Laboratory, Athens, Greece

**Introduction:** TyG index has emerged as a simple, cost-effective surrogate marker for predicting insulin resistance in children.

**Objectives:** To investigate the ability of TyG Index to identify MetS, as well as the ability of TyG-related parameters to improve prediction of MetS and Insulin Resistance (IR) in Greek children and adolescents.

**Methods:** TyG index, HOMA-IR and the TyG products were calculated in a sample of 145 children (46.9% boys) with mean age 10.2 ± 2.31 years, with overweight or obesity. TyG index was calculated as  $\ln[\text{triglycerides (mg/dl)} \times \text{fasting glucose (mg/dl)} / 2]$ . TyG-BMI was calculated as TyG index × BMI z-score and TyG-WHtR (Waist to Height Ratio) as TyG index × WHtR. The predictive ability of TyG index and products was determined by using receiver operating characteristic

(ROC) curves. The overall performance of the ROC analysis was quantified by computing area under the curve (AUC).

**Results:** Insulin resistance, defined as HOMA-IR ≥ 2.5, was present at 54.5% of the participants, while 18.6% had MetS, defined according to Cook et al. 2003. TyG index was significantly higher in children with Mets ( $p < 0.001$ ). ROC curve analysis for TyG index showed that the optimal cut-off value for the prediction of MetS was 8.36 with sensitivity 85% and specificity 89%, whereas for the prediction of IR was 8.13, with sensitivity 59% and specificity 71%. The AUC was 0.908 and 0.674, respectively ( $p < 0.001$ ). Moreover, the optimal cut-off value for the prediction of MetS with TyG-BMI was 18.3 with sensitivity 74% and specificity 57% and for IR 18.6, with sensitivity 52% and specificity 68%. The AUC was 0.675 for MetS and 0.605 for IR. Similarly, the optimal cut-off value of TyG-WHtR for the prediction of MetS was 5.32, with sensitivity 70% and specificity 84%, while for IR it was 5.02, with sensitivity 66% and specificity 68%. The AUC for MetS was 0.830 and for IR 0.686.

**Conclusions:** TyG Index is a stronger predictor for MetS, however TyG-WHtR is superior for the prediction of IR of all the other parameters studied.

### P104 | The association between depressive symptoms and overweight or obesity in prepubertal children: Findings from the QUALITY cohort

S. Bonin<sup>1</sup>, S. Harnois-Leblanc<sup>1</sup>, M.-È. Mathieu<sup>1</sup>, T.A Barnett<sup>2</sup>, C.M Sabiston<sup>3</sup>, M. Henderson<sup>1</sup>

<sup>1</sup>Université de Montréal, Montreal, Canada, <sup>2</sup>McGill University, Montreal, Canada, <sup>3</sup>University of Toronto, Toronto, Canada

**Introduction:** Although recent meta-analyses suggest a positive association between obesity and depressive symptoms in adults and adolescents, the nature of this association in prepubertal children remains unclear.

**Objectives:** This study aimed to examine the bidirectional associations between levels of depressive symptoms and weight status in 8-10-year-old children followed for 2 years, and whether these associations differed by sex.

**Methods:** We used data from the *Quebec Adipose and Lifestyle Investigation in Youth Cohort Study's* baseline and first follow-up evaluations ( $n = 558$ ). Depressive symptoms were assessed using the 12-item Center for Epidemiological Studies Depression scale. Weight status was determined using body mass index z-scores (WHO). Univariable and multivariable linear and logistic regression models were used to assess the direction and magnitude of the association, adjusting for age, sex, physical activity, screen time, parental education, alcohol and cigarette use and baseline outcome measure.

**Results:** Depressive symptoms in children did not differ by weight status. Furthermore, children with higher levels of depressive symptoms at baseline were not more likely to have overweight or obesity 2 years later (odds ratio [95% CI] = 0.95 [0.88; 1.02] per scale unit increment).



Likewise, baseline overweight/obesity was not associated with higher levels of depressive symptoms at follow-up (beta coefficient [95% CI] = 0.20 [−0.47; 0.87]). No meaningful associations emerged in sex-specific analyzes.

**Conclusions:** Contrary to the literature in adults and adolescents, our study did not detect an association between weight status and depressive symptoms in childhood over a two-year period. Potential underlying mechanisms linking weight status and depression in adults might not apply as early as prepubertal childhood. Further longitudinal studies in more diverse samples are needed to confirm these findings.

#### P105 | Diagnosis and management of type 2 diabetes in a pediatric diabetology clinic in Annaba, Algeria

N. Selim<sup>1</sup>, F. Abdelaziz<sup>2</sup>, D. Belamri<sup>1</sup>, L. Boustil<sup>1</sup>, H. Sehab<sup>1</sup>, N. Bouchair<sup>1</sup>

<sup>1</sup>University of Annaba, Department of Pediatrics, Saint Therese Clinic, Annaba, Algeria, <sup>2</sup>Medical Practice, Annaba, Algeria

**Introduction:** Type 2 diabetes (T2D) is defined as an insulin resistance associated with a progressive insulin-secretory defect, its incidence in the pediatric population has grown in parallel with the worldwide rise in obesity.

**Objectives:** The objectives of our study is to determine the frequency of T2D in our clinic and to identify the diagnostic circumstances as well as the therapeutic modalities.

**Methods:** In our pediatric diabetology clinic, we collected 17 cases of T2D between 2015 and 2020. A 14 patients presented with overweight or obesity, and 3 had a normal weight, the diagnosis was based on history, clinical and biological data and the good response to oral hypoglycemic agents.

**Results:** The age at diagnosis was between 12.3 and 16.5 years, with 12 girls and 5 boys, the BMI was between 20.5 and 51 kg/m<sup>2</sup>, the history of T2D is found in all patients, acanthosis nigricans was present in 11 patients, HbA1c at diagnosis was from 6.4 to 13%, c-peptide was normal in 15 patients, insulinaemia was variable, T1D antibodies were negative in 16 patients and only one positive in a patient, the lipid balance was disturbed in only 2 teenagers, one of whom had the Polycystic ovary syndrome.

the screening for microangiopathic complications carried out in most patients came back without abnormalities. All patients received insulin therapy initially and then were put on oral hypoglycemic agents with a good response.

**Conclusions:** It is necessary to know how to think about T2D in children with particular circumstances of onset of their diabetes; such as puberty, obesity and a history of T2DM. The treatment consists in the administration of oral hypoglycemic agents with a good follow-up of the patients to know how to reintroduce the insulin if necessary.

#### POSTER TOUR 12—PUMPS & CGM # 1

#### P107 | A comparison between the FreeStyle Libre 2 90-day glucose management indicator value and the point-of-care HbA1c testing value in children with type 1 diabetes mellitus

C. Dixon<sup>1</sup>, R. Mohanty<sup>2</sup>, M. Ahmed<sup>3</sup>, I. Dalal<sup>2</sup>

<sup>1</sup>Lancaster University, Lancaster, United Kingdom, <sup>2</sup>Blackpool Teaching Hospital, Blackpool, United Kingdom, <sup>3</sup>Blackpool Teaching Hospital, Pediatrics, Blackpool, United Kingdom

**Introduction:** Type 1 diabetes mellitus is a chronic disease and managing the condition has a huge impact on patients in their day-to-day lives. The ever-advancing technologies have revitalized the ways in which patients, in this case children, are able to cope and adapt to living with their condition. Most children now use FreeStyle libre to monitor daily glucose. 90 days readings will give HbA1c.

**Objectives:** In this short study, the flash glucose monitoring system, FreeStyle Libre, is appraised for its ability to generate an accurate HbA1c value, and what implications this could have in clinical practice.

**Methods:** After an initial collection of 134 sets of patient data, following the inclusion criteria, 54 sets of patient data from the Pediatrics Department at Blackpool Victoria Hospital were analyzed. The primary objective was to evaluate the differences between 90-day glucose management indicator readings for type 1 diabetic patients using FreeStyle Libre 2 system and compared this to their point-of-care HbA1c test value. The intended outcome was to prove there is no significant difference between the two values, and to question why we are putting patients through an additional clinical test in the form of a clinic HbA1c. The paired t-test was used to statistically analyze the results.

**Results:** Our results were statistically significant (P = 0.043) and proved that there was no difference between the 90-day GMI and the HbA1c.

**Conclusions:** The implications of these results in clinical practice are varied. We recommend the possibility for reducing the need for patients to have a point-of-care HbA1c, thus improving patient experiences in hospital, and boosting the efficiency of diabetes review appointments by increasing the overall number of virtual consultations. The Freestyle Libre has additional advantages including the ability to record patient's percentage time in target glucose range, as well as the number of hypoglycemic events.

#### P108 | Comparison of continuous glucose monitoring and plasma glucose in the hypoglycemia alert level

E. Jónsdóttir<sup>1</sup>, G. Forsander<sup>1</sup>, F. Sundberg<sup>1</sup>

<sup>1</sup>Sahlgrenska University Hospital, Queen Silvias Children's Hospital, Gothenburg, Sweden

Total n = 611 paired values		Number of pairs	% of pairs
Congruency between CGM and p-glucose	Hypo alert in both CGM and p-glucose	248	40.6
	Hypo alert in p-glucose but not CGM	130	21.3
	Hypo alert in CGM but not p-glucose	56	9.2
	No hypo alert neither in CGM nor p-glucose	177	29.0
Clarke Error Grid	Field A(<20% error and detecting all hypoglycemia alerts in reference)	460	75.3
	Field B(benign failure)	21	3.4
	Field D(dangerous failure)	130	21.3

**Introduction:** Accurate identification of hypoglycemia alert levels  $\leq 3.9$  mmol/L ( $< 70$  mg/dl) is important for insulin treated children. Different information from CGM and p-glucose can be confusing both for the parents and diabetes team.

**Objectives:** To compare simultaneously monitored glucose values measured with continuous glucose monitoring (CGM) and plasma glucose (p-glucose) around the hypoglycemia alert level  $\leq 3.9$  mmol/L ( $< 70$  mg/dl).

**Methods:** As a part of the Azithromycin Insulin Diet Intervention Study (AIDIT) 11 children with newly diagnosed Type 1 diabetes aged 6–15.99 years received supervised high dose insulin infusion aiming for glycemic target 3.5–4.5 mmol/L (63–81 mg/dl) to induce beta-cell rest. Glucose was monitored with CGM Dexcom G6 (Dexcom Inc., California, USA) and capillary plasma glucose Stat-Strip (Nova Biomedical, Waltham, USA) measured by a study nurse. P-glucose values in the range 3.0–5.0 mmol/L (54–90 mg/dl) were compared with simultaneously monitored CGM data. Plasma glucose values was regarded as reference in Clarke Error Grid.

**Results:** 611 pairs of values were collected from 11 children (3 girls). The children's median age was 11, (range 6 to 14 years). Mean Absolute Relative Difference (MARD) in range 3.0–5.0 mmol/L was 14%.

**Conclusions:** MARD is higher in the range 3.0–5.0 mmol/L (54–90 mg/dl) in Dexcom G6 than in the manufacturers reported overall MARD (9.0%). Awareness of this is important when treating children with Type 1 diabetes to target 3.9–7.8 mmol/L. Persons with diabetes need accurate knowledge about and strategies to manage, the high level of uncertainty in the clinical important identification of hypoglycemia alert levels  $\leq 3.9$  mmol/L ( $< 70$  mg/dl) with CGM and p-glucose.

#### P109 | Glycaemic and patient reported outcomes in children with type 1 diabetes who transitioned from Dexcom G5 to G6 continuous glucose monitoring devices

R. James<sup>1</sup>, G. Smith<sup>2</sup>, K. Irwine<sup>1</sup>, T. Jones<sup>1</sup>, C. Taplin<sup>1</sup>, K. Ellis<sup>1</sup>, M. Abraham<sup>1</sup>, E. Davis<sup>1</sup>

<sup>1</sup>Perth Children's Hospital, Pediatric Endocrinology, Perth, Australia, <sup>2</sup>Telethon Kids Institute, Perth Children's Hospital, Perth, Australia

**Introduction:** Continuous Glucose Monitoring (CGM) technology is rapidly evolving but the impact of changes in CGM functionality are not systemically evaluated.

**Objectives:** To examine CGM metrics and patient reported outcomes (PROs) in a real-world cohort of children with Type 1 Diabetes (T1D) transitioning from Dexcom G5 to G6 device.

**Methods:** A retrospective longitudinal analysis of CGM metrics was done in children with T1D ( $> 1$  year) transitioning from Dexcom G5 to G6. The last 2-week period of CGM metrics while on G5 before transition and a second 2-week period of metrics 3 months after G6 use were collected. Metrics analyzed were %CGM use, Time in Range(TIR), Time below Range(TBR), Time above Range(TAR), Glucose Management Indicator(GMI) and mean sensor glucose. PROs were generated with an online user evaluation survey of parents with children (age  $< 10$  years, on G5) after 3 months of G6 use assessing number of finger pricks per day, pain on insertion, data loss, trust in the system and general satisfaction.

**Results:** CGM metrics were analyzed in 221 children (54% female mean age 10.7 years, diabetes duration of 4.3 years). CGM usage  $> 70\%$  was  $94.9 \pm 5.0\%$  on G6 and  $93.5 \pm 5.5\%$  on G5 ( $P < 0.001$ ). In those with CGM wear time  $> 70\%$ , mean sensor glucose was  $9.6 \pm 1.6$  mmol/L on G6 and  $9.4 \pm 1.7$  mmol/L on G5 ( $P = 0.017$ ). GMI was  $58.0 \pm 7$  on G6 and  $57.2 \pm 8$  mmol/mol on G5 ( $P = 0.017$ ). TIR was  $57.2 \pm 14.9\%$  on G6 and  $58.4 \pm 15.5\%$  on G5 ( $P = 0.085$ ). TBR of  $< 3.9$  mmol/L was  $2.8 \pm 3.1\%$  on G6 and  $3.3 \pm 3.5\%$  on G5 ( $P = 0.004$ ). TBR of  $< 3.0$  mmol/L was  $0.7 \pm 1.3\%$  on G6 and  $0.8 \pm 1.4\%$  on G5 ( $P = 0.002$ ). TAR of  $> 10$  mmol/L was  $39.9 \pm 16.1\%$  on G6 and  $38.3 \pm 17.0\%$  on G5 ( $P = 0.021$ ).

PROs were completed by 61 respondents (mean age 7.4 years, 67% diabetes duration  $> 1$  year). There were 65% 'much less' finger pricks, 50% and 40% 'much less' pain on insertion, and discomfort respectively. Data loss was 42% 'much less', 64% overall improved trust and 52% 'much more' general satisfaction with G6 than G5.

**Conclusions:** Although overall glycemic outcomes are similar in children following G5 to G6 transition, there was improvement in CGM wear time and time spent in hypoglycemia with increased user acceptability of the Dexcom G6 system.

**P110 | How do CGM parameters time in range and glucose management indicator correlate with laboratory HbA1c, a prospective audit?**

L. Crawley<sup>1</sup>, M. Clemente<sup>1</sup>, D. Hawcutt<sup>2</sup>, M. Deakin<sup>1</sup>, H. Moore<sup>3</sup>, M. Neame<sup>4</sup>, A. Ghatak<sup>1</sup>

<sup>1</sup>Alder Hey Childrens Hospital, Department of Diabetes, Liverpool, United Kingdom, <sup>2</sup>Alder Hey Childrens Hospital, Clinical Research Facility Clinical Lead, Liverpool, United Kingdom, <sup>3</sup>Glan Clwyd Hospital, Pediatric Department, Rhyl, United Kingdom, <sup>4</sup>Alder Hey Childrens Hospital, Liverpool, United Kingdom

**Introduction:** Until recently HbA1c was the only method of monitoring a patient's long-term glucose control. The development of CGMs has introduced new ways of monitoring this, with the parameters Glucose Management Indicator (GMI, or 'predicted HbA1c'), and Time in Range (TIR).

**Objectives:** To ascertain the relationships between CGM generated parameters and HbA1c. To ascertain if CGM generated parameters of the two CGMs analyzed (Dexcom and FreeStyle Libre) differ in their relationship to HbA1c.

**Methods:** A prospective audit of CGM captured parameters (FreeStyle Libre and Dexcom) and laboratory HbA1c collected at routine hospital visits was undertaken (audit registration numbers 683 and 6524) in all patients diagnosed >6 months who attended pediatric diabetic clinic in person, over a 3-month period at two centers (one secondary, one secondary/tertiary) in the UK. Statistical associations were undertaken using the Mann-Whitney U test.

**Results:** 200 patients were included, (Mean age 157.1 months, 107 Dexcom (53.5%) 93 FreeStyle Libre (46.5%), mean time since diagnosis 60.7 months). Differences were noted between populations on each CGM, with Dexcom users being younger ( $p = 0.232$ ) but

diagnosed longer ( $p = 0.001$ ). Dexcom GMI for 2 weeks and 3 months differed significantly from HbA1c ( $p = 0.0074$ ,  $p = 0.0023$  respectively), while Libre did not ( $p = 0.453$ ,  $p = 0.728$ ). TIR and HbA1c showed a negative correlation.

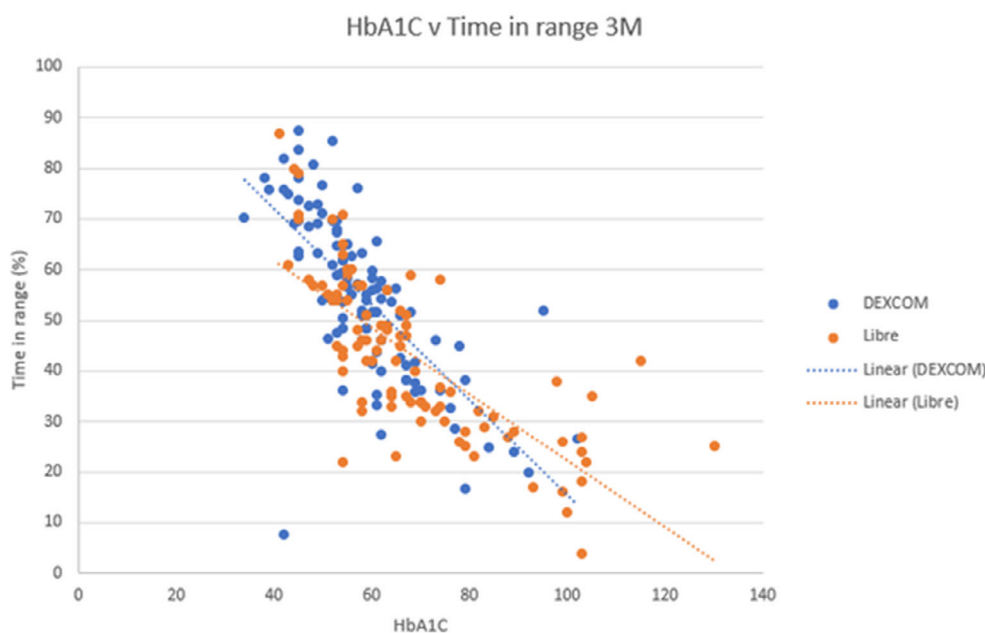
**Conclusions:** CGM parameters TIR and GMI could be a useful way of monitoring long-term diabetes control in the future, reducing the need for hospital visits, and empowering patients to self-manage their diabetes more effectively.

**P111 | Early and late Dumping syndrome as a cause of hypo/hyperglycemia episodes and its medical management**

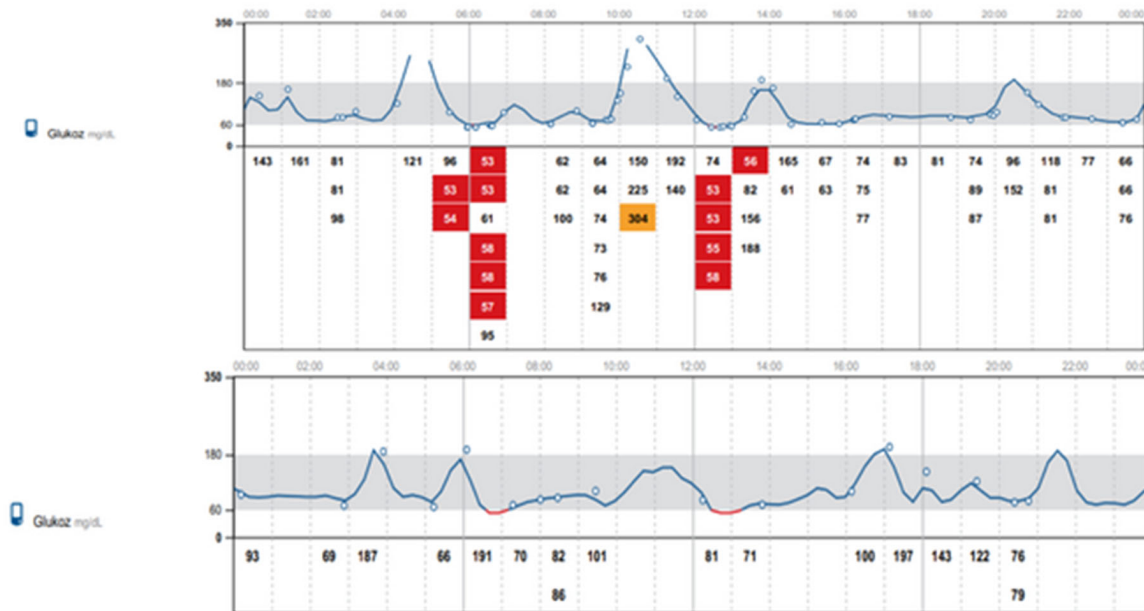
E. Arslan<sup>1</sup>, S. Ozen<sup>1</sup>, Y. Atik Altınok<sup>2</sup>, Ş. Darcan<sup>1</sup>, D. Gökşen<sup>1</sup>  
<sup>1</sup>Ege University School of Medicine, Pediatric Endocrinology and Diabetes, Izmir, Turkey, <sup>2</sup>Ege University/Health Sciences Institute, Nutrition and Dietetics, Izmir, Turkey

**Introduction:** Dumping syndrome (DS) is a late but frequently seen complication after esophageal and gastrointestinal system operations.

**Objectives: Case 1:** A 2.5-year-old patient who underwent tracheal and esophageal atresia operations was admitted with fatigue, restlessness, and hyperglycemia after 4 months of increased feeding. Frequent sampling oral glucose tolerance test (OGTT) was performed, the of. Early DS was diagnosed with weakness, sleepiness in the first hour, an increase in the cardiac rate of more than 10%, and a glucose value of 249 mg/dl at the 45th minute. The diagnosis of late DS was made with the glucose value falling to 30 mg/dl at the 180th minute with symptoms of hypoglycemia. His diet changed to frequent intervals, and small volumes and a thickener were added to his meals. Due to the persistence of symptoms and glucose variability, acarbose  $3 \times 12.5$  mg was given before meals. Acarbose was increased to



**Figure 1: Daily Blood Glucose Graph of Case-1 at the Beginning of Treatment and on the 12th Day of Treatment**



6 × 12.5 mg without any side effects. The patient was followed by a flash glucose monitoring system from the beginning of diagnosis. Blood glucose normalized on the 10th day (Figure 1). **Case 2:** A two-year-old patient underwent repetitive operations due to esophageal atresia. After 6 months, he was admitted to the hospital with a tendency to sleep postprandially, sweating, and restlessness. In the OGTT, glucose was 350 mg/dl at the 30th minute and 46 mg/dl at the 90th minute. Early and late DS was diagnosed in the patient who developed swelling, weakness, flushing, sweating, and palpitations in the first hour. He tolerated acarbose three times a day before the main meals, his blood sugar increased, and his symptoms regressed.

**Methods:** .

**Results:** .

**Conclusions:** A first-choice treatment for DS is nutritional changes; however, the use of acarbose is recommended in patients who do not respond, especially for late DS. It can be used before each meal by increasing the number of daily doses in those who do not respond adequately at standard doses.

Arabia, <sup>2</sup>College of Medicine, King Saud bin Abdul-Aziz University for Health Sciences, Riyadh, Saudi Arabia, <sup>3</sup>King Abdullah International Medical Research Center, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia

**Introduction:** Type 1 diabetes mellitus (T1DM) is the most common type of diabetes affecting youth, with intensive insulin therapy being the mainstay of therapy, delivered either by multiple daily injections (MDI) or continuous subcutaneous insulin infusion (CSII). Real-world data from clinical practice is essential to better understand the impact of CSII compared to MDI on diabetes care and glycemic control outside of controlled clinical trial settings.

**Objectives:** Comparison of CSII with MDI in achieving glycemic control in youth with T1DM.

**Methods:** Retrospective cohort study including two groups of youth aged 0–18 years with T1DM treated by CSII or MDI, followed at a tertiary specialized children's hospital in Saudi Arabia. Both groups were matched in age, gender and HbA1c levels. Primary outcome was HbA1c at 1, 2 and 3 years, with weight gain as a secondary outcome. Ambulatory glycemic profile was analyzed from a subset of patients using continuous glucose monitoring systems (CGMS).

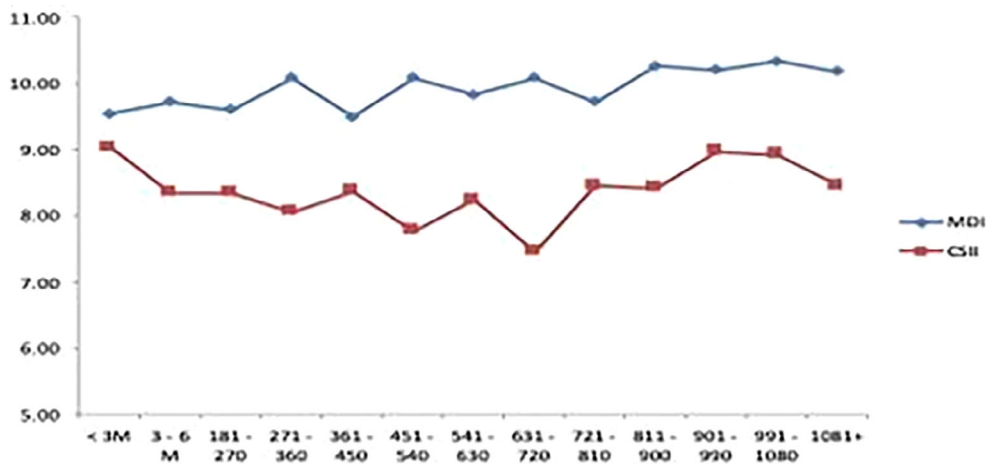
Categorical variables were reported as frequency and percentage and continuous variables as means and standard deviations. Independent t-test was used to compare A1c levels between the two groups (MDI vs CSII), with a p-value <0.05 considered statistically significant. **Results:** A total of 168 youth with T1DM (n = 129 on MDI, n = 39 on CSII) were included. The CSII group consistently had lower A1c levels compared to the MDI group throughout a

**P112 | The effectiveness of insulin pump therapy versus multiple daily injections in children with type 1 diabetes mellitus in a Specialized Center in Riyadh**

H. Alfaraidi<sup>1,2,3</sup>, N. Alammari<sup>2</sup>, A. Aljuraishi<sup>2</sup>, R. Alharbi<sup>2</sup>, H. Alqarni<sup>2</sup>, E. Masuadi<sup>2,3</sup>, A. Alzaben<sup>1</sup>, A. Babiker<sup>1,2,3</sup>

<sup>1</sup>King Abdullah Specialized Children's Hospital, King Abdulaziz Medical City, Ministry of National Guard Health Affairs, Pediatrics, Riyadh, Saudi





3-year follow up period: 8.1% versus 10.1,  $p$ -value<0.001 at 1 year, 7.5% versus 10.1% at 2 years,  $p$ -value<0.001, 8.9% versus 10.3% at 3 years,  $p$ -value = 0.033. BMI significantly increased in both groups at 1 year, although greater in CSII group. In a subgroup using CGMS ( $n = 37$  on MDI and  $n = 29$  on CSII), the CSII group had a lower average blood glucose (194 mg/dl vs. 228 mg/dl,  $p$ -value = 0.028) and a lower estimated A1c level (8.4% vs. 9.6%,  $p$ -value = 0.022).

**Conclusions:** Treatment with CSII resulted in lower A1c compared to MDI in our cohort, which was sustained over a 3-year period.

#### P113 | Validation of optimal sampling duration of continuous glucose monitoring in children and adolescents with type 1 diabetes: Real-world data

M.S. Kim<sup>1</sup>, Y.J. Lee<sup>2</sup>, Y.A. Lee<sup>2</sup>, S.Y. Lee<sup>3</sup>, C.H. Shin<sup>2</sup>, J.H. Kim<sup>1</sup>

<sup>1</sup>Seoul National University Bundang Hospital, Pediatrics, Seongnam, Korea, Republic of, <sup>2</sup>Seoul National University Children's Hospital, Pediatrics, Seoul, Korea, Republic of, <sup>3</sup>Seoul Metropolitan Government-Seoul National University Boramae Medical Center, Pediatrics, Seoul, Korea, Republic of

**Introduction:** Recently, continuous glucose monitoring (CGM) is increasingly used in type 1 diabetes (T1D) patients because it could complement the disadvantages of self-monitoring of blood glucose and glycated hemoglobin (HbA1c) by measuring interstitial glucose continuously. CGM has also been shown to reduce hypoglycemia and improve glycemic control and glucose variability in children and adolescents with T1D. Several guidelines recommend sampling duration for the analysis of CGM should be at least 2 weeks.

**Objectives:** This study aims to validate the optimal sampling duration of CGM for long-term use in Korean pediatric patients with T1D.

**Methods:** A 12 weeks of CGM data were collected before HbA1c measurement on 44 children and adolescents (aged 2-18 years) with T1D using the Dexcom G6 system and Medtronic Guardian Connect system. Participants with at least 70% of their expected CGM

readings were included in the analysis to ensure an adequate amount of data. CGM metrics including mean glucose, coefficient of variation (CV), glucose management indicator (GMI), percentage of time below the range (TBR), percentage of time in target range (TIR), percentage of the time above the range (TAR) were compared between a full 12-week and each sampling period using Spearman's correlation coefficient (R), absolute difference (AD) and relative difference (RD).

**Results:** As the number of weeks for data collection increased, the correlation with the full 12-week data improved, reaching a plateau from around 3 weeks and thereafter. R values increased according to increasing sampling duration with excess over 0.90 for 3 weeks, particularly for mean glucose (0.913), CV (0.949), GMI (0.913), percentage of TAR >250 mg/dl (0.934), percentage of TIR (0.909). AD showed a tendency to converge to 0 by increasing sampling period. RD showed lowest between 3 to 4 weeks of sampling duration.

**Conclusions:** Among children and adolescents with T1D, 3 weeks of CGM data were reasonable to reflect a good estimation of glycemic metrics of the last 12 weeks.

#### P114 | Access and use of new technologies in diabetes care in patients that need an interpreter compared to those that do not

M. Ayya<sup>1</sup>, J.C. Agwu<sup>1</sup>

<sup>1</sup>Sandwell and West Bromwich NHS Trust, Pediatrics, Birmingham, United Kingdom

**Introduction:** Young people with Type 1 Diabetes Mellitus encounter daily struggles with titrating insulin to achieve adequate glycemic control. Insulin pump and continuous glucose monitoring (CGM) technology is constantly improving however, access to it remains variable across the UK. Those from ethnic minorities and deprived areas are less likely to access technology and more susceptible to developing complications of diabetes. Understanding health inequalities is essential to facilitate use of technology in this population.

Table 1

	English first language (n = 65)	English second language (n = 23)	P value
Home computer	57 (88%)	18 (78%)	0.273
<b>Phone</b>	<b>63 (97%)</b>	<b>18 (82%)</b>	<b>&lt;0.005</b>
Insulin pump	21 (32%)	9 (39%)	0.553
CGM/Flash	42 (65%)	11 (48%)	0.157
Downloads	26 (40%)	6 (26%)	0.233
<b>Time in range &lt; 50%</b>	<b>18 (32%)</b>	<b>11 (58%)</b>	<b>&lt;0.05</b>
HbA1c < 8	44 (68%)	16 (69%)	0.868

**Objectives:** To review the use of available technology across our diverse population of young people with T1DM.

**Methods:** We prospectively invited families over a 3 months period to participate in a voluntary questionnaire during clinics or by post to review the use of technology.

**Results:** A 98 families responded and 88 questionnaires were included. We found that 35%(31/88) used an Insulin Pump and 60% (53/88) CGM. Those receiving pump therapy and CGM achieved the best HbA1c(<8%) with 70.9%(22/31) and 76%(40/53) respectively. Data was divided into two groups; those who spoke English as a first language ([EFL] n = 65) and English as a second language ([ESL] n = 23). Findings are summarized in Table 1. Access to mobile phones was different between the groups and was statistically significant (p < 0.005- ESL-82% (18/23) and EFL-97% (63/65)). Access to a home computer was similar (ESL- 78% and EFL- 88%) however, a difference exists in reviewing blood glucose downloads (ESL-26% (6/23) and EFL-40% (26/65)). CGM was accessed in only 48%(11/23) in ESL whilst EFL achieved 65%(42/65).Time in Range(TIR) was reduced and statistically significant (TIR < 50%, ESL-58%(11/19) and EFL 32%(18/57)).

**Conclusions:** Technology in T1DM significantly improves HbA1c in young people however, families must receive support as with traditional diabetes diaries to achieve this. Our study indicates that inequalities maybe remedied by facilitating access to phones to enable management of T1DM.

## POSTER TOUR 13 - PUMPS & CGM # 2

### P115 | Improved glycemic control and reduced DKA in a matched case-control study of tubeless insulin pumps versus multiple daily injections in combination with glucose sensors in children and adolescents with type 1 diabetes

S. Lanzinger<sup>1,2</sup>, H. Haberland<sup>3</sup>, K. Rauh<sup>4</sup>, C. Reinauer<sup>5</sup>, B. Rami-Merhar<sup>6</sup>, S. Khodaverdi<sup>7</sup>, U. Menzel<sup>8</sup>, J. Hamann<sup>9</sup>, T. Danne<sup>10</sup>

<sup>1</sup>Ulm University, Institute of Epidemiology and Medical Biometry, ZIBMT, Ulm, Germany, <sup>2</sup>German Center for Diabetes Research (DZD), Munich-Neuherberg, Munich-Neuherberg, Germany, <sup>3</sup>Children's Hospital, Sana

Klinikum Lichtenberg, Berlin, Germany, <sup>4</sup>Children's Hospital, Clinical Center Chemnitz, Chemnitz, Germany, <sup>5</sup>Heinrich-Heine-University Düsseldorf, Department of Pediatrics, Düsseldorf, Germany, <sup>6</sup>Medical University of Vienna, Department of Pediatric and Adolescent Medicine, Vienna, Austria, <sup>7</sup>Clinic for Children and Adolescent Medicine, Clinical Center Hanau, Hanau, Germany, <sup>8</sup>AKK Altonaer Kinderkrankenhaus, Department of Pediatric Endocrinology, Hamburg, Germany, <sup>9</sup>St. Marien Hospital Landshut, Department of Pediatrics, Landshut, Germany, <sup>10</sup>Auf der Bult, Diabetes-Center for Children and Adolescents, Hannover, Germany

**Introduction:** Registries allow the assessment of real-world use of tubeless insulin pumps.

**Objectives:** To study metabolic control, acute complications and number of hospitalization days in children and adolescents with type 1 diabetes (T1D) using tubeless insulin pumps (Omnipod/Omnipod DASH<sup>®</sup> Insulin Management Systems) in combination with continuous glucose monitoring systems (pump+CGMs, without constant communication). Multiple daily injection therapy with CGMs (MDI + CGMs) was used as the control group.

**Methods:** Children and adolescents <18 years of age (diabetes duration ≥1 year), registered in DPV as of 2015 were included. Propensity score was used to match individuals with pump+CGMs for at least 3 months to individuals with MDI + CGMs with sex, age at T1D onset, current age, and migratory background as covariates. HbA1c, time in range (TIR 70–180 mg/dl; 3.9–10.0 mmol/L), event rates of acute complications (DKA and severe hypoglycemia) and number of hospitalization days in the most recent treatment year were investigated in linear, fractional and negative binomial regression models.

**Results:** A 2172 individuals using pump+CGMs were identified and matched one-to-one to MDI + CGMs controls. In the matched cohort, HbA1c was significantly lower in the pump+CGMs group (7.6% [95% CI: 7.5–7.6]) compared to MDI + CGMs (7.8% [7.7–7.8], p < 0.001). Pump+CGMs was associated with percentage of TIR of 53% (49–57) versus 49% (45–52), p = 0.169, a lower rate of DKA (0.1 per 100 patient years (PY, 0.1–0.5) versus 0.6 per 100 PY (0.3–1.2), p = 0.038) and a lower number of hospitalization days (9.2 days (8.0–10.5) vs. 11.1 (9.5–12.9), p = 0.069). Event rates of severe hypoglycaemia were similar between the matched pairs (4.4 events per 100 PY (3.1–6.3) vs 6.4 events per 100 PY (4.7–9.0), p = 0.114).

**Conclusions:** Real-world data from the multicenter DPV registry shows that tubeless pump therapy in association with CGMs might result in beneficial effects on metabolic control and a reduced number of hospitalization days in comparison to MDI + CGMs.

#### P116 | Insulin infusion pump experience in a case with Mulvihill Smith syndrome with diabetes due to progeria and lipodystrophy

A. Jalilova<sup>1</sup>, A. Ata<sup>1</sup>, T. Atik<sup>2</sup>, F. Özkinay<sup>2</sup>, S. Özen<sup>1</sup>, Ş. Darcan<sup>1</sup>, D. Gökşen<sup>1</sup>

<sup>1</sup>Ege University Faculty of Medicine, Department of Pediatric Endocrinology, Bornova, Turkey, <sup>2</sup>Ege University Faculty of Medicine, Department of Pediatric Genetics, Bornova, Turkey

**Introduction:** Mulvihill-Smith syndrome (MSS) is a genetic disease characterized by severe growth failure, progeria, multiple pigmented nevus, cataract, and diabetes.

**Objectives:** Insulin pump therapy(CSII) experience is presented in a patient whose clinical findings were compatible with MVS and whose lipodystrophy-related diabetes was not controlled by metformin and multiple- dose insulin therapy (MDI).

**Methods:** The patient was referred for glucose regulation before cataract surgery.

**Results:** She was born at 28 weeks, 1850 g and was diagnosed with diabetes at the age of 10 years, and MDI and metformin treatment was started. Later hyperlipidemia, hepatosteatosis, and sensorineural hearing loss occurred respectively. Her weight was 10.5 kg(−18 SDS), height 115 cm(−8.18 SDS), and body mass index: 7.94 kg/m<sup>2</sup>(−26.4 SDS).She had a senile face, high-arched palate, hypoplastic ala nazis and ear lobes, multiple pigmented nevi, hypodontia, generalized lack of subcutaneous fat tissue, clinodactyly, high pitched-voice. Superficial veins were prominent on forehead.HbA1C was 13%, C-peptide: 0.911 mcg/L, concurrent venous blood glucose: 262 mg/dl; diabetes-related autoantibodies were negative, total cholesterol 167 mg/dl, HDL 40 mg/dl, LDL 101 mg/dl, triglyceride 132 mg/dl, ALT 32 U/L, leptin 0.16 ng/ml in her laboratory examination. Hepatosteatosis was detected in ultrasound. In the follow-up although she used 1.5 U/kg/day insulin mean blood glucose values were 300–350 mg/dl. Enteral nutritional support was started due to severe malnutrition. Subcutaneous insulin infusion pump therapy was initiated due to pain and absorption problems of high volume insulin injection with MDI. During the 8-month follow-up she gained 9kilograms of body weight (−11.6SDS), mean glucose concentration decreased to 148 ± 35 mg/dl with 2.5 U/kg/day insulin, and HbA1C decreased to 7.2%.

**Conclusions:** In diabetic patients with severe insulin resistance such as progeria and lipodystrophy, the use of insulin pump therapy may be the most appropriate option in achieving blood glucose targets.

#### P117 | Effects of alternate insulin pump settings in patients with type 1 diabetes during Ramadan: A randomized pilot study

G. AlGhatam<sup>1,2</sup>, D. O'Keeffe<sup>2,3</sup>, H. Taha<sup>1</sup>

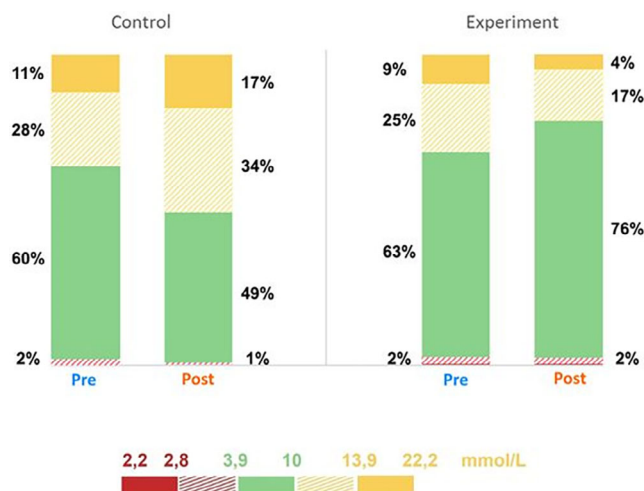
<sup>1</sup>Salmaniya Medical Complex, Department of Medicine - Division of Diabetes and Endocrinology, Salmaniya, Bahrain, <sup>2</sup>National University of Ireland, Department of Medicine, Galway, Ireland, <sup>3</sup>University Hospital Galway, Department of Endocrine, Galway, Ireland

**Introduction:** People with type 1 diabetes (T1DM) are considered a high-risk population for Ramadan Fasting. Various studies have evaluated the safety and efficacy of using insulin pumps (IPs) during Ramadan and demonstrated favorable outcomes in reducing the risk of hypoglycemia and hyperglycemia. However, there is no consensus on the recommendations for basal insulin adjustments and the utilization of technical features of IPs to improve glycemic control.

**Objectives:** To investigate the effects of different insulin pump settings on time in range (TIR) in patients withT1DM during Ramadan.

**Methods:** A randomized pilot study was conducted in Salmaniya Medical Complex, 30 patients who are classified to have low to moderate risk for fasting were assigned to either a control group to traditional treatment guidelines or to an intervention group to use temporary basal rate (TBR) and extended bolus (EB) features along with the basal insulin modifications. TIR was measured by continuous glucose monitoring (CGM).**Results:** The percentage of time spent within the target (70–180 mg/dl) increased significantly in the intervention group from 63.0% ± 10.7% at baseline to 76% ± 16.2% at the end of Ramadan (P < 0.001). Whereas, The percentage of time spent in hyperglycemic level 1 (>180 mg/dl) and level 2 (>250 mg/dl) reduced significantly (P < 0.001). However, no significant difference was observed in the percentage of time spent in the hypoglycemic ranges.

**Conclusions:** The impact of EB delivery on glycemic control has been reported in several studies to prevent prolonged post-prandial hyperglycemia resulting from the consumption of meals high in fat and



protein. Other Findings suggest that patients may likely benefit from the use of TBRs to achieve a higher TIR during the day. Our study points out that incorporating existing practice guidelines with technological approaches may enhance glycemic control during Ramadan in patients with T1DM treated with IPs.

#### P118 | Continuous glucose monitoring in the management of transient neonatal diabetes mellitus

T. Chisnoiu<sup>1</sup>, C.M. Mihai<sup>1</sup>

<sup>1</sup>Ovidius University Constanta, Faculty of Medicine, Pediatric, Constanta, Romania

**Introduction:** Neonatal diabetes mellitus (NDM), also known as monogenetic diabetes of infancy, is a rare disorder typically found in neonates or children up to 6 months of age.

**Objectives:** Continuous Glucose monitoring (CGM) is used very often in the daily life of patients with diabetes and we want to show the importance of CGM due to the high risk of hypoglycemia following insulin treatment.

**Methods:** We describe a case of a preterm girl, small for gestational age born at 37 weeks of gestation with a birth weight of 1480 g with transient neonatal diabetes mellitus who presented from the first day of life hyperglycemia (275 mg/dl) due to anomalies of the 6q24 locus.

**Results:** The etiology of this neonate's hyperglycemia was a uniparental disomy at the 6q24 locus (due to paternal disomy). From the first day of life the neonate presented blood glucose level 275 mg/dl, that increased to 370 mg/dl.

The insulin infusion was started continuous with a rithm between 0.1 and 0.3 ml/h (0.01–0.03 units/kg/h) for the first days and constantly 0.1 ml/h after that (0.43 units/24 h).

Because her increased risk for hipoglycemia and glycemc variability, and considering the fact that after 13 days of life the breastfeeding was started, a continuous glucose monitor was used after that.

After 2 months, patient was transitioned from Insulin drip to continuous and customized doses of rapid acting Insulin (Lispro) through an Insulin pump (with a rithm of 0.05 units/h and blood glucose levels ranged from 80 to 180 mg/d).

The patient was discharged home after 2 and a half months with a good general condition, with a body weight of 4080 g.

At home, the Lispro Insulin dose was reduced gradually, and was subsequently stopped 1 week following her discharge.

Currently, the baby is 7 months old and has not been administered Insulin since then.

**Conclusions:** CGM brought a benefit in this case because we were able to avoid the hypoglycemia and act by decreasing the rate of insulin administration.

#### P119 | Ambulatory glucose profiles of children and young people with T1DM: Identification of factors affecting glycemc control

A. Tandon<sup>1</sup>, Z. Ali<sup>1</sup>, V. Bhatia<sup>1</sup>, P. Dabadghao<sup>1</sup>, S. Sudhanshu<sup>1</sup>

<sup>1</sup>Sanjay Gandhi Post Graduate Institute of Medical Sciences, Endocrinology, Lucknow, India

**Introduction:** Continuous glucose monitoring (CGM) provides information about glycemc control, beyond that provided by HbA1c and SMBG, including short-term glycemc variability, hypoglycemc and hyperglycemc events.

**Objectives:** To describe CGM derived glycemc variables, study their association with HbA1c and socio-economic (SE) factors in young Indian people with T1DM.

**Methods:** A 83 patients (age 15.7 ± 4.9 years, duration of diabetes 6 years), using MDI wore the FreeStyle Libre Pro sensor for a median of 14 days. The association of time in range (TIR), time below range (TBR), time above range (TAR), glycemc variability (%CV) with clinical, SE and demographic parameters was assessed using multivariable regression models.

**Results:** Median (IQR) TIR was 42 (35–53) %, TBR 14 (7–21) % and TAR 40 (21–57) %. Percent CV was 48.7% ± 10.2% and 92% had high CV (>36%). Hypoglycemc episodes (sensor glucose <70 mg/dl) occurred on 36% of nights. Mean HbA1c was 8.0% ± 1.5%. Older age at onset of diabetes was predictive of a higher TIR and lower TAR, but also a higher TBR. Use of NPH as basal insulin was associated with a higher TBR and %CV. Females had a higher TBR as compared to males. The glycemc variables were not associated with age, urban or rural residence, education of mother, socioeconomic (modified Kuppusswamy) score, or whether adjusting bolus insulin according to food consumed. HbA1c showed a negative correlation with TIR ( $r = -0.418$ ), TBR ( $r = -0.498$ ), %CV ( $r = -0.234$ ) and a positive correlation with TAR ( $r = 0.593$ ), mean glucose ( $r = 0.607$ ). TIR showed a strong negative correlation with TAR ( $r = -0.817$ ) and a weak positive correlation with TBR ( $r = 0.349$ ). Acceptability of CGMS was high.

**Conclusions:** These data demonstrate wide gaps between the recommended versus real world glycemc variables. The recognition that majority of time is spent either below or above range and their known ill-effects, highlight the need to implement interventions for better glycemc control including easy access to advanced technology.

#### P120 | Improving diabetes control in Egyptian children after the establishment of insulin pump therapy: Analysis of data from the SWEET Registry

E.M. Sherif<sup>1</sup>, N. Elbarbary<sup>1</sup>, G.S. Abdelwahab<sup>1</sup>, R.A. Thabet<sup>1</sup>

<sup>1</sup>Ain Shams University, Faculty of Medicine, Department of Pediatrics, Diabetes Unit, Cairo, Egypt



**Introduction:** Continuous subcutaneous insulin infusion pump (CSII) therapy can be used safely and effectively in youth with type 1 diabetes (T1D) to assist with achieving targeted glycemic control.

**Objectives:** To evaluate the outcome of diabetes control for patients on CSII during a period of 6 months in youth with T1D.

**Methods:** This study included 385 T1D children participating in SWEET registry. Data were collected for 6 months until April 2022 and were evaluated for glycemic control and presence of acute complications using before and after initiation of CSII. Structured program was set for commencing this pump clinic and its specialized diabetes medical team with various aspects of CSII initiation program including pump start planning, education, training and aspects of follow-up and after-care.

**Results:** Overall, 5.2% of the registered T1D children in our Pediatrics and Adolescents Diabetology Unit (PADU) during the study period are treated with CSII with a mean age of  $10.65 \pm 3.88$  years, 55% female and a median duration of diabetes of 3(2–4) years; 90% of them having diabetes duration less than 5 years. Patients on insulin pump showed significant improvement of their HbA1c (9.07 vs. 7.3%,  $p < 0.0001$ ) and they performed more blood glucose monitoring (2.7 vs. 5.6 times/day,  $p < 0.000$ ). Frequency of severe hypoglycemia dropped significantly after pump initiation ( $P = 0.02$ ). However, the reported diabetic ketoacidosis events in the prior 6 months were comparable between two periods ( $p = 0.49$ ). Moreover, decrease in cholesterol level was also reported (173 vs 139.8 mg/dl,  $p = 0.006$ ).

**Conclusions:** Patients' registry system is an important tool for proper evaluation and improvement of diabetes care. This pilot study reports that the use of technology is the optimum way for improvement of patients' glycemic control without increasing the frequency of severe hypoglycemia. Lessons learned that proper diabetes care team play an integral role in achieving success in establishment of CSII usage in a limited resource country like our center.

#### P121 | The diagnostic and therapeutic value of continuous glucose monitoring in children and adolescents with type 1 diabetes

N. Bouichrat<sup>1</sup>, N. Messaoudi<sup>1</sup>, A. Tahri<sup>1</sup>, I. Rami<sup>1</sup>, S. Rouf<sup>2</sup>, P. Latrech<sup>2</sup>

<sup>1</sup>Mohammed VI University Hospital Oujda, Department of Endocrinology-Diabetology and Nutrition, Oujda, Morocco, <sup>2</sup>Mohammed VI University Hospital Oujda, Department of Endocrinology-Diabetology and Nutrition, Laboratory of Epidemiology and Clinical and Public Health Research, Faculty of Medicine and Pharmacy, Mohammed First University, Oujda, Morocco

**Introduction:** Type 1 diabetes represents a real public health problem whose incidence is continuously increasing. Its management must aim at maintaining an optimal glycemic control adapted to each patient (age, duration of diabetes and comorbidities). Recently, continuous

glucose monitoring (CGM) has become a real mean of diabetes management.

**Objectives:** The objective of this work was to study the diagnostic and therapeutic interest of CGM.

**Methods:** This is a retrospective descriptive study of 35 children and adolescents with type 1 diabetes treated with multi-injection regimen. All patients received a Medtronic iPro™2 CGM. Data collected were analyzed by SPSS 21 software.

**Results:** A 35 patients underwent CGM with an average duration of 6 days. The mean age of our patients was  $11.6 \pm 6.6$  years, with a female predominance (62.8%). The mean duration of diabetes was  $4.1 \pm 3.6$  years. The basal bolus regimen was used in 68.6% of patients and the insulin pump in 17.1%. The initial HbA1c (before blood glucose monitoring) was  $8.9 \pm 2.6\%$ . Glycemic instability was the main indication in 88.6% of patients, which was objectified at CGM with standard deviations greater than 50% of the mean blood glucose in 77.1% of cases. The second indication was hypoglycemia in 57.1% of cases, with time spent in hypoglycemia  $>5\%$  ( $<70$  mg/dl) in 37.1% of patients. Immediately after sensor removal all patients received therapeutic adjustment. HbA1c 3 months after monitoring was  $7.3 \pm 1.5\%$ .

**Conclusions:** Last studies have shown the interest of CGM in the diagnosis of glycemic excursions and asymptomatic hypoglycemia, and they have endorsed its therapeutic interest in improving glycemic control and quality of life. Our results are consistent with the literature.

#### P122 | Safety and user experience with flash glucose monitoring system among very young children with type 1 diabetes

R. Al Khalifah<sup>1</sup>, J. Abulqasim<sup>1</sup>, F. Al-Otaibi<sup>1</sup>

<sup>1</sup>King Saud University, Pediatrics, Riyadh, Saudi Arabia

**Introduction:** Freestyle Libre 1 is FDA approved for children older than 4 years. It provides a way of non-invasive glucose monitoring without the need for finger pricking. Parents of very young children often use the device off-label.

**Objectives:** To assess the safety, parent-child experience of using the Freestyle Libre 1 system, impact on sleep, and glycemic control.

**Methods:** This was an ambidirectional cohort study. We recruited parents of type 1 diabetes very young children who were less than 5 years old when they started using Free style Libre 1 at King Saud University diabetes center. Parents filled a survey evaluating their experience using the system in addition, we retrieved children CGM metrics from the Libre view system.

**Results:** We included 30 children, mean age at starting the Freestyle Libre 1 was  $3.88 \pm 1.10$  years (range 1.46–5.4 years), and the mean sensor use  $2.3 \pm 1.3$  years. During sensor therapy, parents were able to sleep longer by 0.71 h ( $p$ -value 0.04), had earlier bedtime by 2.8 h ( $p$ -value 0.04), wake up less often at night to monitor glucose, and

were able to sleep in separate rooms away of the child. During sensor therapy, the time in range improved by 9.9%, and time above range was reduced by 8.8%, HbA1c reduced by 1.56%. The most common reason for using the sensor was to avoid finger pricking and ease of use. The most common side effects were scarring, skin allergy, itching, skin discoloration, and local bleeding. Only 3 patients discontinued the sensor therapy for various reasons.

**Conclusions:** Very young children with type 1 diabetes using Freestyle Libre 1 have a similar safety profile to older children. Its use was associated with improved parent and child sleep quality, as well as metabolic control.

### P123 | Use of real time continuous glucose monitoring to assess daily glucose profiles in a girl diagnosed with a novel variant HNF1A gene HNF1A-MODY (MODY 3)

V. Bisbinas<sup>1</sup>, T. Arvanitaki<sup>2</sup>, Z. Karabouta<sup>3</sup>

<sup>1</sup>Gloucestershire Royal Hospital, Emergency Department, Gloucester, United Kingdom, <sup>2</sup>Chania General Hospital 'St George', Pediatric Department, Chania, Greece, <sup>3</sup>AHEPA University General Hospital, 2nd Pediatric Department, Thessaloniki, Greece

**Introduction:** HNF1A-MODY manifests after the 10th year of life.

**Objectives:** We describe the use of real time continuous glucose monitoring (RT-CGM) in a 8.5 year old girl with MODY3 to assess daily glucose profiles.

**Methods:** The patient presented with abdominal pain, nausea, hyperglycaemia, and glycosuria. Blood glucose(BG) levels and urine revert to normal with intravenous N/S 0.9% administration; no insulin given. Clinical examination was unremarkable, growth on the 50th percentile. She was one of dizygotic twins, born at 36 weeks gestation; parents unrelated. Her 51y old father had been diagnosed with hypertension and presumed type 2 diabetes (T2D) since age 40; on antihypertensives, oral antidiabetics, and insulin since. The patient had been discharged home on Self-Monitoring of Blood Glucose(SMBG) and dietary advice. Within the next 3 years her HbA1c was progressively worsening, reported SMBG was within normal range. RT-CGM was used to assess her glucose profile and assess need for treatment initiation.

**Results:** At presentation serum blood glucose 288 mg/dl (16 mmol/L), glucosuria(+++), no ketosis, abnormal oral glucose tolerance test(OGTT, BG 0' 84 mg/dl (4.6 mmol/L), 120' 230 mg/dl (12.7 mmol/L, HbA1c 6%) were noted; autoantibody screening for type 1 Diabetes(T1D) was negative. Genetic testing revealed heterozygosity for the HNF1A gene in a novel variant c.454>C (p.T152P), exon 2 of HNF1A gene in the patient and her father. Latest HbA1c was 6.5%.The CGM report after 2 months with 93% sensor usage, revealed Time In Range(TIR) for BGs 72% for 70–180 mg/dl, 48% for 70–140 mg/dl, 22% > 180 mg/dl, 3% >250 mg/dl. Interestingly there were hypoglycemic periods, 7% for <70 mg/dl, 3% for <54 mg/dl.

Average BG was 140 mg/dl (7.7 mmol/L),estimated HbA1c 6.5% (47.6 mmol/mol),coefficient of variation 39%.

**Conclusions:** Hyperglycemia in MODY3 is progressive and deteriorating with risks of micro- and macrovascular complications. Rt-CGM can be used to monitor daily glucose profiles, assess need for treatment initiation, and improve metabolic control and quality of life.

### P124 | Use of bolus guide in the pump and eating breakfast is associated with lower HbA1c

E. Jelleryd<sup>1,2</sup>, C. Smart<sup>3</sup>, A. Lindholm-Olinder<sup>1</sup>

<sup>1</sup>Karolinska Institute, Dep. of Clinical Sciences and Education, Södersjukhuset, Stockholm, Sweden., Stockholm, Sweden, <sup>2</sup>Karolinska Universitetssjukhuset, Women's Health and Allied Health Professionals Theme, Medical Unit Clinical Nutrition, Stockholm, Sweden, <sup>3</sup>Hunter Medical Research Institute, School of Health Sciences, University of Newcastle, NSW, Australia

**Introduction:** Insulin pump technology allows the use of a bolus guide for assistance in determining insulin dose to meals by entering grams of carbohydrates (CHO).

**Objectives:** The aim was to examine how children and adolescents on insulin pump therapy use the bolus guide and if a greater use impacted glycemic control. The secondary aim was to examine if average CHO (grams) entered in the pump and meal frequency were associated with glycemic control.

**Methods:** A study specific survey was constructed to ask about use of the bolus guide and meals normally consumed. This was given to patients during a routine clinic visit. A 61 children (5–18 years) with a mean HbA1c of 53 mmol/mol (+/– 9,2) answered the questionnaire. Data from the insulin pump and CGM, including CHO intake and number of boluses/days were downloaded from Diasend and Carelink.

**Results:** Use of the bolus guide for “all meals” compared to using it for “most meals” was associated with a lower HbA1c (51 vs. 57 mmol/mol, p = 0.028). Eating breakfast was associated with a lower HbA1c (52 mmol/mol) compared to not eating breakfast (63 mmol/mol) (p = 0.002). Younger children (5–12 years) were more likely to use the bolus guide for all meals (p = 0.033) and had better HbA1c (49 vs. 57 mmol/mol, p < 0.001). Younger children had more bolus doses/day (6 vs. 4, p = 0.029), although there was no difference in the mean number of consumed meals/day (4.5) across age groups. No significant associations were found between CHO intake and number of meals/day and HbA1c.

**Conclusions:** Using the bolus guide for all meals is important in achieving improved glycemic control. Even a difference in use from “all” to “most” meals may impact blood glucose. Continuous education and age adjusted methods to simplify carb counting are important in helping adolescents use bolus guides.

Breakfast is also a key factor in achieving lower HbA1c.

## POSTER TOUR 14—DIABETES EDUCATION

**P125 | A quasi experimental study to understand the effect of educational intervention in primary care givers of children diagnosed with type 1 diabetes**M. Maheshwari<sup>1</sup>, S. Dokania<sup>1</sup>, S. Malik<sup>1</sup>, A. Joshi<sup>2</sup><sup>1</sup>All India Institute of Medical Sciences, Pediatrics, Bhopal, India, <sup>2</sup>All India Institute of Medical Sciences, Bhopal, India

**Introduction:** Diabetes management in children requires reasonable understanding about disease, consistent care, & active participation by primary care giver. We evaluated the effect of structured self-management diabetes educational intervention in terms of translation of education into practices & better outcome.

**Objectives:** - Assess the knowledge, attitude, & practice of type 1 diabetes among primary care giver.

- Implement a structured educational module in a synchronous manner and explore the effect on Knowledge retaining & Translation into practices with Glycemic control.

**Methods:** A single center, longitudinal before and after educational interventional study. The participants were interviewed at the beginning of the study (Test 1a:Pre intervention) and 3 months later (Test 1b: Post-intervention) by using structured, self-designed, expert validated, scored questionnaire. Simultaneous HbA1C recording was done. Educational sessions were conducted at 0,1 and 2 months in between the two time points. Comparative analysis were noted to explore the effect of intervention by using SPSS.

**Results:** Total 22 participants were enrolled. Test 1a showed median Knowledge, Attitude & Practice score as 24.5 with IQR(18.5–28.7), 18 with IQR(17–18.7) and 16 with IQR(15–18) respectively. Good knowledge about disease & insulin was observed in 50% & 68% participants respectively but knowledge deficiency (<50%) was seen in domains of

diet, monitoring, hypoglycemia & diabetic ketoacidosis. After educational intervention, Test 1b showed median Knowledge, Attitude & Practice score as 47 with IQR (45–48.75), 20 with IQR(19–20) and 19 with IQR(18.25–19.75) respectively. Paired t-test from the two study time points showed that the participants had a significantly higher level of knowledge, attitude, and practice after intervention.

**Conclusions:** Implementation of structured diabetic educational module with repeated sessions can fill knowledge gaps, improve risk perception of the disease and result in better metabolic control.

**P126 | Assessment of diabetes specific knowledge among children with type 1 diabetes mellitus and their primary care givers**R. Maheshwari<sup>1</sup>, P. Singh<sup>1</sup>, A. Seth<sup>1</sup>, R. Malhotra<sup>2</sup><sup>1</sup>Lady Hardinge Medical College, Pediatrics, Delhi, India, <sup>2</sup>All India Institute Of Medical Sciences, Community Medicine, Delhi, India

**Introduction:** Diabetes self-management skill is an important determinant of glycemic control and well-being in children with type 1 diabetes mellitus (T1DM).

**Objectives:** Assessment of the diabetes specific knowledge among children with T1DM and their primary caregiver using validated diabetes knowledge test (DKT) and to determine the factors associated with DKT score.

**Methods:** Cross-sectional study was conducted in a tertiary care teaching hospital, New Delhi (India) in 2019–21. Children 5–18 years of age with T1DM under regular follow up (at least 2 years) and their primary care giver were evaluated for diabetes specific knowledge using a using a validated DKT questionnaire. DKT score was assessed in basic and advanced skills of diabetes management. The association of DKT scores with HbA1c levels, sociodemographic factors, duration of diabetes and rate of complications was studied.

Figure 1: DKT scores in study participants

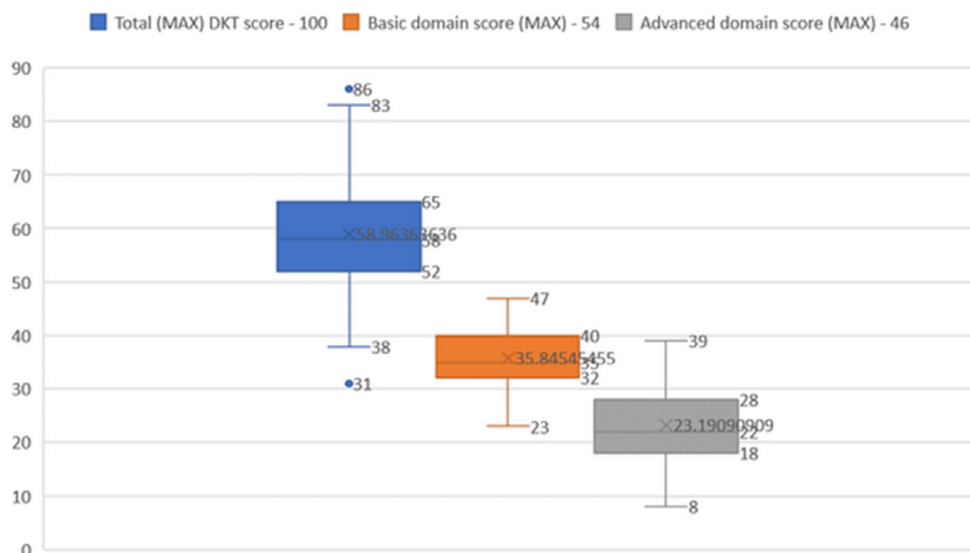


Table 1: Association of the clinical and sociodemographic factors of participants in the study with DKT score > 50%

Parameter	Odds ratio [confidence interval]	P value
Age (10–18 years)	1.18[0.41–3.40]	0.756
Duration of diabetes (>5 years)	1.15[0.45–2.94]	0.769
Urban setting	22.67[4.38–117.30]	<0.001 <sup>a</sup>
Socioeconomic status (upper middle and lower middle)	4.01[1.50–10.71]	0.006 <sup>a</sup>
Maternal education (Graduates and above)	9.90[1.27–77.28]	0.029 <sup>a</sup>
HbA1c (≤9%)	11.78[2.60–53.34]	<0.001 <sup>a</sup>
Annual per capita income (Rs > 50,000)	6.98[1.93–25.25]	0.003 <sup>a</sup>

<sup>a</sup> P value <0.05 -significant.

**Results:** 110 children with mean (SD) age 12.2 (3.3) years and duration of T1DM 5.3 (2.7) years were assessed. The mean (SD) composite DKT score (%) was 58.0 (11.1) while in basic and advanced domain were 66.4 (9.5) and 50.4 (1.5) respectively (figure 1). The DKT score had a negative correlation with HbA1c levels ( $r = -0.595, p < 0.001$ ). Maternal education (graduate and above), socio-economic strata (upper middle and above), annual per capita income (>Rs 50,000/700 USD), urban setting and HbA1c <9% were significantly associated with higher odds of DKT score > 50% (table1). HbA1c < 9% and urban setting were reported significant predictors of the DKT score on multivariate logistic regression analysis ( $p < 0.001$ ). Maternal education had significant effect on the relationship between HbA1c levels and DKT scores ( $p = 0.036$ ).

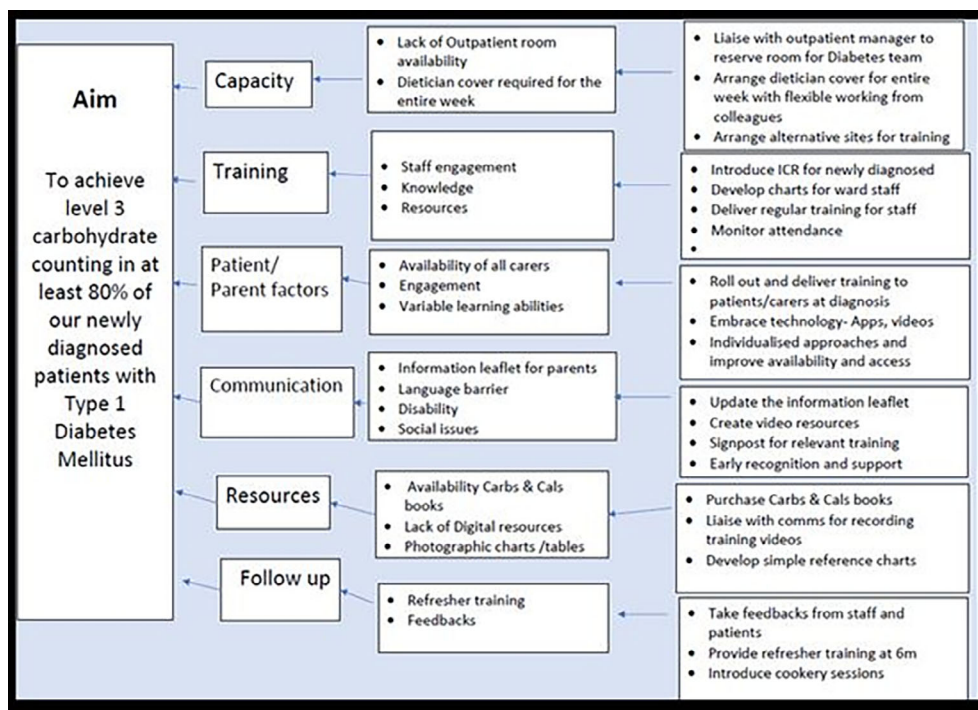
**Conclusions:** DKT scores were higher in children from urban setting and in those with HbA1c <9%. Higher maternal education had

significant impact in achieving high DKT score and improved glycemic control. Assessment of diabetes specific knowledge using DKT can identify individual challenges in specific (basic or advanced) domains related to the diabetes self-management skills, which can be addressed using family centered targeted approach.

**P127 | Improving the pathway for level 3 carbohydrate counting at diagnosis for children and young people (CYP) with type 1 diabetes mellitus**

S. Hulikere<sup>1</sup>, A. Gopalakrishna<sup>1</sup>, N. Frost<sup>1</sup>, E. Armstrong<sup>1</sup>, C. Brookes<sup>1</sup>, E. Holcroft<sup>1</sup>, L. Unsworth<sup>1</sup>

<sup>1</sup>Warrington and Halton Teaching Hospitals NHS Foundation Trust, Pediatrics, Warrington, United Kingdom





**Introduction:** We know that carbohydrate counting for dose adjusting insulin helps to improve the glycemic control and reducing HbA1c. Teaching carbohydrate counting is an important part of providing tools to children and young people with Type 1 Diabetes.

**Objectives:** To achieve level 3 carbohydrate counting in at least 80% of our newly diagnosed patients with Type 1 Diabetes Mellitus.

**Methods:** Warrington and Halton NHS Teaching Hospital Foundation Trust (WHHFT) participated in the 13th QI to improve level 3 carbohydrate counting within two weeks of diagnosis. QI period was during May 2021–December 2021. The Pediatric Diabetes Team included two Pediatric Diabetes consultants, three Pediatric Diabetes Specialist Nurses (PDSN) and two pediatric dieticians participated in this project. The RCPCH QI team delivered the comprehensive QI methodology training and provided ongoing support to the Pediatric MDT team. Every year approximately 20 newly diagnosed patients are referred to the MDT team. The patients were identified at admission and carbohydrate counting was commenced by lead dietician at the time of discharge or soon after discharge.

**Results:** There were 11 newly diagnosed patients during the QI project period between 1st of June 2021 to 31st December 2021. A 8 of them received carbohydrate counting training and were able to use ICR for the management of diabetes. A 73% of the newly diagnosed patients achieved carbohydrate counting which is a 23% increase from previous level of 50%. Reasons for not achieving Carbohydrate counting in 3 patients within the 2-week timeframe were due to parent and/or child having additional learning needs, parental reluctance to engage, isolation due to COVID-19 and lack of technology available.

**Conclusions:** Carbohydrate counting through RCPCH QI has helped the WHHFT team to achieve level 3 carbohydrate counting in 73% of the newly diagnosed with Type 1 Diabetes Mellitus. Participating in QI had positive impact of improving outcomes in CYP.

#### P128 | A study about the parental involvement for the transition from family management to self-care in childhood type 1 diabetes

A. Ogura<sup>1</sup>, Y. Hiratani<sup>1</sup>, T. Kawamura<sup>2</sup>, N. Nishikawa-Nakamura<sup>2</sup>, Y. Yuyama<sup>2</sup>, Y. Hotta<sup>3</sup>

<sup>1</sup>Osaka Metropolitan University Graduate School of Nursing, Osaka, Japan, <sup>2</sup>Osaka Metropolitan University Graduate School of Medicine, Department of Pediatrics, Osaka, Japan, <sup>3</sup>Kashiwara City Hospital, Pediatrics, Kashiwara, Japan

**Introduction:** Type 1 diabetes children have to get the knowledge and skills about their disease for acquiring self-care independently before adulthood. In this study, we focused on the parental involvement for the transition from family management to self-care of them.

**Objectives:** To clarify parental involvement of school-aged type 1 diabetic patients who are going to acquire self-care skills.

**Methods:** We conducted semi-structured interviews with the parents of school age or over children whose onset were below 9 of age, among outpatients of Hospital A. Interview data were analyzed qualitative inductive content analysis.

**Results:** There were 10 study participants, all of whom were mothers. As a result of the analysis, 6 categories, a total of 24 subcategories, were extracted. The 6 categories were: “Complementing diabetes management that is difficult for the child to carry out by themselves,” “Manage with the child,” “To promote diabetes management by the child under the supervision of parents,” “Collaborate with school staff to management diabetes in school,” “Establish a safe and secure environment for children,” and “Devise ways to encourage the child's independence”.

**Conclusions:** This study revealed that the parents were trying to shift diabetes management to self-care at the child's pace. In addition, parents worked to create an environment in which children can safely and reliably manage diabetes even when parents cannot be on their side. It is thought that the parental actions that respects the child's intentions and wishes will lead to the child taking the initiative in managing type 1 diabetes and living with diabetes. It is important for medical staff to understand the implications of parental involvement and supporting children with type 1 diabetes and their parents.

#### P129 | Insulin requirements in young children with type 1 diabetes after learning flexible insulin therapy from parents

G. Mounia<sup>1</sup>, T. Mahmoud<sup>2</sup>, B.-N. Karim<sup>2</sup>

<sup>1</sup>University Military Hospital, Medicine, Oran, Algeria, <sup>2</sup>University Hospital Center, Medicine, Oran, Algeria

**Introduction:** The recommendations for insulin requirements in type 1 diabetes are based on adults' studies without being adapted to young children.

**Objectives:** The aim of this study was to assess the initial insulin requirements in young children in different titration situations from the data of the flexible insulin therapy taught to parents.

**Methods:** Mono-centric and prospective study, flexible insulin therapy taught to mothers. Daily insulin requirements were recorded from treatment diaries. Carbohydrate-to-insulin ratio (CIR) was determined for each patient during the test meals. The needs to correct hyper- and hypoglycemia were expressed respectively for one unit of insulin and for 3 g of sugar.

**Results:** Forty nine children were included, 27 girls. A 3 to 12 years old ( $8.88 \pm 2.40$  years), duration of diabetes  $3.29 \pm 2.34$  years, weighing between 13 and 56 kg for a BMI of 63,  $66 \pm 26.11$  percentile. The daily insulin requirements determined 2875 times were  $0.97 \pm 0.18$  U/kg/24 h with 61.2% bolus and 38.8% basal. The CIR performed 55 times was  $1.25 \pm 0.55$ ,  $0.81 \pm 0.31$ ,  $0.87 \pm 0.87$  and  $0.73 \pm 0.26$  unit of insulin per 10 g of carbohydrate, respectively for breakfast, lunch, afternoon snack and dinner (CIR differed significantly between breakfast and the rest of the meals and between dinner vs afternoon snack). Insulin sensitivity, determined 55 times, showed that one unit of insulin lowered blood sugar by  $0.65 \pm 0.31$  g/L. Sensitivity to carbohydrate, determined 52 times, showed that 3 g of sugar increased blood sugar by  $0.19 \text{ g} \pm 0.13 \text{ g/L}$ . Considering body weight

thresholds of 10 in 10 kg, the mean insulin and sugar sensitivity figures varied toward less insulin and sugar sensitivity.

**Conclusions:** Our results are consistent with those of adults for 24-h insulin requirements and for CIR for each meal of the day. Insulin and carbohydrate sensitivities to correct glycemic drifts were specified according to body weight.

**P130 | The role of certified diabetes care and education specialists in the development of the 4 T program**

J. Leverenz<sup>1</sup>, B. Leverenz<sup>2</sup>, P. Sagan<sup>1</sup>, A. Martinez-Singh<sup>1</sup>, B. Conrad<sup>1</sup>, A. Chmielewski<sup>1</sup>, J. Senaldi<sup>1</sup>, D. Scheinker<sup>3</sup>, P. Prahalad<sup>3</sup>, D. Maahs<sup>3</sup>  
<sup>1</sup>Stanford Childrens, Pediatric Dept. of Endocrinology, Stanford, United States, <sup>2</sup>Stanford University, Diabetes Research Center, Stanford, United States, <sup>3</sup>Stanford University, Stanford, United States

**Introduction:**

**Objectives:** To describe the role of Certified Diabetes Care and Education Specialists (CDCES) in the development and implementation of the 4 T Program (Teamwork, Targets, Technology and Tight control) at Stanford Children's Diabetes Clinic.

**Methods:** Youth with newly diagnosed Type 1 diabetes (T1D) were started on a continuous glucose monitor (CGM) within the first month of diagnosis as part of the 4 T Program. A subset received weekly CGM data review by a CDCES and messages with education and dose changes were sent via the electronic medical record. Plan, Do, Study, Act (PDSA) cycles were utilized to determine the best workflow for the team and for families to develop a scalable process for CGM review.

**Results:** During the 4 T pilot study, a total of 135 youth were started on CGM. The team developed a workflow for CGM initiation, follow up, and education as well as handouts for patients.

The CDCES team reviewed the CGM tracings of a subset of participants (n = 89) weekly in their first year and sent messages to each family each week if changes to insulin dosing were needed. The CDCES team helped co-develop a population health dashboard to facilitate CGM data review. CDCES input helped engineering colleagues define a workflow (Figure) that allowed the growth of this program without increasing the number of CDCES on the team.

**Conclusions:** CDCES teams should play an essential role in program development for the care of youth with Type 1 diabetes.

**P131 | Reasons for not practicing carbohydrate counting among some Omani families taking care of children live with type 1 diabetes mellitus**

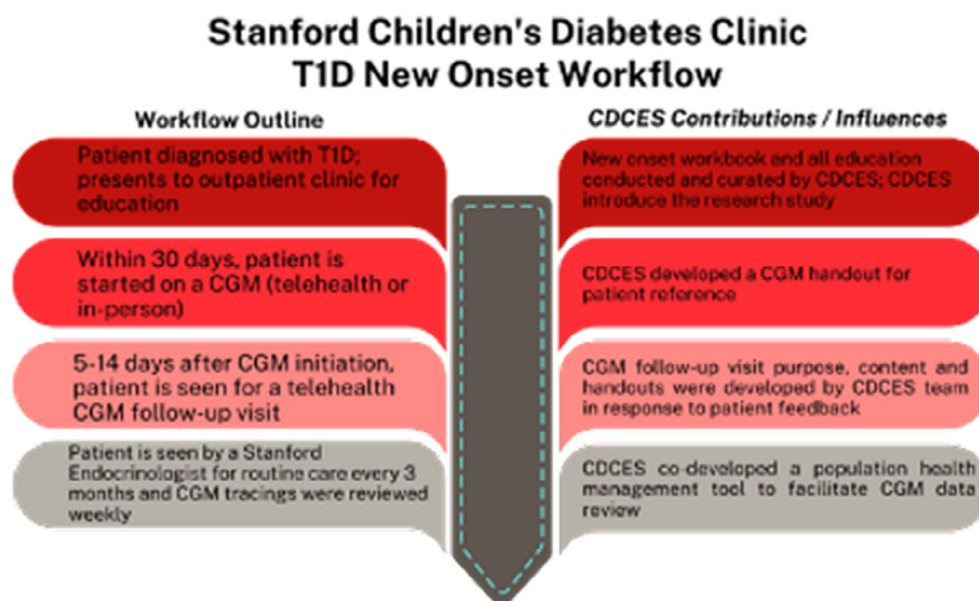
H. Alsaffar<sup>1</sup>, S. Albaloushi<sup>2</sup>

<sup>1</sup>Sultan Qaboos University Hospital, Child Health Department, Pediatric Endocrine and Diabetes Unit, Muscat, Oman, <sup>2</sup>Sultan Qaboos University Hospital, Department of Nutrition, Muscat, Oman

**Introduction:** Carbohydrate counting (CC) became fundamental in the management of T1DM. In Pediatric Diabetes Unit of Sultan Qaboos University Hospital, our patients do have an access to a dietitian as soon as they get diagnosed and on demand thereafter. However, their adherence to the CC despite being educated is still poor which results in a poor glycemic control.

**Objectives:** To study the reasons of not practicing CC despite being educated.

**Methods:** An Online questionnaire was passed to the patients live with T1DM and their families. Data collected over 1 year (1/1 to 31/12/2021), from families whom agreed to participate. Descriptive analysis was used.



**Figure 1.** An outline of the patient workflow for T1D new onset patients at Stanford Children's Diabetes Clinic with the relative influence of the CDCES on the workflow.

**Results:** 33 families responded. 66.7% of their children have diabetes mellitus for less than a year. 66.7% of the families declared that carbohydrates were explained to them either at time of diagnosis or within 2 weeks of the diagnosis. A 5 patients had no chance to learn about the CC. Average of self-rating about adherence to plans of CC was only 2.4 on a 0–5 scale. Majority (55%) attributed the poor adherence to difficulties in understanding how to do the counting, whereas 33% thought about unavailability of specialized book for children live with T1DM in Arabic language having different Omani meals detailing the ingredients. Others 30% considered lack of free smart phone's application is another reason. Other factors included: Hungry child that does not give the guardian a time to CC (26.3%), 2) working mother (10%), 3) thinking the CC is wasting of time (6.7%). 74.2% of this cohort do not use the food scale to weigh the food, rather their counting is based on estimation. A 70% acknowledged that CC associates with a better glycemic control. 66.7% of families depend on the mother to do the CC.

**Conclusions:** Carbohydrate counting is crucial in the management of T1DM. Having an Arabic book for carbohydrate counting as well as a phone application are desirable to encourage patients to have a better practice.

#### P132 | Newly diagnosed diabetes education evaluation using hybrid teaching

A. Landry<sup>1</sup>

<sup>1</sup>Oak Valley Health Markham, Pediatric Diabetes, Markham, Canada

**Introduction:** Pandemic required change to education delivery at diagnosis. New patients diagnosed between March 2020 and December 2020 received a new hybrid model of teaching at diagnosis.

**Objectives:** The primary objective of this quality improvement project was to use knowledge checklists to evaluate patient/family understanding of essential topics. Comparing in person education versus hybrid virtual model.

**Methods:** This quality improvement project had 2 components:

(1) Data from the center's SWEET database was used to assess the hybrid education model. Variables included HbA1c at diagnosis, HbA1c 3–6 months post diagnosis, DKA and severe hypoglycemia.

(2) An online screening tool to identify knowledge gaps following initial education. This screening tool was delivered via email using REDcap approximately 6 months after initial diagnosis. The survey included questions about basic diabetes 'survival' skills, carbohydrate counting and mental health themes. Questionnaires were sent to all newly diagnosed patients in 2020 as well as a cohort pre pandemic. A total of 30 patients were diagnosed during the early pandemic period and received the hybrid teaching model. The response rate from the questionnaires was 38%.

**Results:** Using SWEET data clinical outcomes were compared. Three key knowledge gap areas were identified. Low dose glucagon, illness management, and medical ID The hybrid model was adapted to ensure that additional material and handouts were provided to families

identified as knowledge gaps. We implemented follow-up instructional videos for families to augment virtual teaching sessions. We now administer this skills checklist to this cohort of patients on an annual basis, and expanded the initiative more broadly to include our entire clinic population.

**Conclusions:** Comprehension of some topics are better understood with hands on or face to face delivery. Education knowledge checklists are a valuable tool to identify gaps in knowledge and direct HCP's on patient specific education needs.

#### P133 | Acceptability and feasibility of a virtual educational intervention targeted toward improving diabetes self-efficacy and glycemic control in adolescents and young adults with type 1 diabetes mellitus (T1D): A pilot study

S. Hanif<sup>1</sup>, J. Wood<sup>1</sup>, S. Macleish<sup>1</sup>, R. Hazen<sup>2</sup>

<sup>1</sup>Rainbow Babies and Children's Hospital/ University Hospitals, Cleveland Medical Center, Pediatric Endocrine, Cleveland, United States, <sup>2</sup>Rainbow Babies and Children's Hospital/ University Hospitals, Cleveland Medical Center, Developmental and Behavioral Pediatrics and Psychology, Cleveland, United States

**Introduction:** Despite technological advances, self-management is vital to T1D care.

**Objectives:** 1. To study the acceptability and feasibility of a virtual educational program in adolescents and adults aged 16–23 years with T1D and suboptimal glycemic control.

2. To study its impact on participants' Diabetes Self-Efficacy (Diabetes Empowerment Scale- DES), Diabetes Related Knowledge (self-designed test- DKT), Diabetes Related Distress (PAID or PAID-T) and glycemic control.

**Methods:** A 11 interactive virtual educational modules of 15–20 min duration were presented to the participants via telehealth services over 3 months. The modules were designed on the principles of self-efficacy. Participants completed feedback surveys designed on 5 point Likert based scale at completion of each module and entire program. Pre and post intervention DES, DKT and PAID or PAID-T surveys were performed. Participants received a \$10 gift card at completion of each module.

**Results:** Recruitment rate was 14%. A 10 candidates consented for participation, 5/10 completed the program, 3/10 partially completed it and 2/10 did not respond after consent. The primary reason for refusal to participate was the required time commitment. All modules received positive feedback from the participants (Mean Likert based score was >4.5 for all modules). Of participants who completed the program, 100% 'learnt something that I will incorporate into my self-care' and 'will recommend these sessions to other people'. Of participants who completed the program, 5/5 had improvement in DES score, 4/5 had improvement in DKT score, 2/5 had improvement in PAID or PAID-T score and 4/5 had improvement in HbA1C.

**Conclusions:** This program can serve as an important clinical tool for transitioning adolescents/adults with potential for improved T1D

management goals. Adaptations like improved connectivity, content tailored to individual needs, utilization of the program during clinic visits while retaining flexible scheduling may be important for successful clinical use of the program.

**POSTER TOUR 15—DIABETES IN DEVELOPING COUNTRIES & ACCESS TO CARE # 2**

**P134 | Development and pilot testing of a novel, low literacy scale for estimating correction dose of insulin for hyperglycemia among children with type 1 diabetes, in North India**

L. Rohilla<sup>1</sup>, D. Dayal<sup>1</sup>, B. Bharti<sup>1</sup>, P. Malhi<sup>1</sup>

<sup>1</sup>Post Graduate Institute of Medical Education and Research, Chandigarh, India, Pediatrics, Chandigarh, India

**Introduction:** ISPAD identifies low levels of literacy as a challenge to diabetes management in resource-limited settings. India has a low
























































literacy rate (74.04%, Census, 2011). In such settings, ISPAD recommends encouraging parents to learn the basics of reading and writing. Such parents often fail in estimating the right units as correction dose for hyperglycemia.

**Objectives:** To develop and test a scale (Table 1) to estimate the correction dose of insulin.

**Methods:** The scale requires identifying the glucometer readings digit-wise. Two versions were prepared for the Insulin sensitivity factor of 50 and 100 for children for 6–12 years and below 6 years, respectively. Using an experimental design for pilot testing, a total of 30 parents of children with Type 1 Diabetes, admitted to a tertiary care hospital in North India, were enrolled. The parents were given a set of 6 blood sugar (BG) values and were asked to estimate the correction units for their child. The next day, they were taught how to use the novel scale and were given another set of 6 BG values for estimating the correction units. A timer was set to assess if the scale could help in both accuracy and speed.

**Results:** The median age of participants was 37 years (Range: 23–48 years), half of them were males, 46.6% were educated below primary level, 53.3% belonged to rural settings, 46.6% were unemployed,

**Table 1: Correction dose scale (For children above 6 years; ISF 50)**

First digit on glucometer: Find it in Top row									
Second Digit on glucometer: Find it in column below first digit									
Correction dose is the digit written in the column just next to it.									
1		2		3		4		5	
									
				<i>(Check ketone)</i>		<i>(Check ketone)</i>		<i>(Check ketone)</i>	
Sugar	Insulin	Sugar	Insulin	Sugar	Insulin	Sugar	Insulin	Sugar	Insulin
0 	0	0 	1	0 	2	0 	4	0 	6
1 	0	1 	1	1 	3	1 	5	1 	7
2 	0	2 	1	2 	3	2 	5	2 	7
3 	0	3 	1	3 	3	3 	5	3 	7
4 	0	4 	1	4 	3	4 	5	4 	7
5 	0	5 	2	5 	4	5 	6	5 	8
6 	0	6 	2	6 	4	6 	6	6 	8
7 	0	7 	2	7 	4	7 	6	7 	8
8 	0	8 	2	8 	4	8 	6	8 	8
9 	0	9 	2	9 	4	9 	6	9 	8



and 40% were laborers on daily wages. The mean score of participants in calculating the correction dose of insulin for hyperglycemia, ( $p = 0.000$ ) and the mean time taken for the same ( $p = 0.000$ ), improved significantly with the use of the novel scale.

**Conclusions:** This novel, low literacy scale can be helpful for assisting illiterate caregivers in estimating the correction dose of insulin for hyperglycemia among children with Type 1 diabetes effectively.

### P135 | Therapeutic education day for children and adolescents with type 1 diabetes in a developing country Burkina Faso

W.P.A.H. Bagbila<sup>1</sup>, S. Yempabou<sup>1</sup>, C.G. Kyelem<sup>1</sup>, T.M. Yameogo<sup>1</sup>, S.M. Ouedraogo<sup>1</sup>, Y.J. Drabo<sup>2</sup>

<sup>1</sup>Universite Nazi BONI, Bobo-Dioulasso, Burkina Faso, <sup>2</sup>Universite Joseph Ki Zerbo, Ouagadougou, Burkina Faso

**Introduction:** Therapeutic education of diabetic patients aims to enable patients to be autonomous in the management of their chronic disease.

**Objectives:** The objective was to evaluate the feasibility of a therapeutic education day for type 1 diabetic patients in the city of Bobo-Dioulasso (Burkina Faso).

**Methods:** This was an observational study to evaluate a therapeutic education day for children and adolescents with type 1 diabetes in the internal medicine department of the Bobo-Dioulasso university hospital in Burkina Faso. For budgetary reasons, the number of participants was limited to 25 people. The items discussed were ketoacidosis, hypoglycemia, and the diet of type 1 diabetics. The therapeutic education day took place from 8 am to 4 pm, that is, a duration of 8 h. At the end of the day, the participants evaluated the therapeutic education day.

**Results:** In total, 22 patients participated in this education day, including 11 children (50.0%) aged between 11 and 18 years. The average age was  $15+/-7.8$  years. The sex ratio was 5/6. The mean age of onset of diabetes was  $12.4 +/-6.7$  years with extremes of 9 and 16 years. The mean duration of progression was  $36.4545 +/-20.8$  with a range of 6 to 71 months. The mean follow-up time was  $22.1818 +/-18.7$  with a range of 0 to 48 months. The preprandial blood glucose levels on the education day were 10.2 mmol/L, 10.5 mmol/L, and 18.9 mmol/L for morning, noon and evening blood glucose levels respectively.

Of the 22 participants, 18 gave an overall score of 5/5 for the TPE days and 4 gave a score of 4/5. The most positive points expressed were “the meeting went very well. We learned well and ate very well” and “I enjoyed what you did. God bless your activities”. The negative points expressed were: unsuitable setting. Topics and suggestions that participants would like to see considered next time: “Do these days regularly” and “Choose a more suitable setting”.

**Conclusions:** This therapeutic education day reminds us of its crucial importance in the management of diabetes mellitus.

### P136 | Perception of disease and experience of the parents of children and adolescents living with type 1 diabetes in Yaounde, Cameroon

S. Sap<sup>1,2</sup>, R. Mbono<sup>3</sup>, J. Sap<sup>4</sup>, C. Fouda<sup>5</sup>, A. Mendomo<sup>2</sup>, J. Tony<sup>1</sup>, P.O. Koki<sup>1</sup>

<sup>1</sup>Universite de Yaounde 1, Pediatrics, Yaounde, Cameroon, <sup>2</sup>Mother and Child Center of Chantal Biya Foundation, Paeditric Endocrinology and Diabetology, Yaounde, Cameroon, <sup>3</sup>University of Douala, Pediatrics, Douala, Cameroon, <sup>4</sup>Faculty of Evangelical Theology, Intercultural Sciences, Yaounde, Cameroon, <sup>5</sup>Yaounde Central Hospital, Psychiatry, Yaounde, Cameroon

**Introduction:** Diabetes is a the most prevalent endocrine disease in children. Long-term outcome of the disease is related to a number of factors including parents' implication. Parents are key actors of management of a child living with type I diabetes.

**Objectives:** The aim of the present study was to understand the perception and experiences parents in a low-income setting.

**Methods:** We did a qualitative study using socio-anthropologic approaches: interpretivism and the pedagogic ethnographic approach. A sample of 10 parents was included. Data were obtained through a focus group. The different themes were the parent's feelings at diagnosis, the affected child feeling from parent view and parents experiences of the disease.

**Results:** The major themes across parents experiences were pain, fear and guilty. Pain and fear was still persistent and was tightly related to idea of death. They recognized the major role of their community and environment on their thoughts and feelings. From the parent's point of view, their children were living in a deny of disease, considering it related to an external force.

**Conclusions:** Thoughts and feelings of parents of children living with diabetes are related with an idea of death. The role of their community in this important. Health care providers should thus address that issue to help diminished that worries and further studies are needed to identify the sources and type of information of the community on diabetes in children.

### P137 | Substance abuse and type 1 diabetes, a difficult issue to address in an 18 years old boy in Cameroon

R.C. Mbono Betoko<sup>1</sup>, C. Eyoum<sup>1</sup>, S. Sap<sup>2</sup>, A. Chetcha Bodieu<sup>3</sup>, C. Eposse<sup>1</sup>, I. Mekone<sup>2</sup>, P. Koki Ndombo<sup>2</sup>

<sup>1</sup>University of Douala, Faculty of Medicine and Pharmaceutical Sciences, Douala, Cameroon, <sup>2</sup>University of Yaounde I, Faculty of Medicine and Biomedical Sciences, Yaoundé, Cameroon, <sup>3</sup>Yaounde Central Hospital, National Center of Obesity, Yaoundé, Cameroon

**Introduction:** Adolescence is a period of physiological and psychological challenges. Youths with type 1 diabetes may have more challenges due to the management of this chronic disease. They are more likely to have behavioral and psychosocial issues than non-diabetic youths.

They try to be accepted by their peers. This may lead to behavioral problems such as substance abuse. This may affect glycemic control in addition to puberty challenges.

**Objectives:** We aimed to describe difficulties to obtain glycemic control in a context of substance abuse.

**Methods:** We present the case of a 18 years old adolescent who was admitted for ketoacidosis in a context of substance abuse.

**Results:** We received a 18 years old boy at pediatric emergency for polyuria, polydipsia, vomiting and abdominal pain since 5 days. He was a known type 1 diabetes patient since 2 years. He received multiple injections regimen with regular and long acting insulin. His last HbA1c was 39 mmol/mol. His parents reported substance abuse since 6 months. At admission, the patient was slimmed, tired and dehydrated. He was sad, anxious, and sometimes aggressive. Glycaemia was 271 mg/dl. Urine dipstick revealed presence of ketones and glucose. The main diagnosis was Substance abuse complicated by ketoacidosis. For management, he received rehydration and rapid acting insulin. Psychologic support was initiated and he received antipsychotics and anxiolytics. He presented 3 episodes of ketoacidosis during hospitalization.

**Conclusions:** This case highlights difficulty to improve metabolic control in type 1 diabetes in presence of substance abuse during adolescence. The risk of death is either related to poor compliance to insulin or antipsychotic drugs or the illicit substance itself.

#### P138 | Glucose control of migrant children with type 1 diabetes in Lombardy

B. Dionisi<sup>1,2</sup>, G. Frontino<sup>1,2</sup>, A. Rigamonti<sup>1,2</sup>, V. Castorani<sup>1,2</sup>, R. Di Tonno<sup>1,2</sup>, E. Morotti<sup>1,2</sup>, F. Sandullo<sup>1,2</sup>, F. Scialabba<sup>1,2</sup>, F. Arrigoni<sup>1,2</sup>, R. Foglino<sup>1,2</sup>, F. Meschi<sup>1,2</sup>, R. Bonfanti<sup>1,2,3</sup>

<sup>1</sup>IRCCS San Raffaele Hospital, Department of Pediatrics, Milano, Italy, <sup>2</sup>IRCCS San Raffaele Hospital, Diabetes Research Institute, Milano, Italy, <sup>3</sup>Università Vita-Salute San Raffaele, School of Medicine, Milano, Italy

**Introduction:** Migrant status may obstacle the management of Type 1 Diabetes (T1D) and the use of diabetes technologies. Patients at our center represent approximately 50% of children with T1D in Lombardy.

**Objectives:** To compare glucose control and treatment choice of migrant children with T1D vs all patients followed at our center in 2021.

**Methods:** Auxological parameters, HbA1c (%), type of glucose monitoring [by blood (BGM), flash (FGM) or continuous (CGM) glucose monitoring], and treatment modality [multiple daily injection (MDI) insulin therapy, sensor augmented pump (SAP), advanced hybrid closed loop (AHCL)] were recorded.

**Results:** Migrant population: 54 patients (23F, 31 M), mean age 14 years  $\pm$  4, mean BMI-SDS 0.79, median T1D duration 4 years, mean age of onset 8.9 years  $\pm$  4.5. Mean HbA1c 7.8  $\pm$  1.5. Of these, 45 (83%) use MDI (2 use BGM, 43 use FGM) and 9 (17%) use pumps (2 SAP, 6 AHCL, 1 pump user with BGM). HbA1c is not significantly different between pump and MDI users (7.3  $\pm$  1.4 vs. 7.9  $\pm$  1.5).

Regarding all 994 children with T1D followed at our center: mean BMI-SDS 0.61, mean age 13.5 years, mean age of onset 10.9 years  $\pm$  4.7, median T1D duration 4 yrs. Mean HbA1c 7.2  $\pm$  1.1. Of these, 44% are pump users and 56% MDI users. HbA1c is significantly higher in migrant children vs overall ( $p = 0.0001$ ). There is no significant difference in HbA1c between migrant pump users vs overall. Other parameters are not significantly different.

**Conclusions:** Our data portrays the current status of diabetes care of migrant children with T1D in Lombardy. Migrant children are less likely to use technology and consequently have suboptimal glucose control. Although technology has evolved to play an ever more central and less cumbersome role in T1D treatment, its use in ethnic minorities is less than desirable. Cultural and linguistic barriers may represent untackled obstacles in the management of diabetes. A more tailored healthcare system must be implemented in order to promote the use of advanced technologies in all children with T1D regardless of cultural background.

#### P139 | Patient acceptability of an intensive insulin management program in Kashmir, India

P.O. Ahmad<sup>1</sup>, C. Lawrence<sup>2,3</sup>, G. Ogle<sup>4,5</sup>, C.E Smart<sup>2</sup>, M.A Paterson<sup>2</sup>, B.R King<sup>2</sup>, S.R Masoodi<sup>1</sup>

<sup>1</sup>Sher-I-Kashmir Institute of Medical Sciences (SKIMS), Department of Endocrinology, Srinagar, India, <sup>2</sup>John Hunter Children's Hospital, Pediatric Endocrinology and Diabetes, New Lambton Heights, Newcastle, Australia, <sup>3</sup>University of Newcastle, Callaghan, Newcastle, Australia, <sup>4</sup>Life for a Child Program, Diabetes NSW and ACT Glebe, Sydney, Australia, <sup>5</sup>University of Sydney, Medical Research Council Clinical Trials Center, Sydney, Australia

**Introduction:** Flexible insulin regimes with multiple daily doses of insulin have been shown to improve outcomes for type 1 diabetes. Resource-limited settings have disproportionately higher rates of diabetes-related complications and mortality and fewer people achieving internationally recommended targets for T1D. The Sher-I-Kashmir Institute of Medical Sciences (SKIMS) in Srinagar, India services 400 children with type 1 diabetes. The average HbA1c is 10.5% and the average life expectancy is 29 years. Access to blood glucose monitoring and diabetes education has been limited. In partnership with the John Hunter Children's Hospital (JHCH) in New South Wales, Australia, and the Life For A Child Foundation, glucose monitoring and an intensive insulin management system (Success With Individualized Insulin Management) was implemented. Here we describe our center's initial experiences.

**Objectives:** To assess patient acceptability of an intensive insulin management program in a resource-limited setting.

**Methods:** We describe two young people with type 1 diabetes who were given access to glucometers and testing strips, photographic carbohydrate counting resources, and personalized insulin-dosing cards. Follow-up was performed at 12 weeks and the families experience was documented. HbA1c was performed at baseline and at review.

**Results:** Patient 1 was a 17yo female who had diabetes for 4 years. At baseline, she did 5BGLs/week, and HbA1c was 13.4%. At the 12-week follow-up, she was doing 35 BGLs per week and HbA1c was 9.3%.

Patient 2 was an 11.5yo male who had diabetes for 7 years. At baseline, he was doing 7 BGLs per week and HbA1c was 13%. At the 12-week follow up he was doing 21 BGLs per week and HbA1c was 9.4%.

**Conclusions:** Flexible insulin regimes are feasible in resource-limited settings. Further research is required to demonstrate long-term improvement in diabetes-related outcomes.

#### P140 | Prevalence of depressive symptoms in children and adolescents with type 1 diabetes and celiac disease in Jordan

A. Alassaf<sup>1</sup>, R. Odeh<sup>1</sup>

<sup>1</sup>University of Jordan, Pediatrics, Amman, Jordan

**Introduction:** Type 1 diabetes (T1D) is a common chronic disease in children and adolescents with significant short and long-term complications. Celiac disease is one of the comorbidities that may be associated with T1D. Patients diagnosed with both diseases are expected to be at higher risk of psychological issues, including depression.

**Objectives:** We aimed to study prevalence of depressive symptoms in children with T1D and celiac disease in Jordan.

**Methods:** This is a pilot case control study, conducted by distributing the Center for Epidemiological Studies Depression Scale for Children (CES-DC) to patients aged between 10 and 17 years with T1D and celiac disease seen at our pediatric endocrine clinic between January 2022 and March 2022, and were compared to controls who were

patients matched for age, gender and duration of diabetes. Demographic and clinical data were collected.

**Results:** A total of 20 children with T1D and celiac disease were enrolled in the study with mean age of  $13.80 \pm 2.47$  years. There was no significant difference of CES depression score between patients with T1D and celiac disease and those with T1D alone,  $p = 0.1$ . Patients with T1D and celiac disease had higher HbA1c than those who had T1D alone,  $p = 0.02$ . There were no significant differences between the two groups; in number of diabetes-related hospital admissions and frequency of self-monitoring of blood glucose.

**Conclusions:** There was no difference in prevalence of depressive symptoms children with T1D and celiac disease and those who had T1D alone. HbA1c was higher in patients with T1D and celiac disease than those with T1D only. This is a pilot study with limited number of patients; further recruitment of patients to our ongoing is needed to explore further prevalence of depression in children and adolescents with T1D and celiac disease.

#### P141 | HelloType1-An innovative digital educational resource platform of type 1 diabetes in local languages for healthcare professionals, families, and people living with diabetes in Southeast Asia

S.M. Ng<sup>1,2</sup>, M. Iv<sup>3</sup>, T.K. Nguyen<sup>4</sup>, K. Le<sup>5</sup>, Y.X.L. Lim<sup>6</sup>, A. Anuar Zaini<sup>7</sup>, N. Lek<sup>8</sup>, S. Seal<sup>9</sup>, S.Y. Tange<sup>10</sup>, A.C. Ficherouille<sup>11</sup>, J. Gore<sup>11</sup>

<sup>1</sup>University of Liverpool, Liverpool, United Kingdom, <sup>2</sup>Southport and Ormskirk Hospital NHS Trust, Southport, United Kingdom, <sup>3</sup>Kantha Bopha Children's Hospital, Phnom Penh, Cambodia, <sup>4</sup>Diabetes and

**Table 1. Overview performance HelloType1 website (May 2021-Feb 2022) (in English and Khmer languages)**

Overview	2021								2022	
	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB
Total users	54	101	80	141	187	226	328	182	173	214
Total pageviews	114	395	253	288	363	810	707	405	525	547
Page per session	1.61	3.28	2.65	1.60	1.67	2.17	1.75	1.83	2.18	2.01
Average time spend (min)	0.5	3	02:57	01:11	01:02	01:58	01:36	01:39	02:09	02:08

**Table 2. Pageviews by audience in Q4 2021)**

Audiences (pageviews)	Q4 2021
T1D	27%
Family Caregivers	20%
HCPs	53%

**Table 3. HelloType1 Facebook Analytics in Cambodia (May 2021-Feb 2022)**

	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB
Overview										
Number of followers	810	824	840	855	881	895	906	915	920	944
Page total reach	2225	6045	3217	7305	7050	4312	3563	4034	3221	4566
Page engagement	8%	7%	9.4%	8.7%	8.4%	10.0%	8%	9%	7%	11%

Endocrine Association of Vietnam, Hanoi, Vietnam, <sup>5</sup>National Yang Ming Chiao Tung University, International Health Program, Taipei, Taiwan, <sup>6</sup>Dietitian 90 Consultancy, Georgetown, Malaysia, <sup>7</sup>University of Malaya, Kuala Lumpur, Malaysia, <sup>8</sup>KK Women's and Children's Hospital, Singapore, Singapore, <sup>9</sup>T1D Advocate, Bangkok, Thailand, <sup>10</sup>Summit Consulting, Copenhagen, Denmark, <sup>11</sup>Action4Diabetes, Somerset, United Kingdom

**Introduction:** There is minimal data of Type 1 Diabetes (T1D) outcomes in Southeast Asia (SEA) where government funding of insulin and blood glucose monitoring is limited. Action4Diabetes (A4D) is a non-profit organization charity that currently provides comprehensive partnership programs with defined local hospitals through a Memorandum of Understanding (MOU) signed with the governments in SEA that guarantees ongoing supplies of free insulin, blood glucose testing, HbA1c tests and hospital emergency funds. In 2021 HelloType1 was developed in collaboration with SEA local healthcare professionals as an innovative digital educational resource platform of T1D in local languages.

**Objectives:** To educate, engage and empower healthcare professionals, families, and people with T1D by creating a digital platform that is free-to-access and provides accurate information, patient-oriented education, and best practice care about T1D care in local languages.

**Methods:** HelloType1 content is reviewed, translated to local languages and adapted by a panel T1D healthcare experts and lay people with T1D in SEA to ensure that the information is appropriate in a local context. A list of sources and content reviewers are published within each core topic. HelloType1 educational content includes 32 articles, 7 posters, 9 videos, and 13 quizzes.

**Results:** Table 1 shows the number of users, engagement, and page views in 2021–22. Table 2 shows 53% of page views were coming from healthcare professionals and 47% from families and people with T1D. Table 3 shows the HelloType1 Cambodia Facebook analytics with approximately 1000 followers and a 4% increase each month.

**Conclusions:** In the long term, only systemic changes in local health policies such as universal coverage and education can confront health inequalities and T1D gaps in SEA. This would include scaling up of diabetes knowledge among healthcare professionals and people living

with T1D to optimize management and developing a peer support network.

**P142 | Type 1 diabetes glycemc control outcomes stratified by insulin regimen in two large Cambodian tertiary hospitals**

S.M. Ng<sup>1,2</sup>, M. IV<sup>3</sup>, C. Yay<sup>4</sup>, L.C. Khun<sup>4</sup>, B. Manet<sup>3</sup>, T. Martin<sup>5</sup>, N. Lek<sup>6</sup>  
<sup>1</sup>University of Liverpool, Liverpool, United Kingdom, <sup>2</sup>Southport and Ormskirk Hospitals NHS Trust, Southport, United Kingdom, <sup>3</sup>Kantha Bopha Children's Hospital, Phnom Penh, Cambodia, <sup>4</sup>Jayavarman VII Hospital, Siem Reap, Cambodia, <sup>5</sup>Action4Diabetes, Somerset, United Kingdom, <sup>6</sup>KK Women's and Children's Hospital, Singapore, Singapore

**Introduction:** In Cambodia, Action 4 Diabetes (A4D) is a UK non-profit organization has been providing free insulin and self-monitoring blood glucose test kits for children and young people (CYP) with type 1 diabetes (T1D) in Cambodia's 2 large tertiary hospitals-Kantha Bopha II Hospital based in Phnom Penh (KB2H) and Jayavarman VII Hospital based in Siem Reap (J7H), since July 2018 and January 2020, respectively.

**Objectives:** To report the glycemc control outcomes of T1D patients in the two large Cambodian tertiary hospitals stratified by insulin treatment regimen, namely, twice daily injections using self-mixed short- and long-acting insulin (BD); and basal-bolus multiple daily insulin injections (MDI).

**Methods:** Data on gender, current age, HbA1c at enrolment and during follow up in A4D clinical support program, were reviewed and summarized in the Table.

**Results:** By December 2021, a total of 263 patients (109 male; 41%) were supported by A4D. Mean age of patients in KBH2 on self- mixed BD regimen was 16.6 years versus 17.4 years for MDI regimen. Mean age of patients in J7H on self-mixed BD regimen was 14.5 years versus 18.1 years for MDI regimen. On average, patients in KB2H were 1.4 years older than those in J7H. In both hospitals, the patients on MDI were older than those on BD treatment. Overall glycemc control was suboptimal with mean HbA1c >10% (>86 mmol/mol) between 2019 and 2021, except for those on MDI in KB2H during 2020.

Hospital	Province	Insulin Regimen	Number of patients			Gender		Current Age (year)				Mean HbA1c at enrolment, % (mmol/mol)	Mean HbA1c during follow-up, % (mmol/mol)		
			2019	2020	2021	Female	Male	Min	Max	Mean	SD		2019	2020	2021
Kantha Bopha II Hospital	Phnom Penh	Self-mixed BD	32	43	101	64	37	12	23	16.6	2.9	12.9 (117)	11.4 (101)	11.0 (97)	11.6 (103)
		Basal-bolus MDI	19	28	60	32	28	12	29	17.4	3.2	13.0 (119)	11.5 (102)	9.8 (84)	11.4 (101)
		TOTAL	51	71	161	96	65	12	29	16.9	3.0	12.9 (117)	11.4 (101)	10.6 (92)	11.6 (103)
Jayavarman VII Hospital	Siem Reap	Self-mixed BD	--	37	74	45	29	5	25	14.5	4.3	13.4 (120)	--	12.9 (117)	12.9 (117)
		Basal-bolus MDI	--	18	28	13	15	7	29	18.1	5.5	11.8 (105)	--	12.3 (111)	12.0 (108)
		TOTAL	--	55	102	58	44	5	29	15.5	4.9	13.0 (119)	--	12.7 (115)	12.6 (114)



**Conclusions:** The glycemic control in the patients with T1D in these two hospitals in Cambodia was suboptimal regardless of the insulin treatment regimen. The findings in this study suggest that in addition to providing insulin and blood glucose test kits, there is urgent need to further provide support and education to families and people with T1D and upskill the local healthcare professionals in T1D management so that they can empower the patients and their caregivers to optimize self-management effectively on a daily basis.

**P143 | Southeast Asia type 1 diabetes healthcare professionals regional network and webinars program initiative**

S.M. Ng<sup>1,2</sup>, N. Lek<sup>3</sup>, T. Sahakitrungruang<sup>4</sup>, L. Finnigan<sup>5</sup>, S.P. Chan<sup>6</sup>, L.M. Yong<sup>7</sup>, P.T. Bui<sup>8</sup>, S.N. Nyi<sup>9</sup>, A.-C. Ficherouille<sup>10</sup>, C. Toomey<sup>10</sup>  
<sup>1</sup>University of Liverpool, Liverpool, United Kingdom, <sup>2</sup>Southport and Ormskirk Hospital NHS Trust, Southport, United Kingdom, <sup>3</sup>KK Women's and Children's Hospital, Singapore, Singapore, <sup>4</sup>Chulalongkorn University, School of Global Health, Bangkok, Thailand, <sup>5</sup>Southport and Ormskirk Hospitals NHS Trust, Southport, United Kingdom, <sup>6</sup>Malaysian Endocrine and Metabolic Society, Kuala Lumpur, Malaysia, <sup>7</sup>Malaysian Diabetes Educators Society, Kuala Lumpur, United Kingdom, <sup>8</sup>Vietnam National Children's Hospital, Hanoi, Vietnam, <sup>9</sup>Health and Happy Families, Yangon, Myanmar, <sup>10</sup>Action4Diabetes, Somerset, United Kingdom

**Introduction:** In the Lancet Commission 2020, it was estimated that approximately 15,000 individuals with Type 1 Diabetes (T1D) died in 2017 globally from a total prevalence of diabetes in 1.61 million people. There was no data of T1D incidence or prevalence available from Southeast Asia (SEA) countries within this Commission, and there is minimal data of health outcomes for T1D in SEA where government funding of insulin and blood glucose monitoring kits either do not exist, or is limited in many low-middle income countries (LMICs) in SEA.

**Objectives:** Action4Diabetes (A4D) is a non-government organization making sustainable and scalable progress to provide quality T1D healthcare in the SEA region. Since 2015, A4D formed strategic partnerships with relevant local health authorities, public hospitals, and medical societies to ensure ongoing supplies of free medication, patient education, and healthcare training, aiming to bring positive health outcomes for the T1D Community.

**Methods:** In 2020–2021, A4D facilitated the establishment of the T1D healthcare professionals (HCP) regional network to facilitate cross-country collaborations, knowledge exchange, and best practice sharing through 3 different initiatives:

- A HCP advisory group
- The T1D SEA Regional Network Meetings
- Free-to-access A4D webinars program on T1D.

**Results:** The HCP advisory group comprise 26 multidisciplinary HCPs from 8 countries and professions (Table 1). Number of registrants

**Table 1. A4D HCP Advisory Group by country and profession**

Profession/Country	Cambodia	Laos	Malaysia	Myanmar	Singapore	Thailand	UK	Vietnam	Total
Paediatric Endocrinologist			3		1	3	1	2	10
Paediatrician	1	2		1					4
Physician	2								2
Endocrinologist			1			1		1	3
Diabetes Specialist Nurse					1		2		3
Dietitian				1			1		2
Psychologist							1		1
Pharmacist			1						1
<b>Total</b>	<b>3</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>3</b>	<b>26</b>

**Table 2. Number of registrants of the T1D Regional Network Meeting (Nov 2021) per country and professions**

Profession/Country	Cambodia	Laos	Malaysia	Myanmar	Singapore	Thailand	UK	Vietnam	Other	Total
Doctors	13	3	8	2	1	6	1	11	2	47
Diabetes Educator			2		1	1	2		2	8
Dietitian				1			1			2
Pharmacist		1	1							2
<b>Total</b>	<b>13</b>	<b>4</b>	<b>11</b>	<b>3</b>	<b>2</b>	<b>7</b>	<b>4</b>	<b>11</b>	<b>4</b>	<b>59</b>

**Table 3. Number of registrants to the A4D webinars (total of 4 webinars in 2021–2022) by country and professions**

Profession/Country	Cambodia	Laos	Malaysia	Myanmar	Singapore	Thailand	UK	Vietnam	Other	Total
Doctors	33	12	6	12	1	1	2	35		102
Diabetes Educator	1	1	2		1	1	2		1	9
Dietitian			1	2						3
Pharmacist	1		24							25
Other HCPs		1	1	1			2	2	6	13
<b>Total</b>	<b>35</b>	<b>14</b>	<b>34</b>	<b>15</b>	<b>2</b>	<b>2</b>	<b>6</b>	<b>37</b>	<b>7</b>	<b>152</b>

attending the quarterly T1D regional network meeting in Nov 2021 are shown in Table 1, with 80% of the HCPs who participated in the meetings were doctors. The analytics from the webinar's attendance is demonstrated in Table 3, with the top 3 countries engaged with the A4D Webinars from Cambodia, Malaysia and Vietnam.

**Conclusions:** These initiatives are crucial in closing the T1D gaps in SEA. Strengthening health systems, education and developing locally owned solutions are vital to improve health and quality of life for people with T1D in SEA.

## POSTER TOUR 16—AUTOMATED INSULIN DELIVERY # 1

### P144 | On-boarding children and young adults on MiniMed™ 780 G system: Real- world data from Egyptian experience

Y.I. Elhenawy<sup>1</sup>, M.A. Shaarawy<sup>2</sup>, E.M. Selim<sup>3</sup>

<sup>1</sup>Ain Shams University, Pediatric and Adolescent Diabetes Unit (PADU), Cairo, Egypt, <sup>2</sup>Regional Pump Consultant, Cairo, Egypt, <sup>3</sup>Diabetes Educator and Certified Pump Educator, Cairo, Egypt

**Introduction:** Advanced hybrid-closed loop (AHCL) systems achieved a significant improvement in glycemic control among young people with type 1 diabetes (T1D).

**Objectives:** The aim of the current study was to evaluate the safety and efficacy of the initiation protocol for MiniMed™780G system in a real-world setting among an Egyptian cohort of young people with T1D.

**Methods:** A prospective study including 72 participants with T1D that successfully initiated AHCL system; 55 participants shifted from multiple daily injections (MDI) with no previous pump experience and 17 were using either standalone or sensor augmented pumps. A 5 days of structured education and training were provided to all users and continuous glucose monitoring (CGM) was initiated on the first day of the training. After reviewing 1-week data of CGM, users initiated the pump in Manual Mode, with suspend before low feature, for an average of 7 days before shifting to Auto Mode. Patients with previous pump experience started the Auto Mode after 1-week data of CGM. Data and downloads of users completing the 84 days were analyzed.

**Results:** A total of 55 user with T1D (age  $12.6 \pm 4.9$  years) completed the planned 84 days on Auto Mode; 41 /55 with no previous pump experience. The mean HbA1c decreased from  $8.7\% \pm 2.0\%$  to  $6.8\% \pm 0.5\%$  ( $P < 0.01$ ) without any severe hypoglycemia or DKA. Time in range (TIR; 70–180 mg/dl) substantially improved from  $62.6\% \pm 14.1\%$  before initiating Auto Mode to  $82.3\% \pm 7.4\%$  after spending 84 days in Auto Mode ( $p < 0.01$ ) with 2.2% of the time spent below 70 mg/dl. Insulin-to-carbohydrate ratio (ICR) was optimized and made more aggressive; decreasing by 16.7% from a mean of  $16.0 \pm 9.3$  g/unit % to  $12.3\% \pm 6.6\%$  g/unit ( $P < 0.01$ ). Regarding AHCL compatibility, users spent a mean of  $95.3\% \pm 6.7\%$  time in Auto Mode.

**Conclusions:** MiniMed™ 780G system significantly improved levels of HbA1c and successfully achieved TIR > 70% with minimizing the risk of hypoglycemia. Real world data confirms the robust effect of AHCL systems on glycemic outcomes.

### P145 | Effect of 24 months of optimized glucose control on residual C-peptide secretion in youth with new onset type 1 diabetes

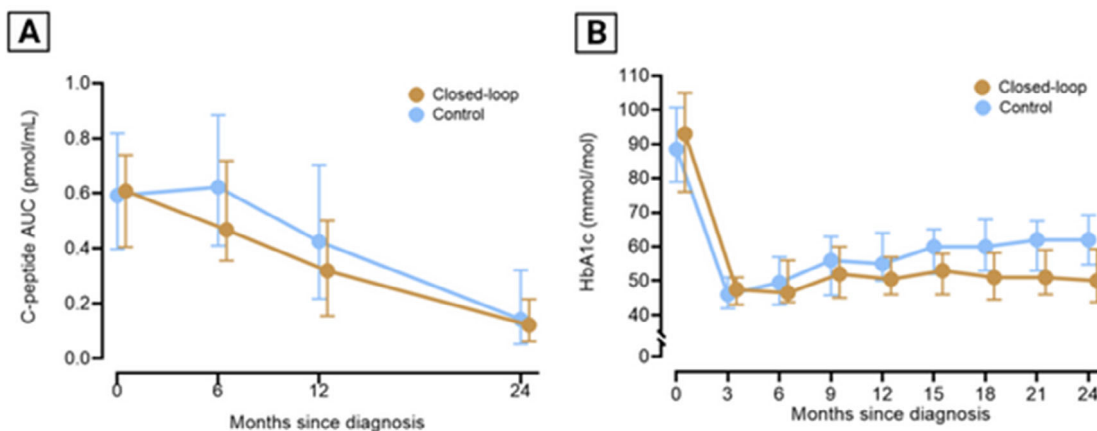
J.M Allen<sup>1,2</sup>, C.K Boughton<sup>1,3</sup>, J. Ware<sup>1,2</sup>, M.E Wilinska<sup>1,2</sup>, S. Hartnell<sup>3</sup>, A. Thankamony<sup>2</sup>, T. Randell<sup>4</sup>, A. Ghatak<sup>5</sup>, R.E. Besser<sup>6,7</sup>, D. Elleri<sup>8</sup>, N. Trevelyan<sup>9</sup>, F.M Campbell<sup>10</sup>, R. Bailey<sup>11</sup>, J. Sibayan<sup>11</sup>, P. Calhoun<sup>11</sup>, G. Dunseath<sup>12</sup>, R. Hovorka<sup>1,2</sup>

<sup>1</sup>University of Cambridge, Wellcome Trust-MRC Institute of Metabolic Science, Cambridge, United Kingdom, <sup>2</sup>University of Cambridge, Department of Pediatrics, Cambridge, United Kingdom, <sup>3</sup>Cambridge University Hospitals NHS Foundation Trust, Wolfson Diabetes Endocrine Clinic, Cambridge, United Kingdom, <sup>4</sup>Nottingham University Hospitals NHS Trust, Department of Pediatric Diabetes and Endocrinology, Nottingham, United Kingdom, <sup>5</sup>Alder Hey Children's NHS Foundation Trust, Department of Diabetes, Liverpool, United Kingdom, <sup>6</sup>Oxford University Hospitals NHS Foundation Trust, NIHR Oxford Biomedical Research Center, Oxford, United Kingdom, <sup>7</sup>University of Oxford, Department of Pediatrics, Oxford, United Kingdom, <sup>8</sup>Royal Hospital for Sick Children, Department of Diabetes, Edinburgh, United Kingdom, <sup>9</sup>Southampton General Hospital, Department of Pediatric Endocrinology and Diabetes, Southampton Children's Hospital, Southampton, United Kingdom, <sup>10</sup>Leeds Children's Hospital, Department of Pediatric Diabetes, Leeds, United Kingdom, <sup>11</sup>Jaeb Center for Health Research, Tampa, United States, <sup>12</sup>Swansea University, Diabetes Research Group, Swansea, United Kingdom

**Introduction:** It has yet to be determined whether sustained intensive glycemic control following diagnosis can ameliorate the decline in endogenous insulin secretion in youth with type 1 diabetes. Hybrid closed-loop systems have been shown to improve glucose control in youth and accommodate variability in exogenous insulin requirements.

**Objectives:** We assessed whether improved glucose control with hybrid closed loop can preserve C-peptide secretion compared to standard insulin therapy in youth with new onset type 1 diabetes.

**Methods:** In an open-label, multicenter, randomized, parallel trial, youth aged 10 to <17 years were randomized within 21 days of type 1 diabetes diagnosis to hybrid closed-loop using the Cambridge algorithm or standard insulin therapy (control) for 24 months. Primary endpoint was the difference in mixed meal C-peptide AUC 12 months post diagnosis. Analysis was by intention to treat. **Results:** We randomized 97 participants (mean  $\pm$  SD age  $12 \pm 2$  years), 51 to closed-loop and 46 to control therapy. There was no difference in C-peptide AUC at 12 months (primary endpoint) or 24 months between groups (geometric mean [95% CI] 12 months closed-loop: 0.35 pmol/ml



**Figure 1.** The area under the curve for plasma C-peptide in response to a mixed-meal tolerance test at baseline, 6, 12 and 24 months post diagnosis of type 1 diabetes (panel A; geometric mean [IQR]) and the glycated haemoglobin from baseline to 24 months (panel B; median [IQR]).

[0.27, 0.43] vs. control: 0.46 pmol/ml [0.33, 0.61]; mean adjusted difference - 0.06 [-0.14 to 0.03];  $p = 0.19$  and 24 months closed-loop: 0.18 pmol/ml [0.12, 0.24] vs. control: 0.24 pmol/ml [0.12, 0.37]; mean adjusted difference - 0.04 [-0.14 to 0.06]). Glycated hemoglobin was lower in the closed-loop group by 4 mmol/mol [0.4%] (95% CI 0 to 8 mmol/mol [0.0% to 0.7%]) at 12 months, and 11 mmol/mol [1.0%], (95% CI 7 to 15 mmol/mol [0.5% to 1.5%];  $p < 0.001$ ) at 24 months. Five severe hypoglycaemic events occurred in closed-loop group (3 participants), and one in control group; one diabetic ketoacidosis occurred in the closed-loop group.

**Conclusions:** In youth with new onset type 1 diabetes, optimizing glucose control for 24 months does not appear to prevent the decline in residual C-peptide secretion.

**P146 | A single center experience of hybrid closed loop insulin pumps- Is it really worth the efforts and investment?**

A. Gangadharan, R. Cordingley, C. Bowness, C. Tomos, P. Nallappan

Betsi Cadwaladr University Health Board, Pediatrics and Diabetes, Bangor, United Kingdom

**Introduction:** The Hybrid closed loop (HCL) Insulin delivery system has revolutionized the management of T1D especially in children under 8-years of age. There are various limitations to its wider use, mainly the training required for its effective use and cost implications.

**Objectives:** The aim was to understand the impact of hybrid closed loop insulin delivery system in maximizing the outcomes and improving the quality of life in T1D.

**Methods:** A retrospective analysis of all hybrid closed loop (HCL) pump users in a district general hospital in UK was carried out. Patient characteristics (age, BMI SDS, Time in Range %, Hypoglycaemia % & HbA1c) were analyzed at various time points (6 months leading up to HCL, at start of HCL and at the latest clinic assessment). A subgroup analysis was carried out for licensed and DIY pump users. Results were expressed in mean, range, and percentage.

**Results:** There were total of 15 patients of which 6 were male. Before the start of looping, 8 patients were using MDI and 7 were using

Results were summarized in the following table: Mean (Range)

Parameters	Up to 6 months before HCL	At start of HCL	At latest clinic F/U of HCL
Age in years	9.6 (3.3-13.7)	10.5 (3.6-14.2)	11.5 (4.4-16.1)
BMI SDS	+1.0 (-0.2 to +2.3)	+0.9 (-0.2 to +2.2)	+1.0 (-0.6 to +2.0)
HbA1c (mmol/mol)	54 (37-69)	53.2 (33-72)	51 (35-69)
Time in range (%)	59 (31-89)	67 (50-89)	68 (50-82)
Hypoglycemia <4 mmol (%)	2.2 (0-6)	2.1 (0-6)	1.9 (0-4)
<b>Licensed HCL users (11/15)</b>			
HbA1c (mmol/mol)	58 (44-69)	57.2 (48-72)	55.6 (42-69)
<b>DIY Loop users (4/15)</b>			
HbA1c (mmol/mol)	45.5 (37-50)	42.3 (33-54)	43.8 (35-54)

pump therapy (4 Omnipods, 1 Roche Combo, 1 Animas and 1 Tandem pump without control IQ). Of 4 Omnipod users, 3 started DIY loop technology by themselves and the 4th user switched over to Tandem pump with Control IQ function. The HCL follow up period was 1.0 (0.1–2.9) years. In DIY HCL the follow period was 2.3 (1.4–2.9) years.

**Results showed that during hybrid closed loop usage,**

- HbA1c has decreased from 53.2 to 51 mmols/mol ( $p = 0.057$ )
- HbA1c was lower in DIY loop users at all time points
- BMI SDS has remained stable during the follow up period
- HCL loop users had lower percentage of hypoglycemic episodes

**Conclusions:**

1. HCL improved glycemic control by improving the time in range and reduces hypoglycemic episodes
2. Commitments from DIY pump users showed maintenance of HbA1c levels well below the NICE target of 48 mmol/mol
3. HCL pump users experienced less stress, better sleep and hence better quality of life

#### P147 | The use of advanced hybrid closed loop of 780G offers further improvement in well controlled children and adolescents with type 1 diabetes

K. Patouni<sup>1</sup>, M. Xatzipsalti<sup>1</sup>, G. Kourousi<sup>1</sup>, E. Bourousis<sup>1</sup>, A. Triantafyllidou<sup>1</sup>, D. Delis<sup>1</sup>, A. Vazeou<sup>1</sup>

<sup>1</sup>P&A Kyriakou Children's Hospital, Diabetes Center, A' Department of Pediatrics, Athens, Greece

**Introduction:** Advanced Hybrid Closed Loop (AHCL) provides a novel therapeutic approach to optimize glycemic control in people with type 1 diabetes (T1D).

**Objectives:** To evaluate the difference in HbA1C, TIR, TAR, and TBR in children, adolescents, and young adults with well controlled T1D before, 3 and 6 months after initiation of AHCL system.

**Methods:** A 41 subjects [24 males, median age 11.1 years (range 0.7–40 years) median disease duration 4.9 years (range 0.7–22.7 years)] previously treated with multiple daily injections ( $n = 5$ ) or insulin pump ( $n = 34$ , median duration 3.9 years [range 0–12 years]), were included in the study. Six were using intermittently scanned CGM and 35 Sensor Augmented Pump 640G. The subjects were well controlled [mean HbA1C 6.8% (SD 0.7)]. They switched to the AHCL system of Medtronic MiniMed 780G system. HbA1C, TIR, TAR, TBR, basal, bolus and daily insulin requirements, were evaluated before, 3 and 6 months afterwards.

**Results:** There was an improvement of HbA1c at 3 and 6 months compared to baseline (Mean HbA1c before (SD):6.8 (0.7) mg/d vs 6.4 (0.5) ( $p = 0.022$ ) and 6.3(0.4)  $p = 0.011$  respectively), in TIR (Time in Range) 68.2 (12.9) % vs. 78.1 (6.3)  $p < 0.001$  and 77.7 (6.8)  $p < 0.001$ , and a significant reduction in TAR (Time above range) (180–250 mg/dl) 26 (12.5%) vs. 15 (4.4%)  $p < 0.001$  and 15.5 (4.9%)  $p < 0.001$ . There was no difference in TAR>250 mg/d or TBR (Time below range) <54 or < 70 mg/dl. Although there was no difference in the total insulin dose, there was a decrease in the percentage of basal insulin compared to the baseline data 42.7% (12.6) before vs 36.3 (5.7)  $p = 0.004$

and 36.1 (5.1)  $p = 0.005$  respectively and increase of boluses 56.4% (12.3) vs 64.4 (7.0)  $p < 0.001$  and 63.9 (5.0)  $p = 0.001$ . The percentage of auto correction boluses was 21.3 (6.9) % and 22.1 (7.1) % at 3 and 6 months.

**Conclusions:** The use of AHCL system offers further improvement in glycemic control, TIR and TAR in well-controlled children adolescents and young adults with T1D.

#### P148 | Reverting suboptimal glucose control by implementing an advanced hybrid closed-loop system in non-compliant adolescents with type 1 diabetes

V. Castorani<sup>1,2</sup>, G. Frontino<sup>1,2</sup>, A. Rigamonti<sup>1,2</sup>, R. Di Tonno<sup>1,3</sup>, E. Morotti<sup>1,2</sup>, F. Sandullo<sup>1,2</sup>, F. Scialabba<sup>1,2</sup>, R. Fogliano<sup>1,2</sup>, F. Arrigoni<sup>1,2</sup>, B. Dionisi<sup>1,2</sup>, F. Meschi<sup>1,2</sup>, R. Bonfanti<sup>1,2,4</sup>

<sup>1</sup>IRCCS San Raffaele Hospital, Department of Pediatrics, Milano, Italy, <sup>2</sup>IRCCS San Raffaele Hospital, Diabetes Research Institute, Milano, Italy, <sup>3</sup>IRCCS San Raffaele Hospital, Pediatric Immunohematology Unit and BMT Program, Milano, Italy, <sup>4</sup>Università Vita-Salute San Raffaele, School of Medicine, Milano, Italy

**Introduction:** Advanced hybrid closed-loop (AHCL) systems represent the next step of automation intended to maximize normoglycemia in children with type 1 diabetes (T1D). Many adolescents with T1D may experience a deterioration in metabolic control due to erratic meal and exercise patterns, poor adherence to treatment regimens, hazardous and risk-taking behaviors, disordered eating behaviors, other mental health issues, and endocrine changes associated with puberty, leading to greater insulin resistance.

**Objectives:** The aim of our study was to evaluate the impact of Tandem Control IQ (CIQ) AHCL in a cohort of diabetic adolescents with suboptimal glucose control.

**Methods:** We enrolled 11 patients with T1D using multiple day injections (MDI) and flash glucose monitoring. All patients were upgraded and educated on the use of CIQ. Carbohydrate was not included as patients had previously expressed non-compliance. Glucometrics including time in range (TIR), above range (TAR), and below range (TBR) were downloaded at baseline and after 2-weeks of CIQ use.

**Results:** A 11 adolescents with T1D were included (age: 15.6 ± 2.1 years, 72% females, diabetes duration: 5.4 ± 4.1 years, HbA1c: 9.1% ± 2.4). Time in range (TIR) 70–180 mg/dl increased from 33.2% ± 21.7 at baseline to 69.8% ± 12.4 at 2-weeks ( $P = 0.002$ ). TAR 180–250 mg/dl and >250 mg/dl decreased from 21.5% ± 8.7 to 19.5% ± 6.9 (not statistically significant) and from 40.9% ± 26.4 to 7.7% ± 6.4 ( $P = 0.003$ ) respectively. Mean glucose improved from 236 mg/dl ± 73 to 156 mg/dl ± 19 ( $P < 0.05$ ). No differences in TBR 54–70 mg/dl or < 54 mg/dl were found. No adverse events were reported apart from a patient who suffered from a single event of mild diabetic ketoacidosis.

**Conclusions:** AHCL systems allow even poorly compliant adolescents with T1D to significantly, quickly, and safely improve their glucose control even with approximate correction factor settings, and without



carbohydrate counting. This is a turning point for technology that used to favor mainly those who were already compliant.

**P149 | Overnight diabetes management using hybrid closed loop (HCL) therapy: Lessons from young children**

S. Lange<sup>1</sup>, L. Towers<sup>1</sup>, E. Jost<sup>1</sup>, C. Berget<sup>1</sup>, R.P. Wadwa<sup>1</sup>, E. Cobry<sup>1</sup>  
<sup>1</sup>University of Colorado/Barbara Davis Center for Childhood Diabetes, School of Medicine, Aurora, United States

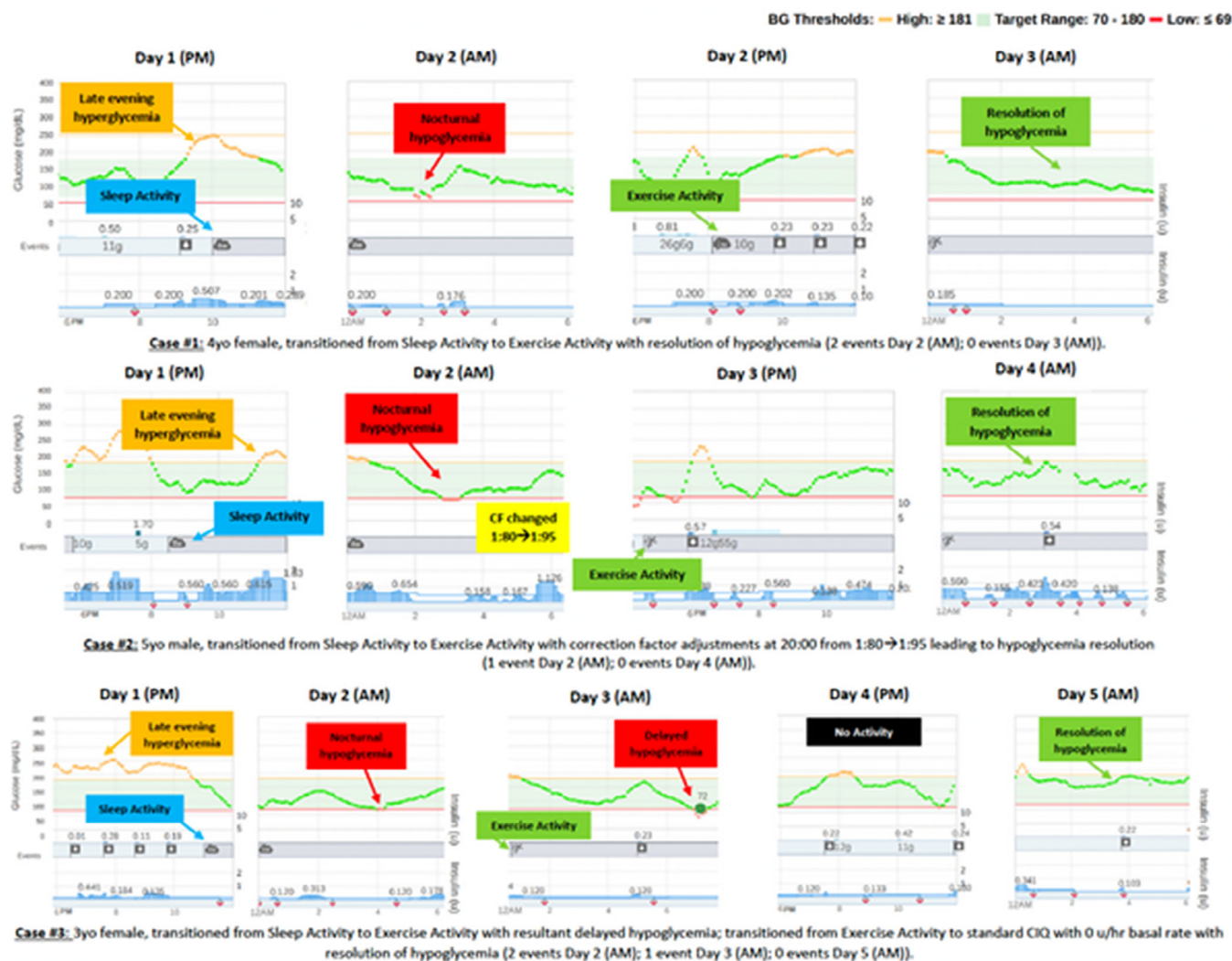
**Introduction:** Overnight glycemic control is challenging in young children with Type 1 Diabetes (T1D). Hormone influxes in the evening often result in insulin resistance and hyperglycemia followed by increased insulin sensitivity overnight, leading to potential nocturnal hypoglycemia. HCL offers glucose responsive insulin delivery, altering the approach to overnight glycemic management. Increased basal modulation in response to late evening hyperglycemia in HCL therapy may result in nocturnal hypoglycemia in some young children.

**Objectives:** To provide clinical insights for glycemic management overnight in young children with T1D using HCL.

**Methods:** We present three cases highlighting this challenge in young children aged 3–5 years with T1D using the Tandem t: slim X2 Control-IQ (CIQ) HCL system commercially available in the US (Figure 1).

**Results:** Sleep Activity targets glucose values of 112.5–120 mg/dl; however, this target may be too low for some young children, causing nocturnal hypoglycemia. Exercise Activity targets higher glucose values (140–160 mg/dl) and can be a possible solution; however, Exercise Activity allows for auto corrections increasing risk for hypoglycemia, therefore correction factors (CF) need adjustment. Standard CIQ therapy (targets 112.5–160 mg/dl) with a 0 u/h basal rate programmed in early morning hours may be an alternative option.

**Conclusions:** New ways of mitigating overnight hypoglycemia must be considered with HCL therapy in young children. With CIQ, if sleep activity results in overnight hypoglycemia, using Exercise Activity overnight, turning off Sleep Activity, or programming 0 u/h basal rates decreases overnight hypoglycemia and should be considered.



	SAP	AHCL The first 2 weeks	AHCL The 2 weeks after 6 months
Avg SG [mg/dl]	139.83 ± 15.63	131.26 ± 12.18	131.95 ± 13.63
CV [%]	34.99 ± 5.91	34.34 ± 5.7	33.75 ± 5.09
TDI [u.]	29.5 ± 15.94	28.23 ± 16.45	33.95 ± 18.92
GMI [%]	6.65 ± 0.37	6.45 ± 0.29	6.47 ± 0.33
Sensor use [%]	88.34 ± 10.23	94.92 ± 0.29	93.18 ± 7.75
Auto mode [%]		91.90 ± 15.98	96.60 ± 5.59

Abbreviations: Avg SG, average sensor glucose; CV, coefficient of variation; GMI, glucose management indicator; TDI, total daily insulin.

**P150 | Advanced hybrid closed loop (AHCL) system in children with type 1 diabetes (T1D): Is it really a sustained success after 6 months?**

S. Seget<sup>1</sup>, E. Rusak<sup>1</sup>, A. Polanska<sup>1</sup>, A. Bielawska<sup>1</sup>, M. Tworek<sup>1</sup>, M. Drózdź<sup>1</sup>, A. Chobot<sup>2</sup>, J. Polanska<sup>3</sup>, P. Jarosz-Chobot<sup>1</sup>

<sup>1</sup>Medical University of Silesia, Department of Children's Diabetology, Katowice, Poland, <sup>2</sup>University of Opole, Department of Pediatrics, Opole, Poland, <sup>3</sup>Silesian University of Technology, Department of Data Science and Engineering, Gliwice, Poland

**Introduction:** The MiniMed 780G is the first ACHL pump available in Poland and is becoming more and more popular among people with T1D, also children.

**Objectives:** Our aim was to assess continuous glucose monitoring (CGM) parameters in T1D children and adolescents after 6 months of AHCL use and compare them with CGM parameters from their former treatment modality (sensor augmented pump, SAP).

**Methods:** For 50 children with T1D, aged 12.3 ± 5.5 year, their SAP records from the 2 weeks preceding the AHCL connection were compared to the records of the first 2 weeks in AHCL and a two-week period after 6 months of AHCL use. The initial ACHL training period (7 days) was excluded from analysis.

**Results:** Significant improvements in time spent in the range (70–180 mg/dl), average sensor glucose, and glucose management indicator ( $p < 0.05$ ) were observed 2 weeks after switching to the AHCL. There was no change in coefficient of variation. The improvement was maintained after 6 months of treatment using AHCL (Table 1).

Abbreviations: Avg SG, average sensor glucose; CV, coefficient of variation; GMI, glucose management indicator; TDI, total daily insulin.

**Conclusions:** ACHL in children with T1D allows to achieve a sustained improvement in CGM parameters over a 6 months period.

**P151 | Technology is no quick-fix: the impact of hybrid closed-loop systems on patient and parent confidence with diabetes self-management**

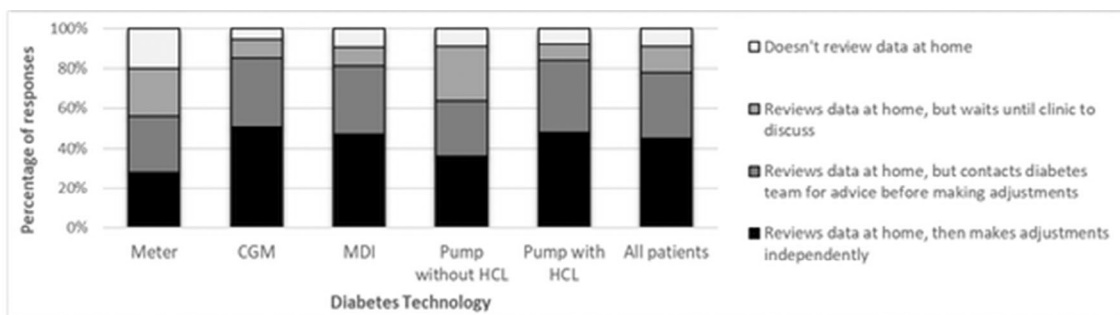
N. Boulos<sup>1</sup>, N. Trevelyan<sup>1</sup>

<sup>1</sup>Southampton Children's Hospital, University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom

**Introduction:** Continuous glucose monitors (CGM) and hybrid closed-loop systems (HCL) have shown positive impact on HbA1c and time in range for children with type 1 diabetes (T1D), but the data they create can be overwhelming, and it is unclear how this data overload impacts patient/parent independence with diabetes self-management.

**Objectives:** To explore patient and parent confidence with diabetes self-management, their review of diabetes data, insulin self-adjustment, and preferred frequency of clinical contact with the diabetes team.

**Methods:** A web-based survey was offered to all children and adolescents (0–18 years) with T1D or their parents at a large teaching hospital in Southampton, UK. **Results:** We received 100 responses. A 75 patients were using CGM (43% (n = 32) on multiple-daily injections [MDI], 24% (n = 18) using insulin pumps without HCL, and 33% (n = 25) using pumps with HCL). Regardless of insulin regimen, 51% (n = 38) of responders using CGM made independent dose adjustments of insulin at home, compared to only 28% (n = 7) of those using glucose meters alone (figure 1). On a Likert scale, patients using HCL were 'not very confident' or 'not confident at all' in adjusting insulin to carbohydrate ratios (48%, n = 12) compared to those on MDI (36%, n = 19) or pumps without HCL (28%, n = 6). Patients on HCL preferred the most clinical support, with 48% preferring 1–2 monthly contact or more frequently to discuss their data (vs. 38% for MDI and 27% for pumps without HCL).



**Figure 1.** Reported level of autonomy with reviewing data at home and independently making insulin adjustments.

**Conclusions:** We found that CGM improves patient independence with reviewing data at home, whereas HCL users appear less confident at insulin self-adjustment compared to MDI, and prefer more support and frequent clinical contact. One reason may be that HCL adds a layer of complexity that diminishes patient/parent confidence with self-management. Offering HCL should be made in conjunction with frequent clinical contact to teach patients/parents how to interpret data and maintain independence with self-care.

**P152 | Glucose control is at least as good with user-built hybrid closed loop systems as with Medtronic 670G in children and adolescents with type 1 diabetes**

A. Lindholm Olinder<sup>1,2</sup>, R. Hanås<sup>3,4</sup>, P. Adolfsson<sup>3,5</sup>, H. Svensson<sup>6</sup>, M. Hiis<sup>2</sup>, B. Rathsmann<sup>1,2</sup>

<sup>1</sup>Karolinska Institute, Dep of Clinical Sciences and Education, Södersjukhuset, Stockholm, Sweden, <sup>2</sup>Södersjukhuset, Sachs' Children and Youths Hospital, Stockholm, Sweden, <sup>3</sup>University of Gothenburg, Sahlgrenska Academy, Institute of Clinical Sciences, Gothenburg, Sweden, <sup>4</sup>Uddevalla Hospital, Department of Pediatrics, NU Hospital Group, Uddevalla, Sweden, <sup>5</sup>The Hospital of Halland, Kungsbacka, Sweden, <sup>6</sup>Diassist Technology, Mölndal, Sweden

**Introduction:** Commercial hybrid closed loop insulin pumps are available for the treatment of type 1 diabetes. However, these systems have some limitations, especially for small children. While waiting for an optimal closed loop system, parents to children with diabetes have built own closed loop systems. The technologies are shared as open sources on internet.

**Objectives:** To evaluate glucose control, safety, and treatment satisfaction when using user-built hybrid closed loop systems (DIY) compared to the Minimed 670G hybrid closed loop system (670G) in the treatment of type 1 diabetes in children and adolescents.

**Methods:** This was a national cross-sectional study. Families who used DIY or 670G were asked to participate in the study via various Facebook pages or via the clinics. The requirement for participation was children and adolescents with type 1 diabetes, age 2–17 years, willingness to share all data from insulin pumps and CGMs, with technologies in use for at least 6 months. HbA1c values were obtained from clinic records. Treatment satisfaction was measured with the questionnaire DTSQ-parents.

**Results:** The children who used DIY (Omnipod or Dana pumps and Dexcom G6 or Libre) were younger, had lower HbA1c and mean glucose, higher percent time in range (TIR), time in target (TIT), and lower percent time above range level 1 (TAR lev1). There were no differences in time above range level 2 (TAR lev 2), time below range (TBR) or treatment satisfaction (table 1).

**Conclusions:** In this small study, both DIY and 670 G children had relatively well-controlled glucose control. DIY seems to be as safe as 670G regarding hypoglycemia frequency. The glucose control was slightly better in the children using DIY, but their younger age may partly explain this.

**POSTER TOUR 17—DIABETES IN SCHOOL**

**P153 | AIM for excellence: improving glycemic control in children and young people with type 1 diabetes at school**

K. Darwin<sup>1</sup>, J. Harding<sup>1</sup>, E. Gunn<sup>1</sup>, E. Cribb<sup>1</sup>, L. Joseph<sup>1</sup>

<sup>1</sup>Doncaster & Bassetlaw Teaching Hospitals NHS Trust, Bassetlaw Pediatric Diabetes Unit, Worksop, United Kingdom

**Introduction:** During the COVID-19 pandemic lockdown, glycemic control in children with Type 1 diabetes under our care improved. One of the reasons could be due to inconsistency in the management of diabetes at school. In order to address this possibility, our unit

Table 1. TIR, 3.9–10 mmol/L, TIT, 3.9–7.8 mmol/L, 70–140 mg/dl, TAR level 1: 10.1–13.9 mmol/L, 181–250 mg/dl, TAR level 2: >13.9 mmol/L, > 250 mg/dl, TBR level 1: 3.0–3.8 mmol/L, 54–69 mg/dl, TBR level 2: < 3.0 mmol/L, < 54 mg/dl

Variable	User-built closed loop n = 15	Minimed 670 n = 16	p-value * p < 0.05
Age, years (SD)	9.3 (4)	12.8 (4.9)	0.04
Male /Female (n/n)	11/4	8/8	
Diabetes duration, years (SD)	5.0 (2.6)	6.1 (4.1)	0.445
HbA1c mmol/mol (SD)	44.1 (4.2)	52.5 (7.1)	0.002*
HbA1c % (SD)	6.2 (0.4)	7.0 (0.6)	
Mean glucose, mmol/L (SD)	7.2 (0.7)	8.0 (0.9)	0.012*
TIR % (SD)	79 (7.4)	72 (7.5)	0.007*
TIT % (SD)	62 (9.1)	52 (9.3)	0.009*
TAR lev 1, % (SD)	12 (5.2)	18 (6.1)	0.009*
TAR lev 2, % (SD)	3.1(2.1)	4.9 (3.6)	0.115
TBR lev 1, % (SD)	3.8(2.1)	3.2 (2.1)	0.478
TBR lev 2, % (SD)	0.8 (0.6)	1.3 (1.6)	0.264
Treatment satisfaction	46.5 (6.7)	46.2 (6.4)	0.924

09.00-10.15 First Lesson		10.15-10.30 Morning Break		10.30-12.00 Second Lesson		12.00-13.00 Lunch		13.00-15.00 Afternoon Lesson		Home	
<p><b>P.E.</b></p> <ul style="list-style-type: none"> <li>Check CGM before P.E.</li> <li>Follow P.E guide on page 4.</li> </ul>		<p><b>After P.E.</b></p> <ul style="list-style-type: none"> <li><b>Above 14</b> <ul style="list-style-type: none"> <li>↑↑↑ give full correction as calculated.</li> <li>→↘↘ give ½ correction as calculated.</li> <li>↘↘ no correction needed.</li> <li>No snack.</li> </ul> </li> <li><b>11 - 14</b> <ul style="list-style-type: none"> <li>↑↑↑ give half correction.</li> <li>→↘↘, ↘↘↘ no correction needed.</li> <li>No snack.</li> </ul> </li> <li><b>7 - 10.9</b> <ul style="list-style-type: none"> <li>Watch and check CGM in 15 minutes. If having a snack work insulin dose out for this and adjust insulin as per trend arrows.</li> </ul> </li> <li><b>5.5-6.9</b> <ul style="list-style-type: none"> <li>↑↑↑, ↑↑, → watch and check in 15mins.</li> <li>↘ have 10g snack no insulin.</li> <li>↘↘ have 15g snack no insulin.</li> <li>↘↘↘ have hypo treatment.</li> </ul> </li> <li><b>4 - 5.4</b> <ul style="list-style-type: none"> <li>↑↑↑, ↑↑, → check CGM again in 5minutes.</li> <li>↘, ↘↘, ↘↘↘ follow hypo treatment until trend arrow is straight across or trending upwards.</li> </ul> </li> <li><b>Less than 4</b> <ul style="list-style-type: none"> <li>Hypo treatment.</li> </ul> </li> </ul>		<p><b>Lesson Two</b></p> <ul style="list-style-type: none"> <li>Check CGM.</li> <li>Look at direction of arrows. Calculate insulin dose, look at arrows and increase/reduce as needed. Correct above 5.                     <ul style="list-style-type: none"> <li>↑↑ add 30%</li> <li>↑ add 20%</li> <li>↔ add 10%</li> </ul> </li> <li>→ calculated dose</li> <li>↘ reduction of 10%</li> <li>↘↘ reduction of 20%</li> <li>↘↘↘ reduction of 30%</li> <li>Give insulin dose before lunch.</li> </ul>		<p><b>Lesson Three</b></p> <ul style="list-style-type: none"> <li>Check CGM before leaving school.</li> <li>Look at direction of arrows correct above 11 as per CGM education.                     <ul style="list-style-type: none"> <li>↑↑ add 30%</li> <li>↑ add 20%</li> <li>↔ add 10%</li> </ul> </li> <li>→ calculated dose</li> <li>↘ reduction of 10%</li> <li>↘↘ reduction of 20%</li> <li>↘↘↘ reduction of 30%</li> <li><b>4 - 5.4</b> <ul style="list-style-type: none"> <li>↑↑↑, ↑↑, → check CGM again in 5 minutes.</li> <li>↘ have 10g snack no insulin.</li> <li>↘↘ have 15g snack no insulin.</li> <li>↘↘↘ follow hypo treatment until trend arrow is straight across or trending upwards.</li> </ul> </li> <li><b>Less than 4</b> <ul style="list-style-type: none"> <li>Hypo treatment.</li> <li>Check CGM once home.</li> </ul> </li> </ul>					

### My CGM/MDI 'AIM' P.E. Guide

If you feel the advice in this timetable and P.E. guide is not working for you please talk to your diabetes team

## My CGM P.E. Action Plan

### Check blood glucose before P.E.!

- If BG less than 4: **Follow hypo guide.** Do not start P.E.
- If BG 4 - 5.4: ↘↘ Have hypo treatment and 20g carb snack with no insulin. ↘↘↘ Have hypo treatment and 10g carb snack with no insulin. → 15g carb snack with no insulin. ↔ 10g carb snack with no insulin. ↑↑, ↑ No action.
- If BG 5.5 - 6.9: ↘↘ Have hypo treatment and 15g carb snack with no insulin. ↘↘↘ Have hypo treatment and 10g carb snack with no insulin. → 10g carb snack with no insulin. ↑↑, ↑ No action.
- If BG 7 - 10.9: ↑↑, ↑↑↘ No action. Start P.E. ↘ No action but check again in 15mins. ↘↘ 10g carb snack with no insulin. ↘↘↘ 20g carb snack with no insulin.
- If BG 11 - 14: **Check ketones!**
  - Ketones less than 0.6?** Look at arrows and do as below.
    - ↘↘, ↘↘↘ No action check 15 mins into exercise. ↘↘↘ No action.
    - ↑↑↑ give 50% correction check in 15mins.
  - Ketones 0.6 or more?** Follow sick day rules. Do not start P.E.
- If BG above 14: **Check ketones!**
  - Ketones less than 0.6?** ↘↘, ↘↘ No action. ↘↘↘ Give 50% correction and check in 15mins.
  - ↑↑, ↑ Give full correction and check again in 15mins.
  - Ketones 0.6 or more?** Follow sick day rules. Do not start P.E.

**Examples of 10g snacks**

1 Digestive biscuit,  
1 light cereal bar  
(e.g. Alpen Light Bar)  
or 1 small apple/pear.

**Examples of 15g snacks**

2 Ginger biscuits,  
1 cereal bar (e.g. Kellogg's Special K Bar)  
or 1 medium banana/apple.

**Check blood glucose after P.E and take action if high or low. Remember to keep hydrated if your readings are higher than 11.**

Doncaster and Bassetlaw Teaching Hospitals  
NHS Foundation Trust

commenced a Quality Improvement Project to improve glycemic control of children with diabetes at school.

**Objectives:** Our Quality Improvement Project involved developing an educational tool called AIM - Activity, Insulin, Meals, an aid to

improve glycemic control at school based on insulin regime and type of glucose monitoring. AIM tool provides advice on insulin management at meal times and PE [Physical Exercise] along with a PE guide with specific advice on glycemic control around exercise.



**Methods:** We produced separate AIM guidance for the following groups:

1. Multiple Dose Insulin regime [MDI] using self-monitoring of blood glucose [SMBG]
2. MDI regime using CGM [Dexcom G6]
3. MDI regime using Flash Glucose scanning [Libre]
4. Continuous Subcutaneous Insulin Infusion [CSII] using SMBG
5. CSII using CGM
6. CSII using Libre

A sample AIM tool [1st & last pages] for the group using MDI with CGM is inserted below.

We introduced the AIM guidance to patients, parents, and school staff from mid October 2021 to end of February 2022. We are allowing 3 months to embed the guidance in the day to day management of children and young people with diabetes at school. We will then analyze the impact of the AIM educational tool on glycemic control by comparing HbA1c, time in range, average glucose, and coefficient of variability during a 6 weeks period. Post introduction data collection with start in June.

**Results:** Awaiting post introduction data collection for analysis. We are likely to have 25 patients with complete pre and post introductory data.

**Conclusions:** Based on the results. However we hope clear instructions using our educational tool 'AIM' will improve glycemic control in school going children and young people.

#### P154 | Type 1 diabetes (T1D) in Mauritius: Challenges in T1D management at school among children and adolescent living with T1D

L. Danharry<sup>1</sup>, A.K Auroomoogum<sup>1</sup>

<sup>1</sup>T1Diams NGO, Psychosocial / Medical, Quatre Bornes, Mauritius

**Introduction:** Children and adolescent spend 1/3 of a day in school and the management of their T1D is as important within the school environment, with frequent glucose monitoring, meal planning and insulin injection.

**Objectives:** Identify challenges at school for children and adolescent living with T1D. Accordingly, these challenges can inform delivery of T1D Complex Care support involving child and parents, classmates, school staff, T1Diams (NGO) and concerned ministries.

**Methods:** A cross-sectional study was carried out using a questionnaire to evaluate the situation with 100 children (6–18 years) and parents registered with NGO in Mauritius.

Recruitment took place between March 2021 and March 2022. The parents attended sessions of Therapeutic Education at NGO and the Biopsychosocial team. They were informed about the objectives of the study both verbally and written. The Study was conducted in adherence to ethical protocol.

**Results:** The questionnaires were completed by the parent or adolescent. The results show that hyper and hypo glycaemia occurs at any time, impacting child's learning, cognition, attention, and behavior.

There are no nurses in educational institutions in Mauritius. Children are not receiving proper T1D support and care. Due to lack support, school staffs are offered training, but they are still reluctant to intervene. Adolescents are most impacted mainly for non-adherence to treatment.

**Conclusions:** The introduction of intensive insulin therapy and the rising prevalence of diabetes in younger children has increased the need for involvement of the nurses and school personnel in T1D care. Schools should work together to implement T1D Complex Care support.

Keywords: School, T1DM, Diabetes Management, NGO.

#### P155 | Teachers' knowledge about diabetes. Cities changing diabetes in Poland

M. Zamarlik<sup>1</sup>, M. Gałązka-Sobotka<sup>2</sup>, I. Kowalska-Bobko<sup>1</sup>, M. Polak<sup>1</sup>

<sup>1</sup>Jagiellonian University Medical College, Institute of Public Health, Krakow, Poland, <sup>2</sup>Lazarski University, Warszawa, Poland

**Introduction:** International studies show that people living in cities are nearly twice as likely to suffer from diabetes as rural dwellers. The situation is similar in Poland, where over 65% of people affected by diabetes live in the city.

Cities influence how people live, eat and spend their free time. The development of the agglomeration, its dynamics, and pace contribute to a change in the lifestyle of the inhabitants, which also translates into the development of civilization diseases. School is an important place to promote health, proper eating habits, and physical activity. The quality of school activities is influenced by the knowledge, personal behavior, and attitudes of teachers.

**Objectives:** The aim of the study is to establish the level of knowledge about diabetes among teachers from Cracow and Warsaw. Other motivations were to learn about teachers' opinions on overweight, to get data about their lifestyle.

**Methods:** In order to obtain the above-mentioned information, a questionnaire was conducted, provided to teachers by City Halls. A 3061 people from Kraków and 1190 from Warsaw participated.

**Results:** The highest rate of correct answers to the topic of diabetes was recorded in the 46–55 age group. In general, teachers have the least amount of information on the causes and symptoms of diabetes, as well as on the management of hyperglycemia and hypoglycemia. With age, the problem of obesity increases (the highest dynamics is observed in the 35–45 age group), as well as regular physical activity and diet (the highest in the age groups 44–55). The youngest teachers are the most critical and the least active in pro-health activities undertaken by schools, teachers aged 46–55 are the most satisfied.

**Conclusions:** The data from the study show that the school is a very important place for health promotion. Teachers' competences should be regularly improved and they should be actively involved. System and local government interventions as well as interventions carried out directly in educational institutions are needed.

### P156 | Young children with T1D experiences of using diabetes technology in the primary school setting: A narrative review of the literature

T. O'Neill<sup>1</sup>, E. Hollywood<sup>1</sup>

<sup>1</sup>Trinity College Dublin, School of Nursing and Midwifery, Dublin, Ireland

**Introduction:** Type 1 Diabetes is a complex chronic autoimmune disorder and is one of the most common and fastest growing chronic health conditions in childhood. In recent times, advances in technology have become an integral part of T1D management, including Continuous Subcutaneous Insulin Infusion (CSII) devices, CGM's and other emerging technologies, such as closed loop systems. Having T1D can place challenges on the child's school experience from an academic, social, and emotional perspective and despite the advances in diabetes technology, daily management remains too complex for young school aged children to undertake independently; especially during the primary school day.

**Objectives:** To provide a comprehensive and objective review of studies regarding the experiences of young children aged between 6 and 12 years, with T1D who use diabetes technologies such as continuous Insulin Infusion Pumps (CSII), glucose sensors and other emerging technologies, focusing on their experiences in the primary school setting.

**Methods:** The literature search was conducted using key medical healthcare databases to source appropriate literature to answer the key question. Literature from the years 2000 and 2022 were included, as diabetes treatment changed to insulin pump therapy during this time, therefore articles prior to this were not deemed relevant. Key concepts in relation to the research question with appropriate index terms and keywords were used. Articles that meet the inclusion criteria were screened and analyzed to unearth the relevant themes within the literature.

**Results:** A total of 9 studies were identified as appropriate for inclusion in the review.

**Conclusions:** Findings will give a greater awareness of the experiences of the young child with T1D. It will also demonstrate the significant lack of research in this area. Further research will also inform future diabetes health and primary school related service provision and provide a voice for the young school aged child.

### P157 | Supporting children with type 1 diabetes: Experiences of school personnel

S. Banka Cullen<sup>1</sup>, H. Fitzgerald<sup>2</sup>, E. Hollywood<sup>1,3</sup>

<sup>1</sup>Trinity College Dublin, School of Nursing and Midwifery, Dublin, Ireland, <sup>2</sup>Child Health Ireland Tallaght, Pediatric Diabetes, Dublin, Ireland, <sup>3</sup>Trinity College Dublin, Dublin, Ireland

**Introduction:** The aim of the study was to evaluate a structured, hospital based educational program on the care and management of type 1 diabetes for children in the primary school setting.

**Objectives:** The objectives of the study were:

To explore the experiences of school personnel regarding the care and management of children with type 1 diabetes in the primary school setting.

To identify the facilitators and barriers to providing support to children who have type 1 diabetes in the primary school setting.

To explore the experiences of schools in relation to accessing support services for the care and management of children who have type 1 diabetes attending primary school.

To identify the views of the nurse-led structured educational program following completion by school personnel.

To identify potential avenues for improvement in relation to education and support from the perspective of primary school personnel.

**Methods:** Following ethical approval, a mixed methods approach was adopted to achieve the study aim. A two phased approach was used, phase one consisted of a retrospective audit of anonymous program attendee feedback forms and attendance information collated by the pediatric diabetes nursing team. Phase two involved an examination of school personnel's experiences of providing care and support to children with type 1 diabetes in the primary school setting. Data analysis was conducted with the use of SPSS, Excel, and NVivo.

**Results:** Three themes were identified: supporting care, multiple practical challenges and outreach education.

**Conclusions:** The education program needs to continue with peer review to maintain standards. All schools that have children with type 1 diabetes in attendance should be offered the program and encouraged to participate. The experiences of children with type 1 diabetes who attend primary school need to be explored to find out what children think about the care and management of their diabetes while at school.

Number of studies	Focus of the study	Authors
1	The young child's experiences of using diabetes related technology specifically in the primary school environment	(Benassi et al. 2013)
2	The young child's experiences of using diabetes technology in the management of their diabetes	Freeborn et al. 2013 Alsaleh et al. 2014
6	The young child's experiences of T1D care in the school environment	Amillategui et al. 2009 Schwartz et al. 2010 Edwards et al. 2014 deCassia et al. 2017 Fried et al. 2018, Ješić et al. 2016

**P158 | The diabetes and school health program (DASH): A health equity intervention to optimize school based care for children with T1D**

K. Gandhi<sup>1</sup>, A. Moffett<sup>2</sup>, K. Simms<sup>2</sup>, R. Cline<sup>2</sup>, M. Moore<sup>2</sup>, A. Jones<sup>3</sup>, M.K. Irwin<sup>2</sup>, A. Wood<sup>1</sup>

<sup>1</sup>Nationwide Children's Hospital, The Ohio State University College of Medicine, Endocrinology and Diabetes, Columbus, United States, <sup>2</sup>Nationwide Children's Hospital, Community Wellness, Columbus, United States, <sup>3</sup>Nationwide Children's Hospital, Ambulatory Pharmacy, Columbus, United States

**Introduction:** The Nationwide Children's Hospital (NCH) Diabetes and School Health program (DASH) is an interdisciplinary intervention that provides school-based support to students with high risk for complications of T1D.

**Objectives:** DASH aims to reduce risk by addressing inequities, supporting school nurses and staff, standardizing care, improving self-efficacy, providing psychosocial support, and optimizing communication between schools, families, and the diabetes team.

**Methods:** Over 2000 school-aged patients receive T1D care at NCH. Nearly 20% have been identified as high risk for complications (score < 10 on scale 1–18) based on the Diabetes Composite Score, a novel tool developed at NCH. The pilot aimed to enroll over 50 patients in central Ohio with scores <10. Once enrolled, DASH completed monthly one-on-one in-school appointments, provided formal and informal education to school staff, couriered medications and supplies to home and school, coordinated care with NCH, and facilitated screenings and referrals. Baseline and follow up data were obtained including A1C, appointment attendance, CGM use, T1D complication, and acute care use, as well as survey data for students, school staff, and caregivers.

**Results:** A 53 students across 10 districts enrolled. The majority endorsed T1D “burn out,” and most caregivers noted feeling defeated by T1D care. Majority utilized injections, 50% had never used a continuous glucose monitor, mean A1C was 12%. More than 60% identified as an ethnic minority, 3% as gender diverse. Follow up data show CGM use increased by 27%, attendance at routine appointments increased by 40%, and overall risk decreased to intermediate.

**Conclusions:** DASH is an innovative, interdisciplinary school-based intervention designed to address inequities, enhance collaboration, improve self-efficacy and psychosocial wellness, and reduce risk of complications. The pilot year proved DASH to be sustainable and effective in creating positive impact on health outcomes and working toward achieving equity in T1D care.

**P159 | Diabetes providers' experiences with school-based diabetes care: What's our report card?**

C. March<sup>1,2</sup>, L. Siminerio<sup>3</sup>, T. Kazmerski<sup>1,2</sup>, A. Albanese-O'Neill<sup>4</sup>, E. Miller<sup>1,2</sup>, I. Libman<sup>1,2</sup>

<sup>1</sup>University of Pittsburgh, Pediatrics, Pittsburgh, United States, <sup>2</sup>UPMC Children's Hospital of Pittsburgh, Pittsburgh, United States, <sup>3</sup>University of

Pittsburgh, Medicine, Pittsburgh, United States, <sup>4</sup>University of Florida, Family, Community, and Health System Science, Gainesville, United States

**Introduction:** ISPAD recommends collaboration among parents, medical providers, and schools to support children with diabetes. Our prior work found that school staff identify communication challenges. Diabetes provider perspectives are unknown.

**Objectives:** To understand providers' experiences with and support for school-based diabetes care (SBDC).

**Methods:** We conducted a national survey of pediatric diabetes providers (physicians, mid-level providers, and diabetes care and education specialists, DCES) in the United States through the Pediatric Endocrine Society. Questions addressed beliefs related to SBDC, current practices, and perceived barriers/facilitators.

**Results:** Participants returned 131 completed surveys (91% physicians, 76% female, mean age 43 years, 65% white). Nearly all (94%) indicated SBDC was very important. Though most (63%) counseled families once/year, few (17%) spoke with school staff regularly, reporting that was a shared responsibility by providers (66%), DCES (88%), nurses (37%), and social workers (36%). Moderately to extremely significant barriers included limited staff resources (66%), time (83%), ease of communicating with school staff (54%), need for school nurse education (62%), and differing policies across school districts (69%). There were no significant differences in reported barriers by the location, size, and type of practice. Desired facilitators for SBDC included a designated school liaison (84%), electronic forms for schools (89%), and accessible educational tools for school staff (95%). Over 90% of providers agreed feedback from schools about their patients' SBDC would be helpful, yet only 30% routinely requested this input.

**Conclusions:** Providers recognized the importance of SBDC for their patients. Systems-level factors (e.g., time, resources, and lack of formal processes for communication) may limit their ability to promote SBDC regardless of practice setting. Future research should establish supportive infrastructure to maximize school-provider-parent collaboration.

**P160 | School based training and education program with psychological and peer support (STEPPS) initiative for children and young people living with type 1 diabetes**

H. Day<sup>1</sup>, M. Quinn<sup>1</sup>, L. McCaffrey<sup>1</sup>, H. Kyrios<sup>1</sup>, R. Hubbard<sup>1</sup>, L. Finnigan<sup>1</sup>, D. Pintus<sup>1</sup>, D. Bray<sup>1</sup>, S.M. Ng<sup>1,2</sup>

<sup>1</sup>Southport and Ormskirk Hospital Trust, Childrens Diabetes, Ormskirk, United Kingdom, <sup>2</sup>University of Liverpool, Liverpool, United Kingdom

**Introduction:** The delivery of structured diabetes education can be challenging in children and young people (CYP) with T1D.

**Objectives:** The STEPPS program was initiated to enable a positive learning environment for diabetes education based in school and to promote living well with diabetes.

**Methods:** Single center using mixed methods analysis of quantitative and semi structured qualitative analysis, were used to view the effectiveness of delivering a structured education, psychological and peer support in schools. The educational training package utilizes 'The Goals of Diabetes' validated structured education program as the foundation for planning the education pathway where each age groups' needs were identified and could be met. The learning was split into five sections and lesson plans were created for each section led by a specialist nurse, educator, dietitian and psychologist based in school. Each lesson plan incorporated a psychological solution-based approach with the groups being able to relate to their own individual experiences. The qualitative arm was undertaken by the team psychologist.

**Results:** There were 40 young people age 11–16 included in the STEPPS program. The preliminary findings showed that 75% of the CYP although they highlighted knowledge around their diabetes, 50% of them still found it difficult to seek help and were unable to feel confident to ask for this help when in school. A 37.5% found it difficult to also talk to their friends. Following completion of the STEPPS program 100% identified increased knowledge in the understanding of their diabetes, evidence showed that there was an improvement of CYP feeling like their teachers understood their diabetes and they were more confident to seek support in school. Findings also showed that the CYP had increased confidence to talk to peers.

**Conclusions:** The STEPPS program provided the CYP with an alternative learning environment, creating a platform where they could share and relate these experiences with their peers.

## POSTER TOUR 18—ASSOCIATED DISEASES # 1

### P161 | Time trend and potential risk factors for celiac disease development in children with type 1 diabetes mellitus: 10-year single center experience in the Emirate of Abu Dhabi-UAE

F. Ahmed<sup>1</sup>, S. Al Jneibi<sup>2</sup>, J. Rajah<sup>3</sup>, S. Al Remeithi<sup>2</sup>

<sup>1</sup>Sheikh Khalifa Medical City, Educational Institute, Pediatric Residency Program, Abu Dhabi, United Arab Emirates, <sup>2</sup>Sheikh Khalifa Medical City, Educational Institute, Endocrine Division, Abu Dhabi, United Arab Emirates, <sup>3</sup>Sheikh Khalifa Medical City, Department of Pediatric, Abu Dhabi, United Arab Emirates

**Introduction:** The frequency of coexistence of T1DM and CD is widely described, ranged from 2.5% to 16.4% worldwide. The risk of CD is higher among younger children, females and during the first few years of T1D diagnosis.

**Objectives:** Describe demographic and clinical characteristic of children with CD with underlying diagnosis of T1DM.

Estimate the incidence and time trend of CD diagnosis among children of T1DM in our cohort.

Evaluate for potential factors that increase the risk of development of CD among this cohort.

**Methods:** Retrospective chart review of EMR of children with T1DM attended pediatric endocrine clinic during the period 2010–2021.

**Results:** 898 patients with T1DM were identify. A 93 developed CD during the study period, incidence of CD was 10.4%. A 52.7% of CD/T1DM were females. The mean age at CD diagnosed of  $8 \pm 3.5$  years, with the average duration of diabetes of 2.9 years  $\pm$  (2.8) prior to CD diagnosis. Majority (64.5%) were asymptomatic for CD and were identified through routine screening. 83% developed CD over the first 5 years of T1DM diagnosis. All CD/T1DM had positive serology for CD, 79.5% underwent endoscopic duodenal biopsy, 90.5% of them showed villous atrophy. Risk factors of CD development in our cohort include: Age  $\leq 8$  years at time of T1DM diagnosis ( $P = 0.003$ ) and positive family history of CD ( $P = 0.001$ ). Coexistence of autoimmune thyroid disorder and gender were not significant predictor of developing CD in our cohort ( $P = 0.056$ ) and ( $P = 0.8$ ) respectively.

**Conclusions:** Incidence of CD among children with T1DM in our setting is 10.4%.The estimated cumulative risk of CD is significantly higher in younger children and those with positive FHx of CD. Majority (64%) were asymptomatic for CD and identified through routine screening. More than wo third of children with CD were diagnosed during the first 5 years diabetes. These findings support the importance of implementing routine CD screening among children with T1DM in order to reduce the risk of potential health related consequences of un- diagnosed CD.

### P162 | Metreleptin reversing diabetes mellites and other metabolic derangement in a patient with congenital generalized lipodystrophy

S. Dehidi<sup>1</sup>, J. Al Jubeh<sup>2</sup>

<sup>1</sup>Sheikh Khalifa Medical City, Pediatrics, Abu Dhabi, United Arab Emirates, <sup>2</sup>Sheikh Khalifa Medical City, Pediatric Endocrinology, Abu Dhabi, United Arab Emirates

**Introduction:** Congenital Generalized Lipodystrophy (CGL) is an autosomal recessive disease characterized by total loss of adipose tissue formation. Patients usually have distinctive physical features, and prone to develop diabetes, hypertriglyceridemia, and liver cirrhosis secondary to deficiency in hormones secreted by adipocytes.

**Objectives:** In this study, we describe the effect of a novel hormonal therapy in preventing disease progression and reversing diabetes and other metabolic derangements.

**Methods:** A 2- year-old female presented with hyperphagia and unique appearance. Examination revealed scant subcutaneous fat, bulky muscles, acanthosis, hirsutism, macrognathia, large hands, and feet. Initial workup was unremarkable, genetic testing revealed a homozygous mutation in the AGPAT2 gene coding a key enzyme in adipogenesis pathway diagnostic for CGL.

During childhood, her blood glucose levels and liver enzymes remained normal, but TGs levels were slightly elevated. At the age of 14, she developed diabetes, started on Insulin MDI therapy with a gradual increase in requirement reaching 3.6 U/kg/day. She had persistently elevated triglyceride levels despite Fenofibrate treatment



and elevated liver enzymes [AST] 41–59 IU/L, [ALT] 57–81 IU/L along with ultrasonographical evidence of fatty liver disease.

She was started on daily subcutaneous Metreleptin: a synthetic analog of leptin; hormone deficient in patients with GLD.

**Results:** After initiation of treatment, we observed a dramatic improvement in her metabolic disturbances: Insulin was tapered and stopped in 3 months. She achieved HbA1c of 5.2% 8 months after starting Metreleptin. Her liver enzymes and triglyceride levels normalized and Fenofibrate was stopped totally.

**Conclusions:** Metreleptin treatment in patients with CGL resulted in a complete reversal of hyperglycemia, hypertriglyceridemia, and normalization of transaminitis Preventing lethal complications and rendering the use of other medical treatments like Insulin and Fenofibrate unnecessary.

**P163 | Celiac disease in children with type 1 diabetes—Relation to age, sex, and duration of T1D**

J. Samuelsson<sup>1,2</sup>, R. Bertilsson<sup>3</sup>, A. Carlsson<sup>4,5</sup>, R. Hanas<sup>6,7</sup>, K. Åkesson<sup>1,2</sup>

<sup>1</sup>Ryhov County Hospital, Department of Pediatrics, Jönköping, Sweden, <sup>2</sup>Linköping University, Linköping, Sweden, <sup>3</sup>Center of Registers in Region Västra Götaland, Gothenburg, Sweden, <sup>4</sup>Skåne University Hospital, Department of Pediatrics, Lund, Sweden, <sup>5</sup>Lund University, Lund, Sweden, <sup>6</sup>Gothenburg University, Sahlgrenska Academy, Gothenburg, Sweden, <sup>7</sup>NU Hospital Group, Department of Pediatrics, Uddevalla, Sweden

**Introduction:** There is a known co-morbidity regarding type 1 diabetes (T1D) and other autoimmune diseases. This can, at least in part, be explained by a genetic susceptibility to development of these diseases. Previous studies in Sweden in T1D patients have found a prevalence of 7%–10% of celiac disease, with the highest risk of developing celiac disease within the first 2 years after diagnosis.

Current ISPAD recommendation is to screen for celiac disease the first 5 years after diagnosis.

**Objectives:** To study celiac comorbidity in subjects with T1D diagnosed <18 years of age in Sweden.

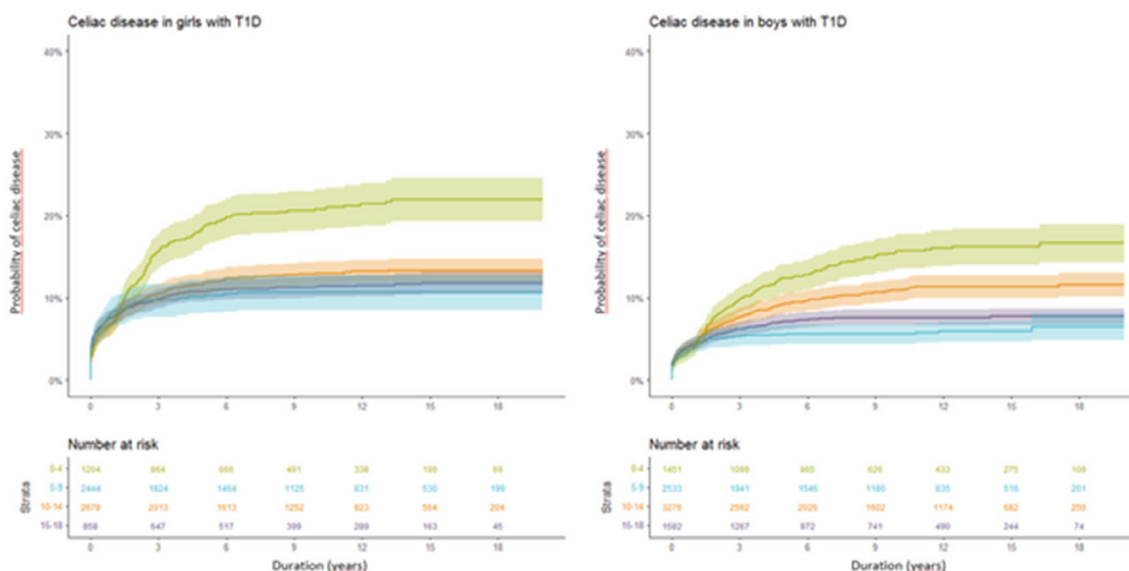
**Methods:** All pediatric patients in NDR/Swediabkids, the nationwide Swedish National Diabetes Register, diagnosed and registered from year 2000 to 2019 were included (n = 16,026, 8842 boys and 7184 girls). This population was linked with the Swedish National Patient Register in order to acquire ICD codes. The risk of being diagnosed with celiac disease was estimated with Kaplan–Meier survival analysis. Subjects were divided into 4 groups depending on age at diabetes onset. If celiac disease diagnosis occurred pre diabetes diagnosis, then the event occurred in time = 0. The analyzes were made separately for girls and boys.**Results:** The risk of a combination of the two diagnoses was significantly higher in children diagnosed with T1D in younger age and especially in girls. Although the risk was highest the first years after T1D diagnosis, there were still children diagnosed with celiac disease after more than 15 years of T1D duration.

**Conclusions:** Children diagnosed with T1D at young age have a higher risk of developing celiac disease and these children need to be screened for celiac disease more than 5 years after T1D diagnosis. If the increased risk is due to genetic factors as well as the impact of celiac disease on metabolic control and risk of complications in these children need to be further analyzed.

**P164 | McCune-Albright syndrome associated with diabetes mellitus**

m. Ben lafqih<sup>1</sup>, M. Alhayane<sup>1</sup>, S. Rafi<sup>1</sup>, G. El Mghari<sup>1</sup>, N. El Ansari<sup>1</sup>  
<sup>1</sup>University Hospital Mohammed VI, Marrakech, Morocco

**Introduction:** McCune–Albright syndrome (MAS) is a rare non-hereditary genetic mosaic disease, the diagnosis is most often made in childhood by the clinical triad associating precocious puberty, fibrous



bone dysplasia and skin hyperpigmentation associated with other endocrinopathies or hepatobiliary disorders. The association of diabetes with McCune–Albright syndrome remains rare.

**Objectives:** We report the case of a patient with syndrome McCune–Albright associated with diabetes mellitus.

**Methods:** A, H 22 years old, at the age of 6 months presented skin macules. At the age of 3 years he developed gait disorders, a taller stature compared with other children of the same age and gender with craniofacial malformations, then signs of precocious puberty with secondary sexual characteristics at the age of 7 years. Bone scintigraphy objectified diffuse hyper fixation and diffuses deforming hyperostosis. Around the age of 12 years, diabetes mellitus was diagnosed with negative Ac anti GAD.

**Results:** Diabetes in McCune–Albright syndrome is a described association but without obvious causal link, hyperglycemia secondary to GH excess or hypercorticism was incriminated, papillary intraductal mucinous tumors with obstruction of the intra pancreatic ductal system and induction of low grade pancreatitis, parenchymal atrophy and endocrine dysfunction responsible for type 2 diabetes, for type 1 diabetes no potential link is evoked but the fortuitous association is described in several case reports.

**Conclusions:** Different types of diabetes can be associated with the syndrome but the pathophysiology remains unclear.

#### P165 | Metreleptin treatment in congenital generalized lipodystrophy

I. Ullah<sup>1</sup>, A. Al-Shidhani<sup>1</sup>, H. Al Saffar<sup>1</sup>, S. Al Yaarubi<sup>1</sup>

<sup>1</sup>Sultan Qaboos University, Child Health Department, Muscat, Oman

**Introduction:** Congenital generalized lipodystrophy (CGL) is a rare autosomal recessive disorder characterized by a generalized lack of adipose tissues in the body leading to deposition in ectopic tissues. Insulin resistance is one of the common features of the disease especially in type 2 congenital lipodystrophy. Most of the affected individuals also have high levels triglycerides in blood. Type 2 is more common than type 4 in Europe, however in Middle East type 4 is not uncommon.

**Objectives:** To study the characteristics of different types of congenital generalized Lipodystrophy and effect of Metreleptin management.

**Methods:** We studied two sisters with Congenital Lipodystrophy and its long term out come in terms of glycemic control and development of Diabetes mellitus with or without Metrelptin treatment.

**Results:** We are Presenting a child with Type 2 congenital generalized Lipodystrophy with severe insulin resistance, Type 2 diabetes mellitus and Dyslipidemia requiring very high doses of Insulin without any biochemical or clinical response. She also has developed liver cirrhosis and chronic renal disease. Metreleptin treatment was not supported due to her severe morbidities. Her younger sister was diagnosed earlier and started on Leptin treatment; she is doing very well with a normal Hb A1c.

Patients with Type 4 Lipodystrophy have less metabolic complications and doing well with or without Leptin in our cohort.

**Conclusions:** In Oman CGL is not uncommon. Type 4 CGL seems to be more prevalent in the region compared to other parts of the world. We described a case series of CGL with the first patient treat with metreleptin successfully in the Middle East and the outcome post treatment. The response of patient with type 4 CGL treated with metreleptin need further follow up and a larger number to establish cost benefit.

#### P166 | Type 1 diabetes mellitus in pediatric celiac disease: Prevalence and clinical predictors

F. Aljuraibah<sup>1,2,3</sup>, N. Alhamied<sup>1,2,3</sup>, A. Alajlan<sup>1,2,3</sup>, A. Alsunaid<sup>1,2,3</sup>

<sup>1</sup>King Abdullah Specialist Children's Hospital, King Abdulaziz Medical City, Ministry of National Guard Health Affairs, Pediatric Department, Riyadh, Saudi Arabia, <sup>2</sup>College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia, <sup>3</sup>King Abdullah International Medical Research Center, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia

**Introduction:** Celiac disease (CD) is a chronic autoimmune disorder characterized by a certain serological and histological changes that cause damage to the mucosa of the small intestine. It is induced by gluten ingestion in genetically susceptible individuals. The association between Type1 diabetes mellitus (T1DM) and CD has long been determined in several studies. The incidence rate of CD among T1DM ranges between 1.5% and 10%, which is higher than 10 folds in comparison with general population. However, the incidence of T1DM in CD is less well established in the literature.

**Objectives:** The aim of this study to determine the prevalence of T1DM in children with Celiac disease as well as clinical predictors of T1DM in patient with celiac disease.

**Methods:** This retrospective study analyzed the data of 226 patients who were diagnosed with celiac disease in a period between 2015 and 2019 at King Abdullah Specialist children hospital. A 50 patients who diagnosed first with T1DM were excluded from our study.

**Results:** The study included 176 cases (mean age  $\pm$  SD  $8.7 \pm 3.3$  years, 66.1% [n = 117] were females) The mean BMI was  $15.6 \pm 3.5$  kg/m<sup>2</sup>. 21.5% (38) cases were found to have family history of celiac disease, whereas 9.1% (16) cases were having family history of other autoimmune disease. However, 10.8% (19) have developed celiac and T1DM at the same time. Short stature and family history of CD were independently associated with development of T1DM (P = 0.013 and 0.026, respectively), but age, gender, family history of other autoimmune disorders, and adherence to gluten free diet did not associate with development of T1DM.

**Conclusions:** In pediatrics, 5.7% of CD cases developed T1DM, which was more common in cases with a family history of CD or short stature. Periodic clinical assessment of T1DM should be considered in cases of CD, especially if there is a short stature or a family history of CD, which needs to be proven through more prospective studies.

**P167 | 7-month-old infant with early onset thiamine responsive megaloblastic anemia (TRMA), diabetes mellitus and sensorineural hearing loss, case report**M. Saleh<sup>1</sup>, M. Mustafa<sup>2</sup>, B. Yacop<sup>3</sup>, M. Helmi<sup>1</sup><sup>1</sup>Al Jalila Hospital, Dubai, United Arab Emirates, <sup>2</sup>Al Jalila Hospital, Pediatric Endocrinology, Dubai, United Arab Emirates, <sup>3</sup>Al Jalila Hospital, Pediatrics, Dubai, United Arab Emirates

**Introduction:** Thiamine-responsive megaloblastic anemia syndrome (TRMA) a rare autosomal recessive condition described by megaloblastic anemia, diabetes mellitus, and progressive sensorineural hearing loss. The onset occurs between infancy and adolescence. Thiamine treatment is correct the anemia, but the red blood cells remain macrocytic; the anemia can recur when thiamine treatment seized. Progressive sensorineural hearing loss can be started early in toddlers; it is irreversible and might not be avoided by thiamine treatment. The nature of diabetes mellitus is non-type 1 and the onset is from infancy to adolescence.

We report a 7-month-old male infant with megaloblastic anemia, thrombocytopenia, and diabetes mellitus. He had significant sensorineural hearing loss that detected upon admission. TRMA was confirmed genetically. He had dramatic response of anemia, thrombocytopenia, and glycemic control to exogenous thiamine therapy.

**Objectives:** To identify different presentation of diabetes associated diseases.

**Methods:** Diagnosis made on clinical features, laboratory findings, and molecular genetic test.

**Results:** Full blood count: hemoglobin 5.6 g/dl (low), hematocrit 18.4%, RBC count  $2.00 \times 10^6$ /ul, white blood cell counts  $12.9 \times 10^3$ /ul, platelet count  $66 \times 10^3$ /ul, MCV 91.9 fl, MCH 27.7 pg, MCHC 30.2 g/dl. The peripheral smear showed dimorphic, hypochromic, and normochromic red cells with poikilocytosis, few elliptocytes, fragmented RBCs, macrocytic, and occasional teardrop cells. Serum folate concentration was 16.4 ng/ml (normal), Vitamin B1: 19.1 Mg/1 (low). Whole exome sequencing identified SLC19A2 as pathogenic gene of Roger syndrome.

**Conclusions:** TRMA syndrome should be kept in mind especially in neonates and children presenting with a triad of megaloblastic

anemia, diabetes mellitus and hearing impairment. Genetic analysis warranted to confirm the diagnosis. We believe that early genetic testing and establishment of thiamine treatment can correct anemia and accomplish euglycemic along with enhancement of the glycemic control.

**P168 | Case report use of liraglutide in steroid induced diabetes mellitus in a pediatric patient**M. Taher<sup>1</sup>, N. Abdullah<sup>2</sup><sup>1</sup>Sheikh Khalifa Medical City, Pediatrics, Abu Dhabi, United Arab Emirates, <sup>2</sup>Sheikh Khalifa Medical City, Pediatrics Endocrinology, Abu Dhabi, United Arab Emirates**Introduction:**

Patients who receive Glucocorticoids (GC) are at risk of developing hyperglycemia and/or steroid induced diabetes (SID).

The mainstay of treatment for SID is subcutaneous insulin administration. There is no evidence of the efficacy and safety of oral hypoglycemic agents in the management of SID and are not recommended for use in pediatric patients.

Liraglutide is a Glucagon-like peptide-1 (GLP-1) agonist that was approved by the FDA and EMA in 2019 for children  $\geq 10$  years with type 2 diabetes.

**Objectives:** Discuss the effect of Liraglutide on SID in pediatric patients.

**Methods:** A 10 years old boy, with steroid dependent nephrotic syndrome, on active chronic oral prednisolone treatment. He developed intermittent hyperglycemia (fasting blood glucose (BG) rise up to 7 mmol/L and post meal BG rise up to 10.9 mmol/L). His (HbA1c) was 6.6%. His weight was 59.10 kg, BMI 33.41 kg/m<sup>2</sup>, BMI > 99.45 centile and BMI z-score 2.55. The patient was commenced on Liraglutide. His prednisolone dose varied during the 6 months period; however, he was never off the medication.

During 6 months of follow up, we monitored: Home capillary blood glucose testing results, HbA1c, Weight, BMI, BMI z scores, Hypoglycemic episodes and other side effects of Liraglutide.

**Results:** After 6 months of Liraglutide treatment his intermittent hyperglycemia completely resolved and HBA1C improved to 5.4%. His other anthropometrics parameters are:

Timing	Initial presentation	At 3 months of Liraglutide commencement	At 6 months of Liraglutide commencement
Weight	59.10 kg	56.90 kg	52.30 kg
BMI	33.41 kg/m <sup>2</sup>	32.07 kg/m <sup>2</sup>	28.82 kg/m <sup>2</sup>
BMI centile	> 99.45	99.33	98.82
BMI z-score	2.55	2.47	2.26

Note: The patient developed gastrointestinal symptoms, however these resolved completely over 3 months period.

Note: No episodes of hypoglycemia were noticed. Patient reported reduced appetite and improved eating behavior.

**Conclusions:**

- The use of Liraglutide in pediatric onset SID is not reported in the literature
- Liraglutide in conjunction with lifestyle intervention led to significant improvement of SID and HbA1c, marked reduction in our patient's weight and BMI Z Scores
- We recommend that further studies are required to support the use of Liraglutide in carefully selected pediatric patients with SID.

**P169 | Hyperglycemia in pediatric liver transplantation**S. Welsch<sup>1</sup>, V. Maillieux<sup>1</sup>, E. Sokal<sup>1,2</sup>, R. Reding<sup>2</sup>, P. Lysy<sup>1,3</sup>

<sup>1</sup>UCLouvain, PEDI, Institut de Recherche Expérimentale et Clinique, Brussels, Belgium, <sup>2</sup>Cliniques Universitaires Saint-Luc, Pediatric Abdominal and General Surgery, Brussels, Belgium, <sup>3</sup>Cliniques Universitaires Saint-Luc, Pediatric Endocrinology Unit, Brussels, Belgium

**Introduction:** After liver transplant (LT), hyperglycemia (HG) is a common complication and is associated to an unfavorable prognosis, a persistent diabetes on set and an increased cardiovascular event. However, in pediatric LT, incidence of HG, its occurrence, persistence, and predispositions remain understudied.

**Objectives:** Therefore, the objectives of our study were the characterization and evolution of hyperglycemia in children with LT and the analysis of their glycemic profile.

**Methods:** We collected 7-years data about 195 children with LT in Brussels to characterize hyperglycemia and associated risk factors in multivariate analyzes, and we followed five children with LT during the most critical moment of HG to analyze their glycemic profile. Hyperglycemia was defined as a glycemia exceeded 200 mg/dl, for at least two measurements separated by 24 h, outside the day of LT.

**Results:** Our retrospective study showed that 24% of LT children presented hyperglycemia and its onset was between 0 and 14 days after transplant. Multivariate analysis showed that children with LT who benefited of steroids (OR 2,51) for a graft rejection and/or had a virus infection (OR 2,05) were more at risk to develop hyperglycemia. Glucose sensors showed that HG was present in the post-prandial afternoon for all LT children.

**Conclusions:** Our study shows that children with LT were more at risk of developing hyperglycemia when they required the use of steroids or when they had a viral infection, and that the measurement of blood glucose during the first month post-transplant and in the post-prandial period is essential to detect glycemic abnormalities.

**P170 | Evaluation of serum adiponectin, its relation to insulin resistance in children and adolescents with type 1 diabetes**R. Shamma<sup>1</sup>, A. Helmy<sup>1</sup>, H. Soliman<sup>1</sup>

<sup>1</sup>Cairo University School of Medicine, Pediatric Endocrinology & Diabetes, Cairo, Egypt

**Introduction:** Adiponectin is an adipokine that is generated and released by adipose tissues and is well known for its anti-diabetic, anti-inflammatory, anti-atherogenic, and cardioprotective properties (*Lee and Shao, 2014*). Additionally, hypoadiponectinemia is a marker of insulin resistance.

**Objectives:** This study aimed to determine the serum level of adiponectin and its relation to insulin resistance in children and adolescents with Type 1 diabetes mellitus (T1DM).

**Methods:** This cross-sectional study included 65 (n = 65) children diagnosed with T1DM who were following up at Diabetes, Endocrine, and Metabolism Pediatric unit (DEMPU) at Cairo University Children's Hospital from November 2020 to January 2021. Demographic, clinical data, investigations, and management details were collected from patients' medical records in addition to evaluation of serum level of adiponectin level using Human adiponectin ELISA Kit. Data management and statistical analysis were performed using Statistical Package for Social Sciences (SPSS) version 24.

**Results:** There was male predominance with male to female ratio 1.3:1, their mean age was 12.6 ± 2 years, the mean age of diagnosis was 7.3 ± 2.8 years. A 82% (82.4%) of the participants were poorly controlled as the mean HbA1c was 9.6 ± 1.5. A 93% (93.8%) of the participants were dyslipidemic. About (40%) of diabetic patients had low serum adiponectin with mean value 2.4 ± 3.6. There was statistically significant difference between patients with normal and low adiponectin regarding age of diagnosis of diabetes, body mass index, occurrence of microalbuminuria, LDL level with p values 0.04, 0.015, 0.022, 0.011 respectively.

**Conclusions:** Serum adiponectin level may be low in children with T1DM. There was also an association between lower adiponectin levels in diabetic children, occurrence of microalbuminuria and dyslipidemia as well. But no reported association between its level and insulin resistance.

**POSTER TOUR 19—AUTOMATED INSULIN DELIVERY # 2****P171 | Sleep, fear of hypoglycemia, and glycemic outcomes in parents identified as poor sleepers and their children with type 1 diabetes (T1D) after initiation of Hybrid Closed-Loop (HCL) technology**A.J. Karami<sup>1</sup>, C. Sakamoto<sup>1,2</sup>, E. Escobar<sup>1</sup>, E. Jost<sup>1</sup>, L. Pyle<sup>1,2</sup>, L. Towers<sup>1</sup>, T. Vigers<sup>1,2</sup>, R.P. Wadwa<sup>1</sup>, E.C. Cobry<sup>1</sup>

<sup>1</sup>University of Colorado Anschutz Medical Campus, School of Medicine, Barbara Davis Center for Childhood Diabetes, Aurora, United States, <sup>2</sup>University of Colorado, Colorado School of Public Health, Department of Biostatistics and Informatics, Aurora, United States

**Introduction:** Youth with T1D and their parents often report reduced sleep quality. HCL systems can alleviate diabetes disturbances, worry, and nocturnal monitoring.



Table: Change in sleep, fear of hypoglycemia, and glycemic measures in the Poor Sleeper group after initiation of HCL technology

	Parents					Youth				
	Baseline	3 months		6 months		Baseline	3 months		6 months	
	Mean (SE)	Mean (SE)	p-value	Mean (SE)	p-value	Mean (SE)	Mean (SE)	p-value	Mean (SE)	p-value
<b>Actigraphy Sleep Measures</b>										
Total Sleep (minutes)	414 (11.3)	416 (11.8)	1.00	409 (11.5)	0.99	448 (12.1)	446 (12.6)	1.00	448 (12.3)	1.00
Sleep Efficacy (%)	85.7 (1.2)	87.1 (1.2)	0.53	87.0 (1.2)	0.61	81.9 (1.3)	83.1 (1.4)	0.89	84.9 (1.3)	0.05
Wake After Sleep Onset (minutes)	47.0 (3.6)	40.2 (3.7)	0.07	40.6 (3.7)	0.07	52.2 (3.8)	53.0 (4.0)	1.00	51.8 (3.9)	1.00
<b>PSQI</b>										
Total	8.0 (0.5)	6.7 (0.5)	0.04	6.9 (0.5)	0.17	**	**	**	**	**
<b>HFS</b>										
Total	42.8 (2.9)	34.6 (3.0)	0.04	33.8 (3.0)	0.02	33.7 (2.5)	31.6 (2.5)	0.98	27.4 (2.5)	0.18
Total Behavior	21.3 (1.6)	19.8 (1.6)	0.77	18.4 (1.6)	0.13	17.6 (1.3)	19.0 (1.3)	0.96	16.2 (1.3)	0.95
Behavior - maintain high BG	3.7 (0.6)	3.9 (0.6)	1.00	3.6 (0.6)	1.00	3.2 (0.6)	3.3 (0.6)	1.00	2.7 (0.6)	0.99
Total Worry	21.4 (1.8)	14.8 (1.8)	0.01	15.4 (1.8)	0.03	16.1 (1.7)	12.6 (1.7)	0.26	11.2 (1.7)	0.04
Worry - helpless/low BG	18.3 (1.5)	12.9 (1.5)	0.01	13.4 (1.5)	0.02	10.8 (1.2)	8.7 (1.2)	0.39	7.5 (1.2)	0.05
Worry - negative social consequences	3.1 (0.6)	1.9 (0.6)	0.36	2.0 (0.6)	0.47	3.7 (0.6)	2.2 (0.6)	0.10	2.3 (0.6)	0.14
<b>Glycemic Measures</b>										
HbA1c (%)	**	**	**	**	**	7.1 (0.3)	7.3 (0.3)	0.95	7.3 (0.3)	0.98
GMI (%)	**	**	**	**	**	7.4 (0.2)	7.3 (0.2)	1.00	7.2 (0.2)	0.93
Time in Range (%)	**	**	**	**	**	63 (4.1)	66 (4.4)	0.97	66 (4.1)	0.98

\* p-value reflects changes from baseline to either 3 or 6-months

**Objectives:** We analyzed sleep, fear of hypoglycemia, and glycemic changes based on poor or good sleep categorization of parents of youth with T1D transitioning to an HCL system.

**Methods:** Parents (age 42 [IQR 38, 48] years, 82% female) of 39 youth with T1D (age 11.1 ± 3.7 years, 54% male, T1D duration 1.1 [0.3, 2.9] years) starting on Tandem's Control-IQ (CIQ) completed the Pittsburgh Sleep Quality Index (PSQI) prior to initiation. Dyads were stratified into "Poor Sleeper" and "Good Sleeper" groups by parent baseline PSQI (≥5 indicates poor sleep). Actigraphy, survey (Hypoglycemia Fear Survey [HFS] and PSQI), and glycemic outcomes were obtained at baseline, 3, and 6 months. Between group comparisons were done using linear mixed models with a random intercept for subject and an interaction term between time and sleeper group. Within group changes were additionally analyzed.

**Results:** Youth sleep efficiency in the Poor Sleeper group increased at 6 months (p = 0.05) (Table). Parent PSQI improved at 3 months (p = 0.04). HFS Total and Total Worry and Worry Low BG subscales in both Poor Sleeper parent and child decreased significantly at 6 months. At baseline, 16 parents were good sleepers and 23 were poor sleepers. At 3 months, 21 were good and 18 were poor sleepers. At 6 months, 16 were good and 21 were poor sleepers. No significant changes were seen in the Good Sleeper group.

**Conclusions:** Parents identified as poor sleepers and their children experienced a reduction in fear of hypoglycemia after youth initiation of an HCL and parent subjective sleep improved. However, sleep duration remained unchanged and the total number of parents with poor sleep returned to baseline by 6 months, indicating

complex factors influence sleep quality, which must be explored further.

#### P172 | Application of a new composite glycemic metric using mean glucose and glucose variability in pediatric data from an advanced hybrid closed loop study

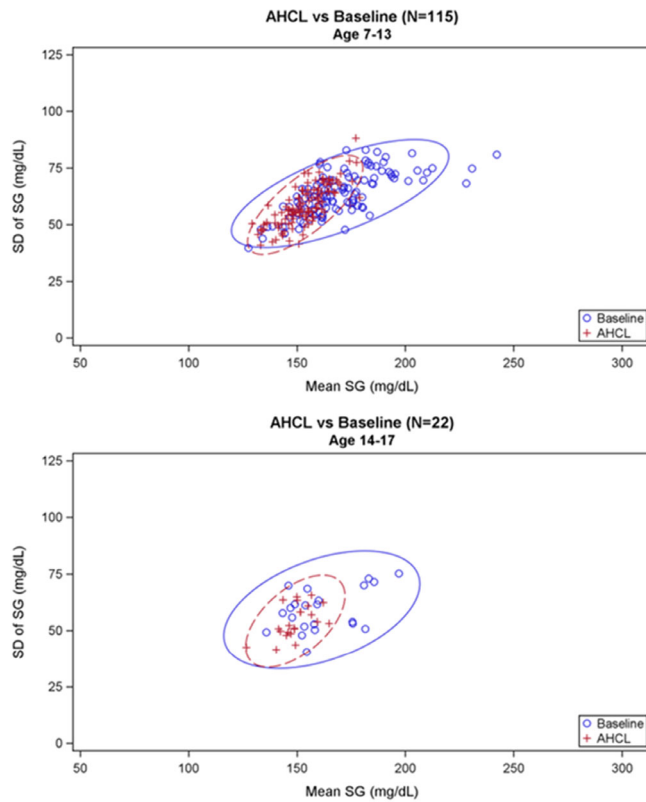
J. Shin<sup>1</sup>, C. Ling<sup>1</sup>, A. Keiter<sup>1</sup>, H. Ma<sup>1</sup>, A. Rhinehart<sup>1</sup>, R. Vigersky<sup>1</sup>  
<sup>1</sup>Medtronic, Northridge, United States

**Introduction:** Overall glycemic control may not be well characterized by HbA1c alone, as glycemic variability (GV) can be an independent risk factor for short- and long-term diabetes complications.

Recently, the Prediction Ellipses Model (PEM), which uses a composite matrix of mean glucose and SD, has been introduced to characterize changes in glycemic outcomes when compared to different glucose management therapies (as presented in Shin et al., ATTD 2022, Barcelona, Spain).

**Objectives:** In this exploratory analysis, the magnitude of PEM area was evaluated using pediatric data from an Advanced Hybrid Closed Loop (AHCL) study to assess its value in youth with type 1 diabetes (T1D).

**Methods:** HbA1c, mean sensor glucose (SG), and SD of SG data from 137 pediatric participants (7–13 years: N = 115, 14–17 years: N = 22) in a 3-month AHCL study were analyzed. The area of PEM



using subject-level data was calculated for the end of study period when AHCL was used and compared to that calculated for the baseline run-in when sensor-augmented pump (SAP) or hybrid-closed loop (HCL) was used.

**Results:** With AHCL, prediction ellipses for both groups became tighter and migrated toward better mean SG and SD of SG, when compared to baseline (Figure). Compared to baseline for each age group (7–13 years and 14–17 years), change in HbA1c reduced by 6.1% and 7.4%; it reduced by 9.5% and 7.6% for SG, and by 7.9% and 8.5% for SD of SG, respectively. There was a greater reduction in SG among those aged 7–13 years, and a greater reduction in SD of SG among those aged 14–17 years. Irrespective of differences in glycemic metrics improvement, reductions in PEM area (decreases by 55.3% and

63.1%, respectively) were apparent and corresponded with the glyce-mic metrics changes observed.

**Conclusions:** The area of PEM, a composite of sensor-derived mean SG and SD of SG, may be a more sensitive and more comprehensive alternative to HbA1c alone in demonstrating overall pediatric glycemic control.

**P173 | Performance of the MiniMed 780G system in a child with T1 Diabetes during bone marrow transplant procedure—A case study**

A. Michalak<sup>1,2</sup>, M. Ussowicz<sup>3</sup>, J. Kotodrubiec<sup>4</sup>, J. Trelińska<sup>4</sup>, A. Szadkowska<sup>1</sup>

<sup>1</sup>Medical University of Lodz, Department of Pediatrics, Diabetology, Endocrinology and Nephrology, Łódź, Poland, <sup>2</sup>Medical, Department of Biostatistics and Translational Medicine, Lodz, Poland, <sup>3</sup>Medical University of Wroclaw, Department of Pediatric Bone Marrow Transplantation, Oncology and Hematology, Wroclaw, Poland, <sup>4</sup>Medical University of Lodz, Department of Pediatrics, Hematology and Oncology, Lodz, Poland

**Introduction:** Maintaining glycemic control in patients with type 1 diabetes (T1D) and coexisting oncological disorders is challenging. Due to high doses of administered steroids, side effects of chemotherapy (primarily vomiting), transient need for partial or total parenteral nutrition – intravenous insulin therapy is needed. However, it is possible that advanced hybrid closed loop system might help maintain safe glucose levels with subcutaneous insulin infusion.

**Objectives:** To describe and assess blood glucose control of a child with T1D and nephroblastoma using the hybrid closed loop MiniMed 780G system during chemotherapy and bone marrow transplantation.

**Methods:** A 7-year-old boy with T1D for 4 months was diagnosed with a recurrent nephroblastoma and subjected to intensive chemotherapy (Protocol Umbrella) followed by an autogenic bone marrow transplantation (BMT). A 2 months before the planned BMT he started using the MiniMed 780G system. During nephroblastoma treatment the boy was in automatic mode all the time except for 30 min suspensions during post BMT-irradiation. Data from his continuous glucose monitoring were assessed in relation to therapy phases, focusing on

	During chemotherapy	During BMT (including 5 days of total parenteral nutrition)	During radiotherapy
TBR <54 mg/dl	0%	0%	0%
TBR <70 mg/dl	1%	1%	1%
TIR 70-180 mg/dl	91%	65%	95%
TAR 180-250 mg/dl	8%	34%	4%
TAR >250 mg/dl	0%	0%	0%
CV	25.9%	26%	26%

time in, below and above range (TIR, TBR, TAR), as well as coefficient of variation (CV).

**Results:** Throughout the observation period (5 months) there were no episodes of severe hypoglycemia or diabetic ketoacidosis. Time spent in clinically significant hypoglycemia (TBR <54 mg/dl) and in extreme hyperglycemia (TAR >250 mg/dl) were 0% throughout the whole observation, and glucose variability (CV) was low and stable. TIR decreased notably in the peri-BMT period but was still acceptable.

**Conclusions:** Analysis of this patient's records indicates that therapy with the MiniMed 780G system may be safe and effective in patients with T1D undergoing chemotherapy and BMT.

#### P174 | Six months glycemic outcomes of advanced hybrid closed loop system in children and adolescents with type 1 diabetes

H.G. Balki<sup>1</sup>, G.D. Oncul<sup>1</sup>, Y.A. Altinok<sup>1</sup>, S. Ozen<sup>1</sup>, S. Darcan<sup>1</sup>, D. Goksen<sup>1</sup>

<sup>1</sup>Ege University School of Medicine, Children Hospital, Department of Pediatrics, Division of Pediatric Endocrinology and Diabetes, İzmir/Bornova, Turkey

##### **Introduction:**

**Objectives:** To assess the effectiveness of advanced hybrid closed-loop systems (a-HCLS) use up to 6 months of treatment in a real-world setting.

**Methods:** HbA1c and BMI were collected at baseline and 6 months after a-HCLS start. Data on glycemic control were extracted from Car-Link™ Personal Software 29 of the 43 participants (67%) were on insulin infusion pump and 14(33%) were on MDI.

**Results:** A 43 patients (13.40 ± 6.14 years; 28 girls [59%]) were included. Mean duration of diabetes was 5.61 ± 5.17 years and HbA1c 7.08 ± 0.80%. TIR increased from 74.88 ± 13.74 to 78.93 ± 7.67%. TBR decreased from 3.02 ± 2.60 to 2.72 ± 1.93% and TAR decreased from 18.23 ± 10.73 to 14.95 ± 7.03%. GMI significantly decreased from 6.63 to 6.47% (p:0.01). Total insulin dose increased from 32.07 ± 17.81 U/d to 39.82 ± 19.36 U/d (p:0.00). Basal insulin % decreased from 41.67 ± 12.32 to 38.99 ± 6.66 and bolus insulin % increased from 58.33 ± 12.32 to 61.02 ± 6.64. HbA1c decreased from 7.08 ± 0.80 to 6.97 ± 1.01%. BMISDs increased from 0.17 ± 1.05 to 0.34 ± 1.11 (p:0.02). Auto correction boluses increased from 18.28 ± 7.98 to 19.14 ± 6% (p:0.001). Negative correlation between TIR and auto correction bolus was found (r: -0.399, p:0.01). GMI decreased from 6.58 to 6.37% in pump group (p:0.01) whereas there was no decrease in MDI group. Total insulin dose increased from 30.32 ± 14.87 U/d to 45.08 ± 21.62 U/d in MDI group (p:0.01) while there was a mild increase from 32.92 ± 19.26 U/d to 37.28 ± 18.02 U/d in the pump group (p:0.04). TIR increased from 76.79 ± 10.65% to 81.83 ± 5.37% in well controlled group (p:0.02) whereas

there was no significant difference in the patients with HbA1c > 7%. TAR and GMI decreased significantly in well controlled group (p:0.03/p:0.01).

**Conclusions:** All sensor-specific measures of glycemic control improved with a-HCLS without increasing time spent in hypoglycemia with a significant increase in BMISDs. Increase in BMI with increase in auto boluses and basal insulin is in favor of increased food intake with an inaccurate calculation of carbs or missed boluses. The patients with well metabolic control were better since auto boluses decreased as TIR increased.

#### P175 | Evaluation of pediatric insulin dosing behavior changes during advanced hybrid closed loop system use

J. Shin<sup>1</sup>, X. Chen<sup>1</sup>, M. Liu<sup>1</sup>, Z. Dai<sup>1</sup>, A. Rhinehart<sup>1</sup>, R. Vigersky<sup>1</sup>

<sup>1</sup>Medtronic, Northridge, United States

**Introduction:** Pediatric type 1 diabetes (T1D) meal management that includes counting carbs and delivering meal boluses at the right time has always been a challenge. The benefit of an Advanced Hybrid Closed-Loop (AHCL) system auto-bolus feature may help with this.

**Objectives:** In this exploratory analysis, meal management (i.e., pediatric user-initiated boluses associated with carbohydrate announcements), system-delivered auto-boluses, and other insulin delivery were assessed alongside glycemic outcomes over time, to evaluate the impact of the AHCL auto-bolus.

**Methods:** The MiniMed™ 780G system with Guardian™ 4 sensor was used by participants (N = 109, aged 7–17 years) over a 3-month period. Glycemic outcomes including mean SG, percentage (%) of time in, below and above target range (70–180 mg/dl) and insulin delivery (total daily insulin dose, user-initiated boluses and system-delivered boluses, with and without meal association) were summarized. The initial 2 weeks of data were considered as a baseline reference and compared to the last 2 weeks of data from months 1, 2 and 3 post-AHCL initiation.

**Results:** A reduction of meal boluses and an increased percentage of auto-bolus associated with meals (1.7 ± 5.6%, p = 0.002, paired t-test) and a reduction in the number of carbs entered per day (−0.2 ± 1.6, p = 0.0949, Wilcoxon signed rank test) were observed. Glycemic outcomes and insulin delivery are shown (Table). The %TIR and %TBR < 70 mg/dl changed by −1.9 ± 7.9% and −0.1 ± 1.3%, respectively, from baseline to month 3.

**Conclusions:** While a relaxation in meal management was detected during 3 months of AHCL use, glycemic control outcomes did not change much. This suggests the AHCL system is compensating for instances when meal management by children is suboptimal. This compensation helps reduce burden, while maintaining good glycemic control.

Glycemic outcomes and insulin delivery during three months of pediatric MiniMed™ 780G system use

Category	Baseline (Initial 2weeks)	Last 2 Weeks		
		Month 1	Month 2	Month 3
<b>Number of Participants</b>	109	109	109	109
<b>Insulin and Carbs</b>				
TDD (U)	52.0 ± 23.4 (46.3)	52.6 ± 24.7 (48.8) <sup>a</sup>	50.9 ± 22.2 (49.6)	53.2 ± 22.5 (48.6)
Basal (U)	20.4 ± 9.7 (17.5)	20.6 ± 10.5 (19.0) <sup>a</sup>	19.9 ± 9.3 (17.9)	20.7 ± 9.1 (19.1)
Bolus (U)	31.5 ± 14.5 (29.6)	32.0 ± 15.3 (31.2) <sup>a</sup>	31.1 ± 13.9 (30.4)	32.5 ± 14.2 (30.0)
Auto Bolus (U)	9.6 ± 6.8 (7.8)	9.9 ± 6.3 (9.2) <sup>a</sup>	9.9 ± 6.2 (8.2)	10.8 ± 7.0 (9.1)
Meal Bolus/All Bolus (%)	68.6 ± 12.8 (70.8)	67.8 ± 12.7 (69.6) <sup>a</sup>	67.2 ± 11.9 (69.0)	65.9 ± 12.4 (67.9)
Non-Meal Bolus/All Bolus (%)	1.8 ± 2.6 (0.9)	1.6 ± 2.2 (0.9) <sup>a</sup>	1.6 ± 2.7 (0.6)	1.5 ± 2.5 (0.8)
Auto Bolus with Meal/All Bolus (%)	17.3 ± 6.5 (17.2)	17.7 ± 7.1 (17.0) <sup>a</sup>	17.9 ± 6.2 (17.0)	19.0 ± 6.6 (19.0)
Auto Bolus Non-Meal/All Bolus (%)	12.3 ± 9.3 (9.4)	12.9 ± 8.4 (10.3) <sup>a</sup>	13.3 ± 8.3 (11.3)	13.5 ± 8.8 (10.9)
Carb Ratio (g/U)	9.1 ± 3.6 (8.5)	9.0 ± 3.5 (8.3) <sup>a</sup>	9.0 ± 3.5 (8.2)	9.0 ± 3.5 (8.3)
Carb Amounts/day	176.1 ± 73.5 (160.4)	176.7 ± 73.6 (157.7) <sup>a</sup>	168.8 ± 68.8 (151.1)	172.5 ± 68.7 (153.0)
Number of Carb Entries/day	5.7 ± 2.5 (5.2)	5.6 ± 2.2 (5.3) <sup>a</sup>	5.3 ± 2.0 (5.1)	5.5 ± 2.2 (5.0)
<b>Glycemic Outcomes</b>				
Overall Average SG (mg/dL)	152.0 ± 16.0 (149.3)	151.6 ± 13.7 (151.9)	152.8 ± 16.4 (152.1)	155.9 ± 15.1 (154.5)
Overall SD of SG (mg/dL)	54.5 ± 10.5 (53.4)	54.2 ± 10.4 (52.7)	54.7 ± 11.4 (52.2)	56.5 ± 10.4 (55.7)
Overall CV of SG (%)	35.7 ± 4.7 (36.1)	35.6 ± 4.7 (35.9)	35.6 ± 4.9 (35.1)	36.1 ± 4.7 (36.2)
SG <54 mg/dL (%)	0.4 ± 0.4 (0.2)	0.4 ± 0.6 (0.2)	0.5 ± 0.6 (0.3)	0.4 ± 0.4 (0.2)
SG <70 mg/dL (%)	2.0 ± 1.6 (1.7)	2.2 ± 1.7 (1.8)	2.3 ± 1.9 (1.7)	1.9 ± 1.5 (1.7)
SG 70 - 180 mg/dL (%)	71.8 ± 9.5 (73.6)	72.1 ± 8.4 (72.3)	71.7 ± 9.2 (72.5)	70.0 ± 9.2 (70.8)
SG >180 mg/dL (%)	26.1 ± 9.9 (24.5)	25.6 ± 8.7 (25.5)	26.0 ± 9.6 (25.6)	28.1 ± 9.5 (27.4)

Data are shown as mean ± SD (Median). <sup>a</sup>N=108. The Guardian™ 4 sensor was used with the MiniMed™ 780G system.

**P176 | Diabetes impact and device satisfaction using non-automated insulin delivery (non-aid) and aid systems in children with type 1 diabetes: Real-world data in Italy**

V. Tiberi<sup>1</sup>, R. Gesuita<sup>2</sup>, M. Marino<sup>1</sup>, A. Iannilli<sup>1</sup>, G.P. Bracciolini<sup>3</sup>, F. Gallo<sup>4</sup>, F. Pascarella<sup>5</sup>, S. Monti<sup>6</sup>, N. Minuto<sup>7</sup>, E. Mozzillo<sup>8</sup>, V. Graziani<sup>9</sup>, D. Tinti<sup>10</sup>, V. Cauvin<sup>11</sup>, M. Marigliano<sup>12</sup>, V. Cherubini<sup>1</sup>  
<sup>1</sup>Azienda Ospedaliero-Universitaria, Ospedali Riuniti di Ancona, G. Salesi Hospital, Department of Women's and Children's Health, Ancona, Italy, <sup>2</sup>Polytechnic University of Marche, Center of Epidemiology and Biostatistics, Ancona, Italy, <sup>3</sup>Children Hospital, ASO SS Antonio Biagio e Cesare Arrigo, Pediatric and Pediatric Emergency Unit, Alessandria, Italy, <sup>4</sup>Perrino Hospital, Unit of Pediatrics, Brindisi, Italy, <sup>5</sup>Sant' Anna e

San Sebastiano Hospital, Pediatric Endocrinology Unit, Caserta, Italy, <sup>6</sup>Bufo Hospital, Department of Pediatrics, Cesena, Italy, <sup>7</sup>Pediatric Clinic, IRCCS Giannina Gaslini; University of Genoa, Department of Neuroscience Rehabilitation Ophthalmology Genetics, Maternal and Child Health, Genova, Italy, <sup>8</sup>Università degli Studi di Napoli Federico II, Department of Translational Medical Science, Section of Pediatrics, Napoli, Italy, <sup>9</sup>S.M. Croci Hospital Ravenna, AUSL della Romagna, Unit of Pediatrics, Ravenna, Italy, <sup>10</sup>A.O.U. Città della Salute e della Scienza di Torino, Center of Pediatric Diabetology, Torino, Italy, <sup>11</sup>S. Chiara Hospital of Trento, Department of Pediatrics, Trento, Italy, <sup>12</sup>University and Azienda Ospedaliera Universitaria Integrata of Verona, Department of Surgery, Dentistry, Pediatrics and Gynecology, Section of Pediatric Diabetes and Metabolism, Verona, Italy



Variables	non-AID (n=569)	AID (n=240)	p
Gender, F	260 (45.7)	128 (53.3)	0.056
Age at diagnosis, years	8.3 (5.3; 11)	6.4 (3.3; 9.6)	<0.001
Disease duration, years	4.5 (2.7; 7.7)	5.1 (2.8; 8.3)	0.264
Percent time in range, %			
<54 mg/dL (<3.0 mmol/L)	0 (0; 1)	0 (0; 1)	0.880
<70 mg/dL (3.9 mmol/L)	3 (1; 6)	2 (1; 4)	<0.001
70–180 mg/dL (3.9–10.0 mmol/L)	57 (46–70)	71 (63–78)	<0.001
>180 mg/dL (>10.0 mmol/L)	27 (21; 36)	20 (15; 27)	<0.001
>250 mg/dL (>13.9 mmol/L)	7 (2; 16)	5 (2; 10)	0.032
Coefficient of Variation, %	37 (33; 42)	35 (31; 39)	<0.001
DIDS – Device Satisfaction, scores	8 (8–9)	9 (8–9)	<0.001
DIDS – Diabetes Impact, scores	4 (3–6)	4 (2–5)	0.019

Table 1. Patients' characteristics, glycemic control and Diabetes Impact and Device Satisfaction (DIDS) scores according to insulin delivery system used.

**Introduction:** In Italy about 40% of children with type 1 diabetes (T1D) are treated with MDI (multiple injection therapy) while automatic insulin delivery systems (AID) are becoming increasingly popular.

**Objectives:** The aim of this cross-sectional multicenter study was to evaluate metabolic control and health-related quality of life characteristics in children using non-AID and AID systems in daily life.

**Methods:** We considered children and adolescents with a diagnosis of T1D for more than 6 months, under the age of 18, who used non-AID (MDI + CGM and SAP) and AID (PLGM, HCL, and AHCL) systems. Clinical data, downloaded CGM metrics, and DIDS (Diabetes Impact and Device Satisfaction) questionnaire results were analyzed.

**Results:** Overall, 809 subjects were included in this analysis (48% females, 52% males), 30% treated with AID systems. All metrics were associated with better glycemic control when using AID compared to non-AID systems, except for TBR <54 mg/dl, which values were extremely low in both groups. Quality of life was significantly better in adolescents treated with the AID system, with significantly higher treatment satisfaction and the impact of diabetes significantly lower than in adolescents treated with non-AID systems (table 1).

**Conclusions:** The use of AID systems on a large unselected population of children and adolescents with T1D was associated with better glycemic control and greater treatment satisfaction. Long-term follow-up studies, extending the analysis to populations with diverse socioeconomic backgrounds, will help provide information on how to make AID systems available to all children with diabetes.

#### P177 | Real life experiences of closed loop systems in children with type 1 diabetes mellitus

N. Punjabi<sup>1</sup>, C. Shaw<sup>1</sup>, K. Subburaj<sup>1</sup>, M. Mesina<sup>1</sup>, A. Kshirsagar<sup>1</sup>

<sup>1</sup>West Middlesex University Hospital, Chelsea and Westminster Hospital NHS Foundation Trust, Pediatrics, London, United Kingdom

**Introduction:** Closed loop systems (CLS) are becoming more popular among the pediatric population with type 1 diabetes mellitus (T1DM), with the real time continuous glucose monitoring and insulin delivery

providing improvements in maintaining optimal glucose control as well as being associated with psychological and physical benefits.

**Objectives:** This study aims to quantitatively assess the impact of CLS on diabetes control and qualitatively on quality of life of children with T1DM.

**Methods:** An observational single-center cohort study in the United Kingdom was conducted, with patients identified by the clinician in charge of their care. Quantitative assessment of diabetes control was collected from the electronic records and analyzed on Microsoft excel. An adapted structured questionnaire covering quality of life measures for children with T1DM, modified for relevance to CLS, was asked to patients and/or their guardians.

**Results:** Eight children (mean age 11.9 years, 62.5% male) were identified to be using CLS (62.5% licensed) out of 187 T1DM patients in the local service. Average time in range was 72.6%, with a statistically significant improvement in HbA1c from 6.9% (within 6 months prior to starting CLS) to 6.3% (within 6 months after starting CLS) ( $p < 0.01$ ). All participants found improvements in quality of life, with 87.5% of participants strongly agreeing it had reduced the burden of diabetes and 75% strongly agreeing it reduced the burden of hypoglycemia. Moreover, 75% strongly agreed it reduced anxiety or stress surrounding T1DM. Half the participants (50%) strongly agreed or agreed that using a CLS had improved their quality of sleep and 62.5% strongly agreed they have spent less time actively managing diabetes.

**Conclusions:** Our findings indicate that CLS improves optimal diabetes control, with patients experiencing a positive impact on aspects of their quality of life. This suggests consideration should be made to encouraging and funding more widespread use of CLS in children with T1DM.

#### P178 | Advanced hybrid closed loop MiniMed 780G system and its characteristics in achieving better glycemic outcome in children and adolescents with type 1 diabetes

G. Petrovski<sup>1</sup>, J. Campbell<sup>1</sup>, F. Al Khalaf<sup>1</sup>, K. Hussain<sup>1</sup>, E. Day<sup>1</sup>

<sup>1</sup>Sidra Medicine, Doha, Qatar

**Introduction:** The recent studies report that improved glycemic outcomes with Advanced Hybrid Closed Loop (AHCL) system are correlated with more stringent pump settings.

**Objectives:** The objective of this study was to evaluate initiation of Advanced Hybrid Closed Loop (AHCL) Minimed 780G system and its characteristics on glycemic control in children and adolescents with Type 1 Diabetes (T1D) previously treated with Multiple Daily Injections (MDI).

**Methods:** The observational single center study enrolled 67 individuals with T1D, aged 7–18 years, who initiated Minimed 780G system from October 2021 to December 2021 at Sidra Medicine in Qatar. Glycemic control (HbA1c and Time in Ranges) and AHCL characteristics (insulin u/kg, basal ratio, insulin to carb ratio (ICR), active insulin time (AIT), algorithm glucose targets, sensor wear and AutoMode use) were analyzed at baseline, 2 weeks and 3 months after the initiation of the AHCL system.

**Results:** 67 individuals (age  $11.4 \pm 2.9$  years, female 39, diabetes duration  $3.8 \pm 1.8$  years), where 77% of participants used Continuous Glucose monitoring (CGM) or flash glucose monitoring (FGM). HbA1c decreased from  $8.3 \pm 1.6\%$  ( $67 \pm 17.5$  mmol/mol) at baseline, to  $6.6 \pm 0.6\%$  ( $49 \pm 6.6$  mmol/mol) at 3 months ( $p = 0.02$ ) of AHCL initiation, while TIR of  $49.5 \pm 15.8\%$  increased to  $77.1 \pm 12.6\%$  respectively. AHCL characteristics are shown in table 1. No episodes of severe hypoglycemia or DKA were reported.

**Conclusions:** MiniMed 780G system with both automated basal and bolus corrections, along with strengthening the ICR, shortening the AIT to 2–3 h and algorithm glucose target of 100 mg/dl and 110 mg/dl can improve glycemic control in a safe manner in children and adolescents previously treated with MDI.

## P179 | Safety and effectiveness of advanced hybrid closed loop system in children younger than 7 years

G. Tornese<sup>1</sup>, C. Carletti<sup>1</sup>, E. Faleschini<sup>1</sup>, E. Barbi<sup>2,1</sup>

<sup>1</sup>Institute for Maternal and Child Health IRCCS 'Burlo Garofolo', Trieste, Italy, <sup>2</sup>University of Trieste, Trieste, Italy

**Introduction:** The advanced hybrid closed loop (a-HCL) system Medtronic Minimed 780G is licensed for use in children  $\geq 7$  years and with a minimum insulin daily dose  $\geq 8$  units.

**Objectives:** To study the safety and the effectiveness of the a-HCL system Medtronic Minimed 780G in children younger than 7 years.

**Methods:** Retrospective study in children with type 1 diabetes mellitus (T1DM) who started using a-HCL before the age limit of 7 years when the clinician considered this treatment to be beneficial, and the family agreed on off-label use of the system. The "G2 clinico" platform was employed to access patients' clinical data. We extracted the latest data on glycemic control from reports generated with CareLink™ Personal Software with observation time frames of 2 weeks. Data are presented as median and interquartile ranges (IQRs). Wilcoxon signed-rank test was performed to check whether the differences between paired data were statistically significant.

**Results:** This retrospective study included 10 individuals (5 females) with T1DM (median age at diagnosis 3.8 years [IQR 2.5;4.9]). The median duration of T1DM was 37 days (IQR 5; 418) at the beginning of insulin pump in manual mode and 164 days (IQR 32–451; min 14 days) when starting treatment with a-HCL in auto mode, at a median age of 4.7 years (IQR 2.9; 5.5, min 2.1 years) and with a median insulin daily requirement of 9.4 U (IQR 8.1;11.6, min 5.6). The

**Table 1. AHCL System Characteristics**

	A Baseline	B First 2 weeks	A vs B, P	C Third Month	B vs C, P
Sensor wear, %	90.5±12.8*	93.9±10.9		94.7±5.1	
AHCL usage, %	/	85.2±7.7	/	92.7±4.1	
TDD, U/(kg/d)	1.0±0.4	1.1±0.3		1.1±0.3	
Basal insulin, as % of TDD	41.6±9.8	33.1±5.9		31.1±7.9	
ICR, gr	15.2±8.2	12.1±7.1		8.8±3.2	
AIT, h	3.4±0.5**	2.6±0.7		2.5±0.6	
<b>Algorithm glucose target, % of users</b>					
100 mg/dl	48 ***	55	/	59	/
110 mg/dl	34 ***	33	/	37	/
120mg/dl	18 ***	12	/	4	/

All values are shown as mean±SD and %

AHCL, Advanced Hybrid Closed Loop System; TDD, total daily dose of insulin; ICR, Insulin To Carb Ratio; AIT, active insulin time

\* Sensors wear in 52 participants, 90 days of CGM data on MDI

\*\* as per manual bolus correction on MDI

\*\*\* algorithm glucose target on initiation of AHCL

	Manual mode	Auto mode start	Auto mode last	PManual versus Auto start	PManual versus Auto last	PAuto start versus last
Time above range (TAR) (%)	40 (36;53)	33 (29;41)	32 (25;37)	<0.01	<0.01	NS
Time in range (TIR) (%)	56 (45;61)	65 (56;68)	66 (61;71)	<0.01	<0.01	NS
Time below range (TBR) (%)	4 (2;5)	3 (2;4)	2 (2;4)	NS	NS	NS
Mean glucose sensor (mg/dl)	169 (165;184)	160 (151;168)	159 (147;166)	<0.01	<0.01	NS
Coefficient of variation (CV) (%)	38.9 (37.6;39.1)	38.2 (36.2;38.8)	38.4 (25.0;40.3)	NS	NS	NS
Glucose management indicator (GMI) (%)	7.3 (7.3;8.1)	7.1 (6.9;7.3)	7.2 (6.9;7.3)	NS	0.02	NS
Total insulin daily dose (U/kg/day)	0.73 (0.40;0.83)	0.79 (0.53;0.89)	0.75 (0.69;0.94)	NS	NS	NS
Bolus amount (%)	49 (45;67)	57 (53;61)	58 (55;64)	NS	NS	NS
Auto-correction (%)		30 (24;38)	30 (24;47)			NS

median age at the last data download was 5.1 years (IQR 3.3–6.6), with a median duration of a-HCL treatment of 179 days (IQR 72;385). No ketoacidosis or severe hypoglycemia events were reported. Time above range (TAR) and mean glucose sensor significantly decreased since the beginning of a-HCL use and until the last download ( $p < 0.01$ ), while time in range (TIR) significantly reduced ( $p < 0.01$ ).

**Conclusions:** The use of a-HCL system Minimed 780G is safe and effective also in children below the age of 7 years and with a total daily insulin dose below 8 U.

#### P180 | Expanding access to automated insulin delivery (AID) within the Latinx pediatric type 1 diabetes (T1D) population

L. Geiser<sup>1</sup>, C. Berget<sup>1</sup>, G. Tellez<sup>1</sup>, G. Spiegel<sup>1</sup>, G. Forlenza<sup>1</sup>, A. Gerard-Gonzalez<sup>1</sup>

<sup>1</sup>Colorado University School of Medicine, Barbara Davis Center, Aurora, United States

**Introduction:** There are significant disparities in T1D care, with minority populations using insulin pumps and CGMs at a lower rate than non-Hispanic white patients. At the Barbara Davis Center (BDC) in Denver, Colorado, 72% of Non-Hispanic white youth with T1D use an insulin pump but only 43% of Latinx youth with T1D use pumps. Insulin pump therapies, especially AID, are associated with improved glycemic outcomes compared to multiple daily injections (MDI).

**Objectives:** The objective of this Quality Improvement (QI) project is to increase access to the t: slim Control IQ (CIQ) pump, an advanced AID system, among Latinx youth with T1D at the BDC.

**Methods:** A multidisciplinary team was formed, including the Latinx Clinic director, a bilingual nurse, and dietitian, and members of the clinical trial team experienced with the CIQ system. Barriers for pump use within the Latinx population were identified, including lack of Spanish training resources and low numeracy regarding carb counting. A query identified Latinx youth using multiple daily injections (MDI) to focus on (Table 1).

**Results:** To address barriers to CIQ use, the BDC QI team created three Spanish language resources to support training for CIQ:

- (1) Overview of the CIQ home screen,
- (2) guide to editing pump settings, and
- (3) guide to pairing the pump with the t:connect mobile app to facilitate pump uploads.

Additionally, a fixed dosing regimen for CIQ was developed to reduce the burden of carb counting for sliding scale insulin (SSI) patients. This regimen involves an assessment by our dietician to determine small, medium, and large meals to identify a fixed carb amount to use in the bolus calculator for each meal.

**Conclusions:** This QI project is essential to improve equity in diabetes care for the BDC Latinx population. Increasing the use of CIQ has the potential to lower burden of care and improve T1D outcomes. Data collection is ongoing to evaluate the impact of the program.

#### POSTER TOUR 20—MONOGENIC & OTHER FORMS OF DIABETES # 3

##### P181 | Off-label Liraglutide in 4 children with Wolfram syndrome type 1: Long-term follow-up of $\beta$ -cell function and OCT parameters

R. Di Tonno<sup>1,2</sup>, G. Frontino<sup>1,2</sup>, A. Rigamonti<sup>1,2</sup>, V. Castorani<sup>1,2</sup>, E. Morotti<sup>1,2</sup>, F. Sandullo<sup>1,2</sup>, F. Scialabba<sup>1,2</sup>, F. Arrigoni<sup>1,2</sup>, R. Foglino<sup>1,2</sup>, B. Dionisi<sup>1,2</sup>, M.L. Cascavilla<sup>3</sup>, D. Canarutto<sup>4,5,6</sup>, F. Meschi<sup>1,2</sup>, R. Bonfanti<sup>1,2,4</sup>, L. Piemonti<sup>4,2</sup>

<sup>1</sup>IRCCS San Raffaele Hospital, Department of Pediatrics, Milano, Italy, <sup>2</sup>IRCCS San Raffaele Hospital, Diabetes Research Institute, Milano,

Table 1. Diabetes Metrics of Latinx Pediatric T1D Patients on MDI

	MDI patients
# of patients	192
Avg age	16.3 ± 4.4 years
Avg diabetes duration	6.9 ± 4.7 years
Avg A1c	11.3% ± 1.8%

Italy, <sup>3</sup>IRCCS San Raffaele Hospital, Department of Ophthalmology, Milano, Italy, <sup>4</sup>Università Vita-Salute San Raffaele, School of Medicine, Milano, Italy, <sup>5</sup>IRCCS San Raffaele Hospital, Pediatric Immunohematology Unit and BMT Program, Milano, Italy, <sup>6</sup>IRCCS San Raffaele Hospital, San Raffaele Telethon Institute for Gene Therapy, Milano, Italy

**Introduction:** Wolfram syndrome type 1 (WS) is a rare orphan genetic disorder characterized by juvenile-onset of insulin-dependent diabetes mellitus and progressive neurodegeneration. Based on preclinical/clinical evidence we proposed liraglutide (LG), a glucagon-like peptide-1 receptor agonist (GLP-1R), as an off-label treatment in children with WS.

**Objectives:** To assess the effect of LG on  $\beta$ -cell function and retinal thickness of children with WS.

**Methods:** Four clinically and genetically confirmed WS patients, (age 10–14 years at baseline), were treated with LG for 15–36 months. LG was administered as a daily subcutaneously injection, starting at 0.3 mg/die and increased progressively up to the maximum dose of

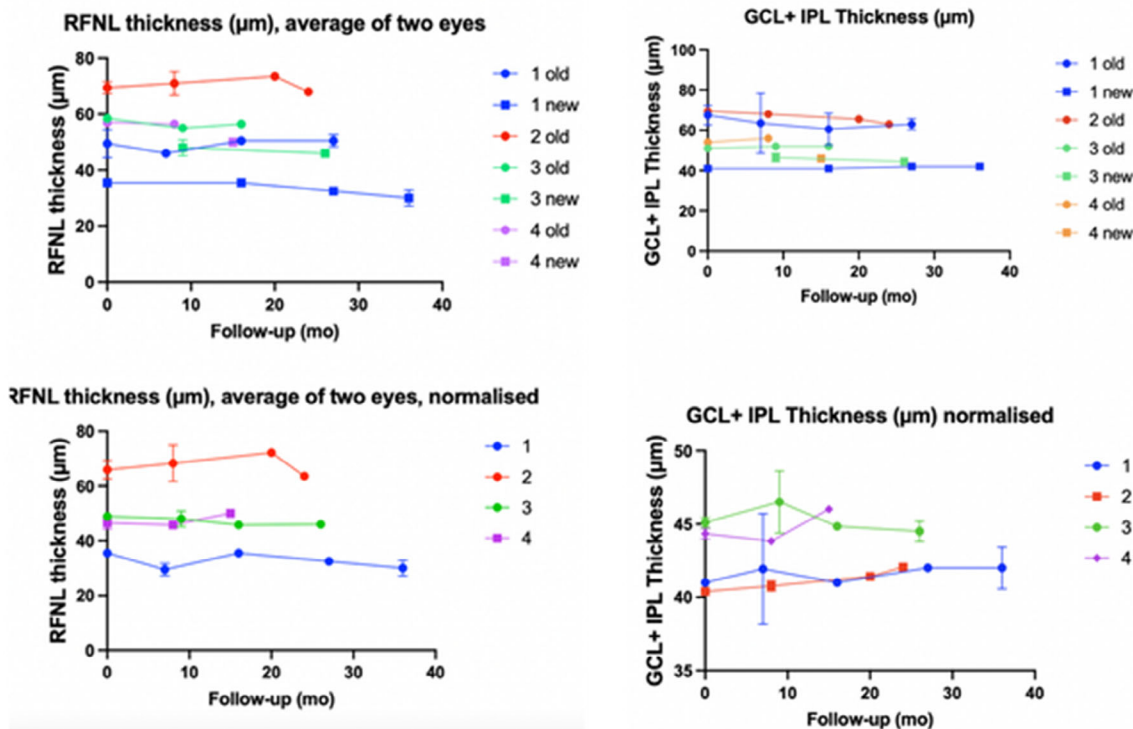
1.8 mg/die.  $\beta$ -cell function was assessed by C-peptide AUC (CA) during mixed meal tolerance test. Retinal nerve fiber layer (RNFL) and ganglion cell complex (GCC) thickness were measured via optical coherence tomography (OCT, Carl Zeiss Meditec and 3D-Topcon). **Results:** LG was well-tolerated. At the latest follow-up, CA ranged from 77 to 249% of baseline, suggesting overall stabilization of  $\beta$ -cell function during treatment (Table 1). Interestingly, also RNFL and GCC remained stable during follow-up even when taking into account potential differences between OCT devices by linear correlation (Figure 1). No adverse events were reported.

**Conclusions:** These are preliminary data of children affected by WS treated with LG with a long-term follow-up without significant overall worsening in both  $\beta$ -cell function and OCT parameters. LG has been shown to decrease ER stress and improve mitochondrial function in both  $\beta$ -cells and neurons and is the only GLP-1R approved for children older than age 10 years. Our data suggests that LG may represent a promising disease-modifying agent for WS. Longer and larger population RCT studies are warranted prior to it becoming used in routine care for WS.

Table 1

	Patient 1					Patient 2				Patient 3				Patient 4		
F-U, months	0	7	16	27	36	0	8	20	36	0	9	16	25	0	8	15
C-AUC ng $\times$ min/ml	122	142	109	102	104	28	40	48	70	111	115	90	91	296	313	316
% variation from baseline	100	117	89	84	77	100	142	171	249	100	103	81	82	100	105	107

Figure 1





**P182 | Hyper pigmented trichosis and diabetes: Common phenotype in two uncommon different monogenic diabetes!**S. Abourazzak<sup>1</sup>, C. Benghabrit<sup>1</sup>, S. Chaouki<sup>1</sup>, S. Ellard<sup>2</sup>, M. Hida<sup>1</sup><sup>1</sup>Faculty of Medicine and Pharmacy of Fez, Sidi Mohamed Ben Abdellah University, Pediatrics, Fez, Morocco, <sup>2</sup>University of Exeter Medical School, Genomics Laboratory, Royal Devon and Exeter NHS Foundation Trust, Exeter, United Kingdom**Introduction:** The type of diabetes assigned to a young person at diagnosis is typically based on their characteristics at presentation. Monogenic diabetes represents a heterogeneous group of disorders resulting from defects in single genes.**Objectives:** This report describes a syndromic presentation of diabetes in whom a homozygous SLC29A3 mutation was identified in the first case with H syndrome; and an INSR mutation responsible of rare insulin resistance syndrome in the second case. Both patients presented pigmented hypertrichotic dermatosis.**Methods:** Analysis of all the coding regions and exon/intron boundaries of the monogenic diabetes genes by targeted next generation sequencing at the Exeter genomics laboratory.**Results:** **Patient 1:** A 4-year-old girlborn to consanguineous parents, referred to the department of pediatrics for diabetes. She had a history of pigmented skin since in her neck and lower limbs, dysmorphic features, skeletal muscle hypertrophy, flexion contractures of fingers, hepatomegaly, hyperpigmented trichosis in her lower limbs, generalized lipotrophy and severe hypertriglyceridemia. She was homozygous for a pathogenic SLC29A3 and diagnosed with H syndrome.**Patient 2:** A 7 years old boy, born to consanguineous parents admitted for diabetes. He had developed progressive darkening of the skin involving the neck and axillae, with trichosis. Genetic studies revealed a homozygous missense mutation in the Insulin receptor gene confirming the diagnosis of Rabson Mendenhall syndrome.**Conclusions:** The genetic diagnosis may inform medical management, gives insight into prognosis, and inform families of recurrence risk.**P183 | A novel GCK mutation requiring insulin therapy: Is it related to G6PD deficiency?**Y. Abdelmeguid<sup>1</sup>, E. Mowafy<sup>1</sup>, I. Marzouk<sup>1</sup>, S. Elsayed<sup>1</sup><sup>1</sup>Alexandria Faculty of Medicine, Department of Pediatrics, Alexandria, Egypt**Introduction:** GCK-MODY is one of the most common MODY subtypes. GCK plays a major role in glucose metabolism, as it catalyzes the rate-limiting step of glucose phosphorylation. Most patients present with mild fasting hyperglycemia on routine screening. Glucose-6-phosphate dehydrogenase (G6PD) enzyme is an antioxidant. G6PD deficiency increases oxidative stress, so can lead to impaired insulin secretion by  $\beta$ -cells, and aggravation of diabetic injury.**Objectives:** However, there are limited number of studies on the relationship between G6PD deficiency & DM.**Methods:** We herein report a boy with a novel GCK mutation, and also diagnosed with G6PD deficiency which were not previously reported. Although patients with GCK-MODY receive no treatment, our patient required insulin; which could be related to G6PD deficiency.**Results:** An 8-year-old boy born to consanguineous parents was diagnosed with G6PD deficiency at birth [G6PD assay 0.3 U/g (N > 7)]. He was screened as his 2 siblings had G6PD deficiency and did exchange transfusion during neonatal period. At age 14 months, he presented with DKA with HbA1c 8.24%, and low C-peptide 0.11 ng/ml, and started insulin 0.8 U/Kg/day. He had 2 grandparents, and 4 uncles diagnosed with DM. His genetic analysis revealed a heterozygous novel GCK missense variant [c.374A > G, p.(Tyr125Cys)]-not previously reported in gnomAD database. On follow up, fasting C-peptide improved and 2 h postprandial C-peptide was normal, denoting residual  $\beta$ -cell function. Although he had GCK mutation, trials to decrease insulin dose resulted in severe hyperglycemia & ketosis. His HbA1c ranged between 6.7% and 8.24% and required insulin therapy. The mother and elder sibling had impaired fasting hyperglycemia and were heterozygous for the same mutation, so they were advised to modify diet.**Conclusions:** Further studies on the relationship between G6PD deficiency & DM are required. This also emphasizes the importance of genetic testing of suspected MODY patients, as it also helps in detecting family members with the same mutation.**P184 | Clinical and molecular characterization of neonatal diabetes mellitus (NDM): Single center experience from Western India**R. Keshwani<sup>1</sup>, S. Rao Chandrashekar<sup>1</sup>, V. Dhawale<sup>1</sup>, R. Joshi<sup>1</sup><sup>1</sup>Bai Jerbai Wadia Hospital for Children, Division of Pediatric Endocrinology, Department of Pediatrics, Mumbai, India**Introduction:** NDM is a rare genetic disease where comprehensive genetic testing allows for improved diagnosis and treatment.**Objectives:** This study aims to characterize the clinical and molecular profile of NDM seen over last 10 years at B.J.Wadia Hospital for Children, Mumbai, India.**Methods:** Retrospective study of records to derive demographic, clinical, and laboratory profile at presentation, the genetic mutation found and treatment given.**Results:** 16 children (10 M, 6 F) presented with NDM at median age of 4 months (range; Day 1 to 7.5 months) with mean weight and height SDS of -1.7 and 0.67 respectively. DKA was the commonest presentation (n = 11/16). 9 (56%) had associated extra-pancreatic features. 3 (18.8%) were born of consanguineous union. Mutation studies were done in 13 cases from Exeter (UK).

2 (12%) children with transient NDM (1 ABCC8; 1 no mutation found) came off treatment by 3 months of age. 14 (88%) had permanent NDM and mutation studies were done in 11. Heterozygous KCNJ11 mutation was seen in 4 (29%) cases, of which one had DEND

syndrome that died at 2.8 years of age and the other 3 are sulfonyl urea (SUR) responsive. A 1 child with heterozygous ABCC8 mutation is also SUR responsive. Three (21%) cases of Wolcott Rallison syndrome (WRS) had homozygous EIF2AK3 mutation of which 1 child died at 3 years of age. Another child with transient transaminitis had homozygous EIF2B1 mutation. Pancreatic agenesis with Arnold Chiari malformation was found in a child with homozygous PTF1A mutation. 3 (21%) children had Thiamine responsive diabetes and genetic study done in one showed homozygous SLC19A2.

Of the 14/16 (87.5%) children in follow up. Insulin therapy (n = 5), SUR (n = 4), Thiamine (n = 3) are the modalities of treatment ongoing with good metabolic control. Children with WRS also receive cofactors. A 2 children with TNDM are off therapy.

**Conclusions:** NDM has varied phenotype and some children have extra-pancreatic features. Genetic studies help in improved diagnosis and treatment.

#### P185 | An unusual diagnosis of monogenic diabetes in a 15-month old child

A. Jacob<sup>1</sup>, N. Thalange<sup>2</sup>

<sup>1</sup>Al Jalila Childrens Specialty Hospital, General Pediatrics, Dubai, United Arab Emirates, <sup>2</sup>Al Jalila Childrens Specialty Hospital, Pediatric Endocrinology, Dubai, United Arab Emirates

**Introduction:** Maturity Onset Diabetes of the Young (MODY) typically manifests in late childhood, adolescence, or young adulthood, with the highest rate between age 15 and 19 years of age. MODY comprises 1%–4% of childhood diabetes.

**Objectives:** -

**Methods:** -

**Results:** Case: We present a boy with new-onset diabetes who presented in diabetes ketoacidosis (DKA) at age of 15 months. He was presumed to have Type 1 diabetes given his age at onset, DKA at diagnosis and high presentation HbA1c (8.9%), however, initial auto-antibody testing for GAD-65, Insulin and IA2 was negative. Accordingly, we additionally checked ZnT8 and Islet-cell antibodies, which were also negative. Neither parent nor his 2 older siblings had diabetes, but paternal grandfather had a 64-year history of uncomplicated, very well-controlled insulin-dependent diabetes. The family chose to manage the child with a very strict low-carbohydrate diet, resulting in minimal insulin requirements, (<1u daily), with outstanding glucose control and follow-up HbA1c levels were below normal range (4.4%–4.8%). Additional antibody testing for Tetraspanin-7 was requested, (found in ~2% of otherwise antibody negative cases) but was not available.

Given his extremely low insulin requirement and negative antibody status, we proceeded to a MODY genetic panel. Genetic testing was suggestive for MODY 3 due to c.716C > T missense mutation in HNF1A (VUS), reported in 2 cases. Nonetheless, given the clinical picture and negative antibodies, we strongly suspect this mutation is causative.

For the time being, parents have decided to pursue his highly successful low-calorie diet in preference to a trial of sulphonylurea (SU) therapy, as evaluating efficacy of SUs would be difficult given his negligible insulin requirement and likely significant  $\beta$ -cell reserve. Moreover, the family has concerns that SU therapy may accelerate  $\beta$ -cell demise, if in fact he truly has T1D. However, the family is willing to proceed to a trial of SUs if his exogenous insulin requirement rises.

**Conclusions:** Heterozygous pathogenic variants in the HNF1A gene cause 1%–2% of all diabetes diagnoses overall and are characterized by early-onset diabetes in adolescence or young adulthood (<35 years) due to impaired  $\beta$ -cell function. One novel aspect of this case is the extremely young age of diagnosis. In conclusion, the use of molecular genetic testing to pursue a diagnosis in antibody-negative cases, particularly if diabetes is atypical.

#### P186 | Successful transfer of an adolescent with maturity onset diabetes of young (MODY) type 5, HNF1A mutation from insulin to once-weekly glucagon-like peptide-1 receptor agonists (GLP-1RAs) (Semaglutide) with a superior efficacy

A. Al Mutair<sup>1</sup>, B. Almulhem<sup>1</sup>

<sup>1</sup>MNGHA-KASCH, Pediatric, Riyadh, Saudi Arabia

**Introduction:** Maturity onset diabetes of young (MODY) is a group of monogenic disorders characterized by AD inherited, accounting for approximately 1% to 6% of all pediatric diabetic patients. Sulphonylurea has been successfully used in MODY type 1 and 3; insulin therapy is needed for other types of MODY, including type 5. GLP-1RAs, Liraglutide daily injection, has been successfully used in one report, after which the patient was off insulin therapy.

**Objectives:** To present a case of MODY Type 5 that showed a great response to weekly treatment of GLP-1RAs (Semaglutide).

**Methods:** A case report, Consent were obtained. **Results:** In our case report, an 18-years old girl known to have MODY type 5 HNF1A mutation required both long and short-acting insulin (0.6 units/kg/day). She had a history of high, low glucose readings and frequent hypoglycemia attacks. Therefore, once weekly, GLP-1RA (Semaglutide) was tried for 3 months. The dose was gradually increased from 0.25 mg to a maximum of 0.5 mg subcutaneously weekly. Insulin therapy was weaned, and then off insulin after the 6th dose; glucose readings were monitored via Dexcom CGM, which confirmed a significant improvement (Figure 1). Moreover, there was a disappearance of hypoglycemic attacks, a reduction of insulin doses approximately to zero, an improvement of time in range (TIR) to about 100%, enhanced glucose variability, and a reduction in the serum HbA1c from 6.1% to 5.6%, which was the lowest record since the diagnosis and finally injections number dropped from 28 per week to only one. However, the medication was stopped as the patient could not tolerate its gastric side effects after she was infected with COVID-19.

**Conclusions:** Semaglutide is effective and superior to insulin therapy for MODY type 5 and can be considered to replace insulin therapy. In



13/14 ٪93 (CGM) الأيام مع بيانات مراقبة الغلوكوز المستمرة (CGM) ١٣/١٤ ٪93  
متوسط المعايير في اليوم

Figure 1A

AGP-Off Insulin, On Semaglutide

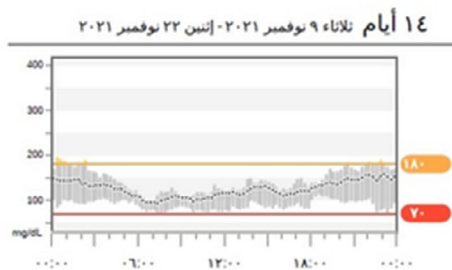


Figure 1C: Off Insulin / On Semaglutide



14/14 ٪57 (CGM) الأيام مع بيانات مراقبة الغلوكوز المستمرة (CGM) ١٤/١٤ ٪57  
متوسط المعايير في اليوم

Figure 1B

AGP-On Insulin, On Semaglutide

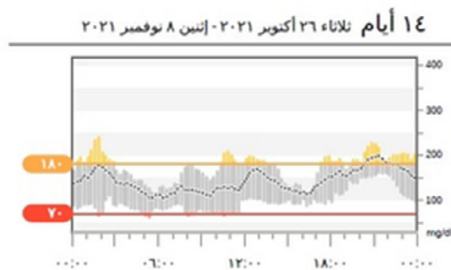


Figure 1D: On Insulin

addition, CGM showed an excellent success that helped safely transfer the patient from intensive insulin therapy to the GLP-1RAs trial. Further studies are needed in MODY type 5.

P187 | Modulation of antimony mediated therapy for an optimal insulin secretion during visceral leishmaniasis infection

S. Sinha<sup>1</sup>

<sup>1</sup>Nehru Gram Bharati, Department of Zoology, Prayagraj, India

**Introduction:** Visceral Leishmaniasis is a macrophage associated disorder for the treatment of which antimony-based drug like Sodium

Antimony Gluconate has been the first choice in the recent past. About 5 percent of the patients may develop insulin dependent diabetes mellitus.

**Objectives:** It appears to have a direct action on pancreatic beta cells, resulting in initial insulin release followed by impaired insulin secretion. Within this context, we looked into alternate therapies of treatment along with SAG on triggering the CD2 epitope.

**Methods:** We have evaluated the effect of combining CD2 with conventional antimonial (sb) therapy in protection in BALB/c mice infected with either drug sensitive or resistant strain of Leishmania donovani with 3 million parasites via-intra-cardiac route. Mice were treated with anti CD2 adjunct SAG sub-cutaneously twice a week for 4 weeks. Assessment for measurement of weight, spleen size,

anti-Leishmania antibody titer, T cell, and anti-leishmanial macrophage function was carried out day 0, 10, 22 and 34 post treatments. Insulin levels were also determined on the same intervals.

**Results:** The combination therapy was shown boosting significant proportion of T cells to express CD25 compared to SAG monotherapy. Although, the level of IFN- $\gamma$  was not statistically different between combination vs monotherapy ( $p = 0.298$ ) but CD2 treatment even alone significantly influenced IFN- $\gamma$  production than either SAG treatment ( $p = 0.045$ ) or with CD2 adjunct SAG treatment ( $p = 0.005$ ) in Ld-S strain as well as in Ld-R strain. The influence of CD2 adjunct treatment was also documented in anti-leishmanial functions in macrophages. Interestingly insulin levels were observed to be optimal on supplementing SAG along with CD2.

**Conclusions:** SAG along with CD2 could be used as a potential therapy to overcome incidences of Diabetes mellitus during Visceral Leishmaniasis.

#### P188 | Oral glucose tolerance testing using candy: A sweet solution to improve screening compliance in cystic fibrosis?

S. Jackson<sup>1</sup>, A. Creo<sup>1</sup>, C. Weeks<sup>2</sup>, J. Olson<sup>2</sup>, V. Dean<sup>2</sup>

<sup>1</sup>Mayo Clinic, Pediatric Endocrinology, Rochester, United States, <sup>2</sup>Mayo Clinic, Cystic Fibrosis Center, Rochester, United States

**Introduction:** The Cystic Fibrosis (CF) Foundation recommends annual screening for all people with CF ages 10 and older via a 2-h oral glucose tolerance test (OGTT). Current adherence rates to OGTT in those with cystic fibrosis is minimal with published data.

**Objectives:** Our aim is to determine if a popular dextrose candy alternative yields similar glycemic curve compared to the standard oral dextrose solution (ODS) used in the OGTT and to describe the patient's experience with candy substitution in their annual OGTT.

**Methods:** Participants with CF age 10–21 from the Mayo Clinic CF Center, from January to August 2021 were recruited. We conducted a self-controlled clinical trial where participants underwent a standard OGTT using ODS with blood sugars obtained at 0 and 120 min per standard protocol. Then a second OGTT using a candy alternative with identical weight-based dosing and protocol. Glucose values were compared across the standard and alternative OGTT at distinct time points. A 5-question survey developed as a tool to record experience and measure satisfaction level with substitution of NERDs for ODS in the OGTT was given at the end.

**Results:** A 7 participants were able to complete the study. Median age of 16 years (R: 12–19). There was no difference at baseline glucose values between NERDs and ODS groups. At minute 120, average difference of blood glucose between NERDs and ODS was 2.71 mg/dl,  $p = 0.9$ .

For the survey answers, only 3 participants stated they would be likely to complete the OGTT with NERDS candy again if asked. Most participants (4, 57.14%) preferred the ODS over NERDs and 2(28.57%) stated no preference.

**Conclusions:** While limited by a small sample size, this pilot suggests NERDs may produce similar standard OGTT results to as an equivalent alternative to ODS. Interestingly, participants preferred ODS to NERDs candy. Future trials should be done with a larger sample size and age range to better understand the satisfaction level across a broader spectrum within this population.

#### P189 | Fifteen percent of fasting glycemia values in children and adolescents with GCK-MODY are outside the diagnostic range

J. Staník<sup>1,2</sup>, J. Hulín<sup>3</sup>, Ľ. Barák<sup>1</sup>, E. Wallenfelsová<sup>4</sup>, S. Kyšková<sup>5</sup>, E. Jančová<sup>1</sup>, M. Hučková<sup>2</sup>, M. Škopková<sup>2</sup>, D. Gašperiková<sup>2</sup>

<sup>1</sup>Medical Faculty of the Comenius University, Department of Pediatrics, Bratislava, Slovakia, <sup>2</sup>Institute of Experimental Endocrinology, Biomedical Research Center Slovak Academy of Science, Diabgene, Bratislava, Slovakia, <sup>3</sup>Slovak Medical University and University Hospital in Bratislava, 1st Department of Internal Medicine, Bratislava, Slovakia, <sup>4</sup>ENDO-EW Outpatient Department, Považská Bystrica, Slovakia, <sup>5</sup>PENDIA Outpatient Department, Žilina, Slovakia

**Introduction:** Diagnostics of the GCK-MODY is based on the chronic stable fasting hyperglycemia between 5.5 and 8.0 mmol/L in majority of the patients. However, not all the glycemia values are  $\geq 5.5$  mmol/L.

**Objectives:** We aimed 1. to determine the percentage of fasting glycemia  $< 5.5$  or  $> 8.0$  mmol/L in children and adolescents with GCK-MODY, and 2. to determine the minimal number of fasting glycemia samples to find at least one glycemia  $\geq 5.5$  mmol/L with a probability of at least 95%.

**Methods:** We have performed a retrospective analysis of fasting glucose concentrations of people with GCK-MODY registered in Slovak nation-wide MODY registry. Children and adolescents  $< 19$  years of age with at least 5 fasting glycemia measurements available in hospital/outpatient departments were included.

**Results:** Out of  $> 250$  people with GCK-MODY in the registry, 54 children and adolescents with at least 5 fasting glycemia measurements were enrolled in this study. Out of 908 fasting glucose measurements, 136 (15%) were outside the diagnostic range for GCK-MODY; 108 (11.9%) were below 5.5 mmol/L and 28 (3.1%) were above 8.0 mmol/L. A 31 individuals (57.4%) had at least 5% (maximum 45%) of the fasting glucose values below 5.5 mmol/L and would thus need  $\geq 2$  measurements to determine a single blood glucose  $\geq 5.5$  mmol/L with a 95% probability.

**Conclusions:** Fasting glucose values outside the diagnostic range for children and adolescents with GCK-MODY are more frequent than previously assumed. More than 57% of people with GCK-MODY below 19 years of age may require at least 2 blood glucose measurements to find one  $\geq 5.5$  mmol/L with a probability of 95%. Therefore, a one-sample approach in the clinical diagnostics could fail to diagnose a significant number of individuals with GCK-MODY. Similarly, screening for individuals among family relatives of people with GCK-MODY could be influenced as well.



Supported by the grant of the Slovak Ministry for Health 2019/20-LFUK-8, and VEGA 2/0131/21.

**P190 | Lipoprotein Lipase (LPL) gene mutation as the cause of severe hypertriglyceridemia in a Libyan patient with type 1 diabetes mellitus**

M. Ghawil<sup>1</sup>, I. Hadeed<sup>1</sup>, N. Algazir<sup>1</sup>, O. Fathalla<sup>1</sup>, N. Ben Omar<sup>2</sup>, S. Omar<sup>2</sup>, O. Bheleel<sup>3</sup>, M. Doggah<sup>1</sup>, S. Abusrewil<sup>1</sup>

<sup>1</sup>Pediatric Department, Tripoli University Hospital, Faculty of Medicine, University of Tripoli, Tripoli, Libya, <sup>2</sup>Pediatric Department, Tripoli University Hospital, Tripoli, Libya, <sup>3</sup>Cardiology Department, Tripoli University Hospital, Faculty of Medicine, University of Tripoli, Tripoli, Libya

**Introduction:** Severe hypertriglyceridemia (HTG) is an uncommon complication of Type 1 diabetes mellitus (T1DM). LPL deficiency is a monogenic lipid metabolism disorder biochemically characterized by HTG inherited in an autosomal recessive manner. LPL gene located on chromosome 8p22, and more than 50 different mutations identified in patients with severe HTG  $\geq 1000$  mg/dl and it is associated with comorbidities, such as uncontrolled diabetes mellitus.

**Objectives:** Case report: A 21-years-old girl diagnosed at age of 4 years with T1DM. She carried to HLA-DRB1\*03,-DRB1\*04-DQB1\*02,DQB1\*03, was on short and intermediate acting insulin till 15 years old when she demonstrated a rising in triglyceride (TG) 301 mg/dl with normal total cholesterol(TC), HbA1c 10%,BMI 21.4 kg/m<sup>2</sup>where changed to flexible insulin regime with Long/Rapid-acting insulin and carb counting. She started treatment with Simvastatin.

At 17 years of age, BMI 18.7 kg/m<sup>2</sup>, HbA1c was 12.5%, her TG 1120 mg/dl, TC 287 mg/dl, LDL128mg/dl, HDL 39 mg/dl, and the highest TG level was 1700 mg/dl. Blood pressure 110/65 mmHg, ECG, and Echocardiography done routinely and were normal.

**Methods:** Genetic analysis for hyperlipidemia showed a heterozygous LPL gene mutation. (c.809G > A,p.Arg270His,Chr8:19813385).

**Results:** Patient started treatment with Continuous Subcutaneous Insulin Infusion (CSII) pump in 2019.Currently with an intensive insulin therapy with CSII pump, HbA1c dropped to 7.7% within 6 months and TG decreased to 127 mg/dl and TC 133 mg/dl, LDL 82.9 mg/dl, HDL 31 mg/dl. Last investigation on March 2022; HbA1c6.8%,TG 52 mg/dl, TC 154 mg/dl, LDL116 mg/dl, HDL 50 mg/dl.

Recently, her other two sisters who diagnosed with T1DM also showed rising in triglyceride levels respectively 172 and 320 mg/dl.

**Conclusions:** We diagnosed for first time a heterozygous mutation of LPL gene in Libyan diabetic patient with severe hypertriglyceridemia. Currently with an intensive insulin therapy and correct metabolic control of T1DM, he maintains a normal lipid profile. Moreover genetic tests for immediate relatives should be performed.

**POSTER TOUR 21—MONOGENIC & OTHER FORMS OF DIABETES # 1**

**P191 | Diabetes in children may very well be, in reality only a cloaked MODY 3. For patients with variants of uncertainty, give HNF1A the third degree**

P. Svalastoga<sup>1</sup>, A. Kaci<sup>1</sup>, J. Molnes<sup>1,2</sup>, M. Solheim<sup>3</sup>, B.B. Johansson<sup>1</sup>, L. Krogvold<sup>4,5,6</sup>, T. Skrivarhaug<sup>4,6</sup>, S. Johansson<sup>3,2</sup>, A. Molven<sup>7,8</sup>, J.V. Sagen<sup>3,9</sup>, E. Sjøfteland<sup>9,3</sup>, L. Bjørkhaug<sup>10</sup>, E. Tjora<sup>3,11</sup>, I. Aukrust<sup>1,2</sup>, P.R. Njølstad<sup>1,11</sup>

<sup>1</sup>University of Bergen, Clinical Science, Bergen, Norway, <sup>2</sup>University of Bergen, Department of Medical Genetics, Bergen, Norway, <sup>3</sup>University of Bergen, Department of Clinical Science, Bergen, Norway, <sup>4</sup>University of Oslo, Department of Clinical Medicine, Oslo, Norway, <sup>5</sup>University of Oslo, Faculty of Dentistry, Oslo, Norway, <sup>6</sup>Oslo University Hospital, Division of Childhood and Adolescent Medicine, Oslo, Norway, <sup>7</sup>University of Bergen, Department of Clinical Medicine, Bergen, Norway, <sup>8</sup>University of Bergen, Department of Pathology, Bergen, Norway, <sup>9</sup>Haukeland University Hospital, Department of Medical Biochemistry and Pharmacology, Bergen, Norway, <sup>10</sup>Western Norway University of Applied Sciences, Bergen, Norway, <sup>11</sup>Haukeland University Hospital, Department of Pediatrics and Adolescents, Bergen, Norway

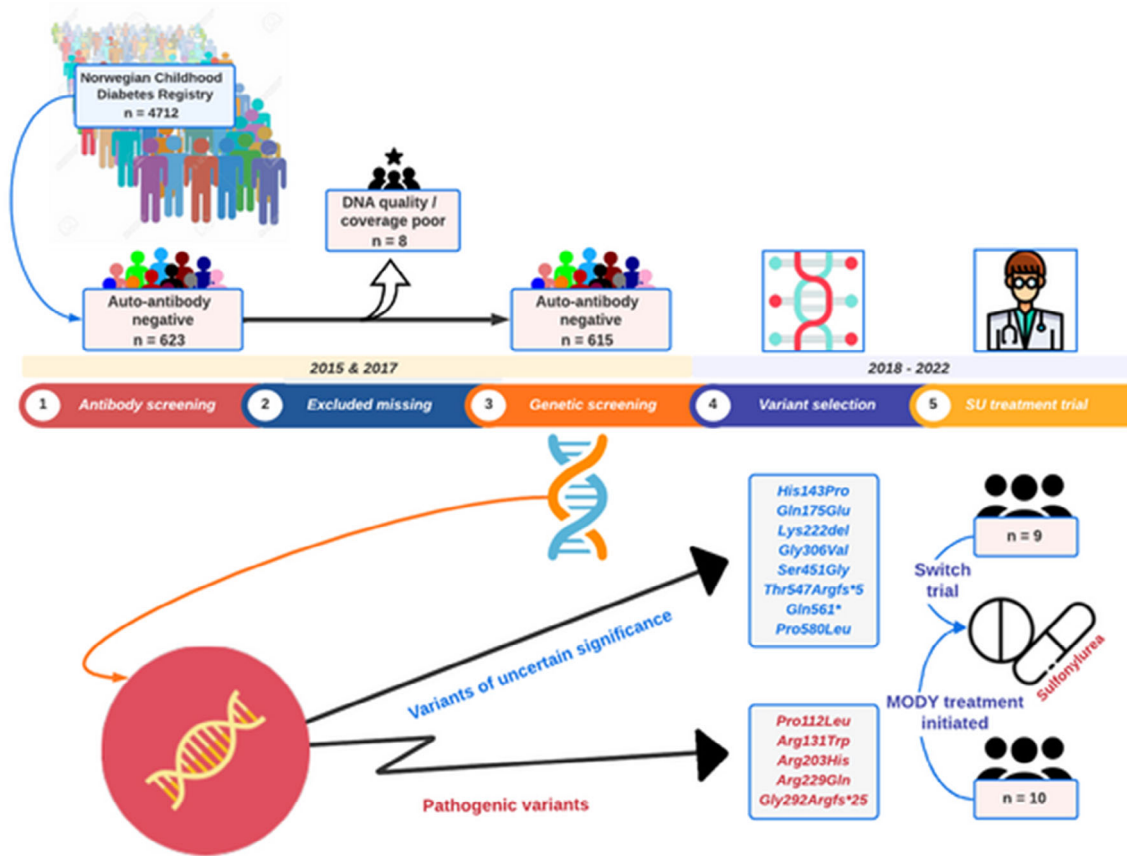
**Introduction:** Correctly, diagnosing HNF1A-MODY is important since subjects can be treated with sulfonylurea rather than insulin, improving metabolic control, and quality of life. Genetic testing can provide a precise diagnosis, but variants of uncertain significance pose an increasing challenge.

**Objectives:** We sought to identify MODY 3 by screening the national pediatric diabetes registry followed by thorough investigations in cases with unclear genetic results.

**Methods:** Autoantibody-negative subjects (n = 615) from The Norwegian Childhood Diabetes Registry was screened with exome sequencing, identifying 19 subjects with rare variants in HNF1A. Half of subjects had pathogenic mutations (n = 10), identifying MODY 3, and half were carriers of variants of uncertain significance (n = 9). Extra efforts were put forward to investigate this group, including functional investigations of the variants and a sulfonylurea switch trial, aiming to diagnose monogenic diabetes.

**Results:** Screening supplemented with refined diagnostics revealed a true prevalence of MODY 3 of 2.4%, permitting patients to stop insulin treatment. Genetics alone failed in providing definitive answers in half of cases, leaving the monogenic diagnosis hanging, but functional data predicted the clinical implications. Four variants (p.His143Pro, p.Lys222del, p-Thr547Argfs\*5, and p.Gln561\*) displayed abnormal functional assays, aligning nicely with patients being able to switch to sulfonylurea. Patients unable to substitute insulin therapy (carrying p.Gly306Val, p.Gln175Glu, p.Ser451Gly and p.Pro580Leu) showed normal HNF-1A properties.

**Conclusions:** Uncloaking MODY in pediatric diabetes is important. The impact of setting the right diagnosis is considerable, permitting insulin-free treatment. Variant interpretation can pose a challenge. Here we show how functional investigations and thorough clinical



assessments can aid the diagnostic process, leading to higher accuracy and representing a good example of precision medicine.

**P192 | Outcome in sq24-related transient neonatal diabetes**

P. Cid Galache<sup>1</sup>, L. Zamorano Bonilla<sup>1</sup>

<sup>1</sup>Hospital de Motril, UGC Pediatría y Neonatología, Motril, Spain

**Introduction:** 6q24-related transient neonatal diabetes mellitus (6q24-TNDM) is defined as transient neonatal diabetes mellitus caused by genetic aberrations of the imprinted locus at 6q24. The cardinal features are: severe intrauterine growth retardation, hyperglycemia that begins in the neonatal period in a term infant and resolves by age 18 months, dehydration, and absence of ketoacidosis.

**Objectives:** In this presentation, we want to show the evolution and outcome of a patient that was diagnosed in our unit 15 years ago.

**Methods:** The initial diagnosis was made using microsatellites looking for a paternal isodisomy or duplication. An isodisomy was found in our case. We have made a follow up throughout these years to see the evolution of our patient.

**Results:** The patient has been absolutely asymptomatic until she was 12 years old. Just 20 months ago (at the age of 13) she started to show abnormal HbA1C levels that has required insulin treatment. Nowadays she is having a perfect control of this new-onset diabetes using really low dose of Insulin glargine. Just 0,3 U/kg are being needed to keep the blood sugar levels in range in 90% of readings. The patient is not needing so far rapid acting insulin.

**Análisis Genético:**

La diabetes neonatal se asocia a tres tipos de trastornos en la región 6q24: isodisomía, duplicación paterna o pérdida de metilación materna. Mediante el uso de microsatélites se ha analizado la región 6q24 en busca de una posible isodisomía o duplicación paterna. El estudio de pérdida de metilación se realizó mediante digestión del ADN genómico con enzimas sensibles e insensibles a metilación y posterior PCR (Temple et al. Diabetes 49: 189-197, 2000)

**RESULTADO**

La persona presenta una mutación en el exón , consistiente en ISODISOMIA

**Observaciones:**

El estudio mediante PCR fluorescente de microsatélites distribuidos por el cromosoma 6 muestra que la persona a estudio PRESENTA isodisomía paterna (marcadores informativos D6STNF1a, D6S262, D6S279, D6S310, D6S355).

**Conclusions:** 6q24-related transient neonatal diabetes can have a relapse in the second or third decade of life in 50% of cases. It is important to know this is not a typical type 1 or 2 diabetes. The etiology of this hyperglycemia is related to this monogenic form of diabetes. So far this relapse is having a very good outcome using low doses of insulin glargine.

#### P193 | MODY2 presenting with post-prandial hyperglycemia, case report

H. Al Shaikh<sup>1</sup>

<sup>1</sup>Muscat Private Hospital, Pediatrics, Muscat, Oman

**Introduction:** Maturity Onset Diabetes of the Young is a non-insulin-dependent form of diabetes mellitus, diagnosed in mid childhood to young adulthood. It results from a single gene mutation and is divided into subtypes depending on the affected gene. MODY2 results from an autosomal dominant mutation in the GCK gene causing mild non-insulin-dependent fasting hyperglycemia, treated normally with diet control.

**Objectives:** To report a case of MODY2 with oligogeneity, and mainly post prandial hyperglycemia.

**Methods:** Medical information was retrieved from the computerized medical records.

**Results:** Case report:

A 9-year-old boy, presented at 8 years of age with dizziness and headache for 1 month and polyuria and polydipsia for 3 months. His *random blood glucose* was high, but *fasting blood glucose* was normal. Urine glucose was positive.

He was born at full-term, normal delivery with no complications. BW: 3.4 kg. The Parents are non-consanguineous. The paternal grandparents and maternal grandmother have T2DM. The mother had GDM. There is no family history of T1DM.

Investigations: RBG: 16.1 mmol/L, FBG: 5.3 mmol/L. Complete Blood Count: Normal with no anemia. Urine glucose +, Ketones: Nil. HbA1c: 6.2%. A GAD Abs and IA2 Abs: Negative.

Physical Examination: No significant findings.

SBGM showed BG values in the pre-diabetic range before breakfast and the diabetic range post dinner. On OGTT: FG: 3.9 mmol/L, 2 h BG: 16.5 mmol/L. He was managed with diet control, daily exercise, and regular BG monitoring.

**7 months later:** It was noticed that the BG was going up, around 11 mmol/L *fasting*, and 20 mmol/L *random*. His BG got controlled with Glimepiride before lunch and Insulin Glargine HS.

Genetic analysis identified a mutation in the GCK gene c.146C > G (p.Thr49Ser). Interestingly, two other mutations were identified: c.1407C > T, GLIS3 gene.

c.42\_47del, SLC19A2 gene.

**Conclusions:** Oligogeneity may alter the clinical characteristics of MODY2, presenting mainly with post-prandial hyperglycemia.

#### P194 | A novel de novo likely pathogenic variant of WFS-1 gene in a Pakistani child

M. Hanif<sup>1</sup>, M. Ibrahim<sup>2</sup>, J. Raza<sup>3</sup>

<sup>1</sup>Misbah Hanif, Department of Pediatric Endocrinology and Diabetes, Karachi, Pakistan, <sup>2</sup>National Institute of Child Health, Department of Pediatric Endocrinology and Diabetes, Karachi, Pakistan, <sup>3</sup>Sindh Institute of Child Health and Neonatology, Endocrinology, Karachi, Pakistan

**Introduction:** Wolfram Syndrome is a rare genetic disorder caused by pathogenic alterations in WFS1 gene, resulting in neurodegeneration, pancreatic cell dysfunction, and apoptosis. Wolfram syndrome is associated with Diabetes Insipidus, Diabetes Mellitus, Optic Atrophy, and Deafness also known as DIDMOD. Though Wolfram syndrome is considered an autosomal recessive disorder, heterozygous pathogenic variants have been noted to cause Wolfram like syndrome (hearing impairment, diabetes mellitus, and optic atrophy).

**Objectives:** To highlight a novel de novo likely pathogenic variant of WFS1 in a Pakistani child causing Wolfram like syndrome.

**Methods:** Case Report.

**Results:** We report a novel de novo likely pathogenic variant in a Pakistani child in WFS1 gene who presented with clinical features consistent with wolfram like syndrome. A 7 years old boy visited our endocrine clinic for management of uncontrolled type 1 diabetes mellitus despite being on glargine and as part his HbA1c was high (14%), though other investigations were normal. A physical exam noted a short stature (−4.55 SDS for age 7 years), otherwise he appeared normal. Past history was significant for sensorineural deafness in his first year of life and had bilateral cataract surgery at the age of 5 years. Family history is only significant for type 2 diabetes on his paternal side. Based on these clinical findings diabetes with extra-pancreatic features was suspected and genetic testing was ordered. Original report noted c.2586G > T (p.Lys862Asn) as a variant of uncertain significance but subsequent parental testing led to the reclassification of variant as a likely pathogenic variant.

**Conclusions:** Based on the above findings eye exam was requested that showed bilateral optic atrophy, which further supported this diagnosis our report highlights the rare possibility of a heterozygous variant causing Wolfram like syndrome and identifies a novel likely pathogenic variant in WFS1 gene, supported by clinical features consistent with Wolfram like syndrome.

#### P195 | Transition from insulin to sulfonylurea in an infant with a novel ABCC8 mutation: A success story

M. Haider<sup>1</sup>, M. Arif<sup>1</sup>, F. Memon<sup>1</sup>, S. Kirmani<sup>1</sup>, K.N. Humayun<sup>1</sup>

<sup>1</sup>Aga Khan University, Pediatric Endocrinology, Karachi, Pakistan

**Introduction:** Neonatal diabetes mellitus (NDM) presenting within the first 6 months of life is an extremely rare condition, with an incidence of approximately 1 in 90,000–160,000 live births caused by 20 known

genetic mutations including both permanent and transient forms. In the past, most cases of NDM were being classically managed with life-long insulin treatment but now its known that heterozygous activating mutations in *KCNJ11* and *ABCC8* are responsive to oral sulfonylurea treatment restoring insulin secretion. In these patients, insulin can be effectively replaced by oral sulfonylureas, which improves glycemic control and quality of life. We report a case of NDM with a novel *ABCC8* gene mutation, who was successfully transitioned from insulin to oral sulphonylurea therapy.

**Objectives:** To present our experience of transitioning a neonate with *ABCC8* mutation from insulin to sulfonylurea.

**Methods:** NA.

**Results:** A 9-week-old baby girl born to a primigravida mother presented with diabetic ketoacidosis. After stabilization, genetic testing for neonatal diabetes was sent to Exeter University (who have been supporting us for a decade with genetic diagnosis of all our neonatal diabetic patients), and insulin therapy was started. Genetic testing by Sanger Sequencing revealed a novel heterozygous, De novo, likely pathogenic *ABCC8* variant. The child was then successfully transitioned at the age of 4 months from insulin to oral sulphonylurea (glibenclamide) using the inpatient transfer protocol. The dose of glibenclamide (0.8 mg/kg/day) was enough to control her glucose levels. Outpatient follow-ups showed blood glucose readings in hypoglycemic ranges so, the dose was further tapered off. Currently, the child is well thriving and showing good control at a dose of 0.6 mg/kg/day divided twice daily of Glibenclamide.

**Conclusions:** Genetic testing should be sought in all patients with neonatal diabetes as oral sulfonylureas are a useful and effective treatment option in these patients with specific genetic mutations.

#### P196 | Monogenic diabetes in Pakistani infants and children:

##### Are we different?

M. Ibrahim<sup>1</sup>, M.I. Hanif<sup>1</sup>, T. Laghari<sup>1</sup>, M. Riaz<sup>1</sup>, S. Flanagan<sup>2</sup>, E.D. Franco<sup>2</sup>, J. Raza<sup>3</sup>

<sup>1</sup>National Institute of Child Health, Department of Pediatric Endocrinology and Diabetes, Karachi, Pakistan, <sup>2</sup>Institute of Biomedical and Clinical Sciences, University of Exeter, St Lukes, United Kingdom, <sup>3</sup>Sindh Institute of Child Health and Neonatology, Department of Pediatric Endocrinology and Diabetes, Karachi, Pakistan

**Introduction:** Monogenic diabetes can be dominant or recessively inherited or may present as a spontaneous occurrence due to the de novo mutation. More than 40 different genetic subtypes of monogenic diabetes have been identified mostly with a typical phenotype.

In regions with a greater prevalence of consanguineous unions, like Pakistan incidence of genetic disorders as well as monogenic diabetes is high. We describe the identification of monogenic diabetes in Pakistani children.

**Objectives:** To see the pattern of monogenic diabetes in Pakistani children.

To compare the results with Arab, British, and Turkish cohorts.

**Methods:** Children with clinical diagnosis of monogenic and syndromic diabetes were recruited and blood samples were sent for genetic analysis. We compared our results with different cohorts. The genetics of Pakistani, Arabic, and British cohort were tested in University of Exeter, Exeter, UK.

**Results:** A 39 patients from diabetic clinic (1064 Pts) of National Institute of Child Health were recruited for genetic testing who fulfilled the criteria for monogenic diabetes. We identified mutations in 18/27 cases with diabetes before 9 months of age. A 12 children presented after 9 months of age and had extra pancreatic features diagnosed with syndromic diabetes. We compared our cohort with Arabic, British and Turkish reported cohorts. Consanguinity was highest in Pakistani population followed by Arab, British, and Turkish cohorts. *EIF2AK3* (Wolcott Rallison syndrome) is commonest in 26.9% of Pakistani and Arab 22.7% cohort. British cohort had  $K_{ATP}$  channel 29.9% mutation while Turkish Cohort has GCK mutation as 59% the commonest. In Pakistani children, 32.5% are of monogenic diabetes with extra pancreatic features while in Arab 37.5% and British 7.8% were reported.

**Conclusions:** Monogenic diabetes in Pakistani population has a similar spectrum as Ar. British and Turkish cohorts have different pattern of monogenic diabetes. Syndromic diabetes is more common in the Pakistani and Arab populations.

#### P197 | A case report of transient neonatal diabetes mellitus with subtype ZFP57 genetic defect in 6q24

A. Mohamed Hekal<sup>1</sup>, N. Abdel Reheim<sup>1</sup>, H. Yaseen<sup>1</sup>, A. Elsenwi<sup>1</sup>

<sup>1</sup>University Hospital of Sharjah, Department of Pediatric & Neonatology, Sharjah, United Arab Emirates

**Introduction:** Neonatal diabetes mellitus (NDM) is a rare form of diabetes characterized by hyperglycemia occurring in the first few months of life with incidence 1 in 300,000 to 400,000 newborns. It is classified as transient and permanent type. Genetic etiology of this disease has been identified. Most of the transient (TNDM) cases are caused by the overexpression of chromosome 6q24. The mainstay of the management is insulin, regardless of the etiology.

Table 1: Molecular genetic analysis for neonatal diabetes mellitus

Gene	parent	HGVS description	Location: GRCh37(hg19)	Zygosity	Classification
ZFP57	mother	NM_001109809.2:c806G > A,p.(Arg269Gln)	Chr6: g.29641082	heterozygous	Pathogenic
	father	NM_001109809.2:c806G > A,p.(Arg269Gln)	Chr6: g.29641082	heterozygous	Pathogenic



**Objectives:** we report a case of Genetic Defect in 6q24 subtype ZFP57, which is pathognomonic of Transient Neonatal Diabetes Mellitus.

**Methods:** We report a case of TNDM with onset at first week of life & remission at 5 months of age registered at neonatal intensive care unit of university hospital of Sharjah. After exclusion of other causes of hyperglycemia, the case was diagnosed based on clinical criteria for transient diabetes: weight at birth, age when first hyperglycemia was detected, starting of insulin with progressive diminution, and definitive stop at the age of 5 months. Additionally, at the age of 3 months, the genetic confirmatory results were available to confirm transient neonatal diabetes.

**Results:** Genetic testing done at genomic laboratory, University of Exeter Medical School, UK showed loss of methylation at the 6q24 locus in Saeed's leukocyte DNA sample, which is a typical molecular feature of transient neonatal diabetes (MIM601410), likely due to maternal hypomethylation at the 6q24 locus. Parents were heterogeneous carrier for the ZFP57 missense variant, p. (Arg269Gln) which confirms diagnosis of transient neonatal diabetes, subtype ZFP57 (PP4\_strong) & the risk that this couple's next pregnancy will be affected by transient neonatal diabetes is 1 in 4 (Table 1).

**Conclusions:** NDM is a rare disease that needs a high index of suspicion, early diagnosis. Insulin therapy is crucial to control hyperglycemia, obtain satisfactory weight gain and growth and to provide a better quality of life.

#### P198 | A case of de novo activating mutation in ABCC8 gene resulting in transient neonatal diabetes

M. Ferreira Clemente<sup>1</sup>, H. Moore<sup>2</sup>, A. Onibere<sup>3</sup>

<sup>1</sup>Betsi Cadwaladr University Health Board - Glan Clwyd Hospital, Pediatrics and Neonatology, Bodelwyddan, United Kingdom, <sup>2</sup>Betsi Cadwaladr University Health Board - Glan Clwyd Hospital, Pediatrics, Bodelwyddan, United Kingdom, <sup>3</sup>Betsi Cadwaladr University Health Board - Glan Clwyd Hospital, Neonatology, Bodelwyddan, United Kingdom

**Introduction:** Neonatal diabetes (ND) is characterized by persistent hyperglycemia in the first 6 months of life. Transient neonatal diabetes (TND) is differentiated from permanent neonatal diabetes by its remission in infancy/early childhood, with possible relapse during adolescence. A gene mutation affecting pancreatic beta cells secretion of insulin is present in more than 80% of the cases. Overexpression of genes on the 6q24 locus is the most common cause of TND followed by mutations of the ABCC8 or KCNJ11 genes coding for the ATP-dependent potassium channel ( $K_{ATP}$ ) in the pancreatic beta cell. Activating mutations in either of the two genes result in inappropriately open  $K_{ATP}$  channels despite hyperglycemia leading to inability of the cell membrane to depolarize and release insulin.

**Objectives:** Case Presentation: Female infant born at 31 weeks' gestation weighing 1.440 Kg. Uneventful initial course. Incidental finding of

hyperglycemia at day 9 of age on a capillary gas, glucose of 18.2 mmol/L. No ketonaemia/acidosis and no stress factors present.

**Methods:** Management: Treatment with soluble insulin infusion was started. Insulin was titrated accordingly and discontinued on day 29 of age. Blood glucose continued to be closely monitored. Glibenclamide was due to be started on day 36 of age, however, infant's blood glucose levels stabilized. Patient considered to be in remission.

**Results:** Genetic testing: Heterozygous mutation in the ABCC8 gene, known to cause ND. No relevant family history, parents did not show any related mutation.

**Conclusions:** ND should be considered in patients with absence of contributing factors, with normal birth weight and a later hyperglycemia (after day 3–5 of age). Genetic testing is important as a specific genetic mutation can significantly alter the treatment and outcome. Despite remission, close glucose monitoring and education of caregivers about diabetes is essential. Long term monitoring is planned (to puberty) with a focus on possible diabetes relapse.

#### P199 | Neonatal mellitus diabetes: Restrospective study in children's hospital of Rabat over 10 years

Z. Imane<sup>1</sup>, A. Boulmane<sup>1</sup>, A. Balafrej<sup>1</sup>

<sup>1</sup>UM5R, Children's Hospital of Rabat, Rabat, Morocco

**Introduction:** Neonatal diabetes Mellitus (NDM) is a rare monogenic diabetes, with an incidence ranging from 1 in 90,000 to 500,000 newborns in Europe.

Based on the treatment duration, NDM is stratified as transient NDM (TNDM) and permanent NDM (PNDM).

TNDM is linked in the majority of cases (~70%) to abnormalities in an imprinted region on chromosome 6q24, and in 30% to genetic mutations: KCNJ11, ABCC8, INS and HNF1 $\beta$ .

PNDM is genetically heterogeneous and several genes have been linked to this disorder. It may be isolated or associated to other syndromic entities. Its etiopathogenesis is increasingly elucidated.

**Objectives:** This work aims to study epidemiological, clinical, biochemical, genetic, therapeutic aspects, and outcome of NDM.

**Methods:** Descriptive Retrospective study from January 2006 to February 2016. We included all infants diagnosed with diabetes before 6 months of age, and followed at our department for diabetes mellitus.

**Results:** 15 infants with NDM were studied. Consanguinity was present in 53%, and a familial story of diabetes in 80%. A 31% of these children had IUGR. Cardinal symptoms were dehydration, vomiting, diarrhea, osmotic polyuria. 66.6% presented with diabetic ketoacidosis (DKA), and only 46.6% had a provisional diagnosis of diabetes or DKA at first physician contact. Peptide C levels were generally low, and all patients tested were negative for autoimmune markers of diabetes.

F2AK3 and INS were found to be responsible for 42% of NDM cases.

Mutations in ABCC8 gene were found in only two cases (15%), which one is candidate for DEND syndrome. Transfer from insulin to oral sulfonylurea was started in index patient.

Only 2 patients (14%) had a TNDM with ABCC8 mutation and abnormal 6q24.

**Conclusions:** In our study genetic etiology are different compared to Europeans and British patients, and it may be due to the higher rate of consanguinity. However, KATP mutations (ABCC8, KCNJ11) should be systematically screened, in reason of their impact on the management and prognosis of NDM.

## POSTER TOUR 22—ASSOCIATED DISEASES # 2

### P200 | Prevalence of parietal cell antibodies and iron deficiency in patients with type 1 diabetes mellitus from north India

S. Verma<sup>1</sup>, K. Ahmed Bhat<sup>1</sup>, V. Bhatia<sup>1</sup>, E. Bhatia<sup>1</sup>, S. Sudhanshu<sup>1</sup>

<sup>1</sup>Sanjay Gandhi Post Graduate Institute of Medical Sciences, Endocrinology, Lucknow, India

**Introduction:** Type 1 diabetes mellitus (T1D) is associated with an increased prevalence of autoimmune disorders. Parietal cell antibody (PCA) mediated autoimmune gastritis increases the risk of iron deficiency and pernicious anemia in adults with type 1 diabetes (T1DM). However, it is not known if these antibodies play a similar role in children and young adults with T1DM.

**Objectives:** We studied the prevalence of parietal cell antibody (PCA) and its clinical associations among T1D patients with onset below 30 years.

**Methods:** In a clinic-based cross-sectional study, 224 north Indian children and young adults with T1DM and 171 healthy controls were enrolled. We measured hemoglobin, serum ferritin, vitamin B12, PCA, thyroid peroxidase (TPO) and tissue-transglutaminase (TTG) antibodies in all patients.

**Results:** The prevalence of PCA was significantly higher in patients [22% (17%–28%)] than age and sex matched controls [10.2% (6%–6%);  $p = 0.002$ ]. Patients with PCA had a higher frequency of anemia (60% vs. 30%,  $p < 0.001$ ), lower hemoglobin [11.8 (2.5) g/dl vs. 12.5 (1.8) g/dl,  $p = 0.002$ ] and lower serum ferritin [20.9 (31.5)  $\mu\text{g/L}$  vs. 29.4(46.9)  $\mu\text{g/L}$ ,  $p = 0.04$ ], as compared to the T1D patients without PCA. Serum vitamin B12 did not differ between the two groups. On multivariate analysis, hemoglobin was associated with PCA ( $\beta = -0.174$ ,  $p = 0.005$ ), serum ferritin ( $\beta = 0.247$ ,  $p < 0.001$ ) and creatinine clearance ( $\beta = 0.160$ ,  $p = 0.012$ ). Patients with anemia had significantly low height Z-scores as compared to patients without anemia (-1.6 vs. -0.9,  $P = 0.004$ ). The prevalence of anemia (31%), hemoglobin [median (IQR) 12.6 (1.8) g/dl] and ferritin levels [median (IQR) 28.9 (48.9)  $\mu\text{g/L}$ ] in controls did not differ from that in T1D patients without PCA.

**Conclusions:** PCA was an independent risk factor for anemia and iron deficiency in children and young adults with T1DM.

### P201 | Management of diabetes in the context of a generalized congenital lipodystrophy

M. Ben Lafqih<sup>1</sup>, S. Ijdda<sup>2</sup>, S. Rafi<sup>2</sup>, G. El Mghari<sup>2</sup>, N. El Ansari<sup>2</sup>

<sup>1</sup>Management of Diabetes in the Context of a Generalized Congenital Lipodystrophy, Marrakech, Morocco, <sup>2</sup>University Hospital Mohammed VI, Marrakech, Morocco

**Introduction:** Generalized congenital lipodystrophy, represents the most extreme phenotype of lipodystrophies with the loss of almost all body fat. It is a rare entity seen at birth or in the first months of life, predisposing to the early development of metabolic complications such as diabetes, hypertriglyceridemia, and fatty liver disease during childhood.

**Objectives:** We report the case of a patient in who generalized congenital with diabetes and different therapeutic options.

**Methods:** 28-year-old patient, the diagnosis of diabetes was revealed at the age of 14 years, and then she was put on 2 mixed insulins and rapid insulin with high doses at a rate of 2.2 IU / kg. At the age of 16, she presented with acute pancreatitis with revelation of major hypertriglyceridemia at 96 mg / l, on clinical examination, we found a adipose tissue atrophy involving the entire body and limbs with an appearance of pseudolebomegaly, muscle hypertrophy with clitoral hypertrophy, and mild hirsutism. The treatment of diabetes focused on hygiene and dietary measures, taking metformin and adjustment of his insulin doses.

**Results:** Lipoatrophic diabetes due to the presence of severe insulin resistance, both muscular and hepatic. Due to insulin resistance, some patients require high doses of insulin. It is important to limit the daily calorie intake in order to control blood sugar. Physical activity is strongly recommended. Recombinant leptin, effective on associated metabolic disorders but does not improve lipoatrophy. Regarding anti-diabetic treatments, metformin remains a first-line treatment due to its hepatic insulin sensitizing action, even if it has no action on the peripheral target tissues of insulin. Glucagonlike peptide-1 receptor agonists are often useful in treating hyperglycemia and overeating, as well as ultra-concentrated insulin.

**Conclusions:** The management of diabetes in the context of lipodystrophy is difficult and requires a multidisciplinary approach.

### P202 | Type 1 diabetes and myasthenia gravis

C. Barcala<sup>1</sup>, G. Krochik<sup>1</sup>, C. Martinez Mateu<sup>1</sup>, S. Monges<sup>2</sup>, M. Prieto<sup>1</sup>

<sup>1</sup>Garrahan Hospital, Pediatric Nutrition, Autonomous city of Buenos Aires, Argentina, <sup>2</sup>Garrahan Hospital, Pediatric Neurology, Autonomous city of Buenos Aires, Argentina

**Introduction:** The development of immunological tolerance against self-antigens is called self-tolerance. The loss of it generates an abnormal regulation of autoreactive T lymphocytes or an alteration in the way in which the presentation of self-antigens is carried out and the development of autoimmune diseases. Type 1A Diabetes Mellitus (1ADM) is a metabolic disorder secondary to autoimmune destruction

of pancreatic beta cells and insulinitis. It is the most common type of diabetes in childhood and youth. Myasthenia Gravis (MG) is an autoimmune disease caused by postsynaptic blockade of the myoneural plate by AAcS against Acetylcholine receptors (ACRA) or against molecules of the postsynaptic membrane. The association between DM1A and MG can be observed in type III polyglandular syndrome, characterized by autoimmune disease of the thyroid gland associated with other autoimmune entities.

**Objectives:** Describe the association of type 1 diabetes and myasthenia gravis.

**Methods:** Case Report, three patients between 7 and 19 years old, with an association of MG and DM1A treated at the Garrahan Hospital.

**Results:** The association of autoimmune diseases related to DM1A is known. The most frequently Hashimoto's Thyroiditis, Autoimmune Gastritis and Celiac Disease. In our group, the frequent association are thyroiditis and celiac disease. The autoimmune disease most frequently related to MG is thyroiditis. The coexistence of DM1A and MG is described in Polyglandular Syndrome III.

**Conclusions:** There is little published evidence on the association of DM1A and MG in children outside the Polyglandular Syndrome III. Two of the three patients have increased HbA1c compared to the mean of our follow-up population. There is no published evidence on the risk of complications in the long or medium term in these cases.

#### P203 | Association of type 1 diabetes mellitus with autoimmune diseases in children in the department of endocrinology-diabetology and nutrition at Mohammed VI University Hospital Center Oujda

H. Charif<sup>1</sup>, L. Yagoubi<sup>1</sup>, A. Ourdi<sup>1</sup>, I. Assarrar<sup>1</sup>, N. Messaoudi<sup>1</sup>, S. Rouf<sup>1,2</sup>, H. Latrech<sup>1,2</sup>

<sup>1</sup>Mohammed VI University Hospital Center, Faculty of Medicine and Pharmacy, Université Mohammed Premier Oujda, Endocrinology-Diabetology and Nutrition Department, Oujda, Morocco, <sup>2</sup>University Mohammed Premier Oujda, Laboratories of Epidemiology, Clinical Research and Public Health, Faculty of Medicine and Pharmacy, Oujda, Morocco

**Introduction:** Type 1 diabetes is frequently accompanied by other autoimmune diseases that can sometimes be integrated into autoimmune polyendocrinopathies.

**Objectives:** Through this work, we sought to describe the association of autoimmune diseases with type 1 diabetes in children.

**Methods:** This is a retrospective and descriptive study, including 354 type 1 diabetic patients hospitalized in the Department of Endocrinology Diabetology and Nutrition at Mohammed VI University Hospital Center Oujda between 2016 and 2021. All our patients had benefited from a systematic search for autoimmune diseases. The statistical analysis was performed by SPSS version 21 software.

**Results:** The mean age of our patients was  $16 \pm 1.9$  years. Our population was predominantly female with a sex ratio of 0.94. A family history of autoimmune diseases was noted in 6 cases. Anti-IA2 and anti-GAD antibodies were positive in 19% of cases.

Autoimmune diseases were noted in 23 patients, 34.7% of whom were men and 65.8% women. Autoimmune dysthyroidism was the leading cause in 34% of cases. Type 1 diabetes mellitus preceded dysthyroidism in 65% of cases. Celiac disease was noted in 30% of cases. Autoimmune polyendocrinopathy was listed in 39.2% of cases and psoriasis in 0.28% of our patients.

**Conclusions:** The frequency of autoimmune diseases in type 1 diabetics, which can sometimes be part of autoimmune polyendocrinopathy, encourages screening for them when diabetes is discovered. The screening will allow an early management of these disorders and prevent further complications.

#### P205 | Early insulin-induced lipoatrophies in a young child treated with topical tacrolimus

E. Morotti<sup>1,2</sup>, G. Frontino<sup>1,2</sup>, A. Rigamonti<sup>1,2</sup>, R. Di Tonno<sup>1,2</sup>, V. Castorani<sup>1,2</sup>, F. Sandullo<sup>1,2</sup>, F. Scialabba<sup>1,2</sup>, F. Arrigoni<sup>1,2</sup>, R. Foglino<sup>1,2</sup>, B. Dionisi<sup>1,2</sup>, F. Meschi<sup>1,2</sup>, R. Bonfanti<sup>1,2,3</sup>

<sup>1</sup>IRCCS San Raffaele Hospital, Department of Pediatrics, Milano, Italy, <sup>2</sup>IRCCS San Raffaele Hospital, Diabetes Research Institute, Milano, Italy, <sup>3</sup>Università Vita-Salute San Raffaele, School of Medicine, Milano, Italy

**Introduction:** Insulin-induced lipoatrophies (IILA) are rare but lead to detrimental effects on esthetics, glucose control, and quality of life. Causes are unclear, and there is no established treatment. There is a correlation with greater age ( $11.5 \pm 3.8$  years), disease duration ( $5.4 \pm 3.6$  years) and associated autoimmune diseases. Switching insulin preparations and mode of administration, local treatment cromolyns, low dose oral or topical corticosteroid are therapeutic options in IILA with variable and often unsatisfying results. T is a macrolidecalcineurin inhibitor that inhibits T-cell activation and is approved in children with moderate-severe atopic dermatitis from 2 years of age.

**Objectives:** To assess the use of T on early IILA in a young child with type 1 diabetes (T1D).

**Methods:** A 4-year-old boy with a 4-month history of T1D (sensor-augmented pump therapy with lispro) and no associated autoimmune diseases presented bilateral IILA at the infusion set sites on the buttocks. At 8 months of follow-up, new IILA appeared at the injection sites on the thighs bilaterally. The patient was switched to multiple injections of insulin as part and glargine. After 3 months and no improvement, local corticosteroid treatment was started. After another unsuccessful 3 months, and due to reported cases of T1D-related necrobiosis lipoidica successfully treated with T, local treatment was started. Primary endpoint was the increase of the subcutaneous fat thickness (SFT) at 6 months as measured by ultrasound (US). Measurements were recorded at baseline, 1 and 6 months.

Table 1

	t0 (mm)	1 month [mm (% from baseline)]	6 months [mm (% from baseline)]
Left buttock	4.5	3.4(−24%)	6.5 (+44%)
Right buttock	9.2	4 (−56%)	8 (−13%)

**Results:** SFT at baseline and during follow-up is show in table 1. Treatment with T is still ongoing with no side effects.

**Conclusions:** ILLA presentation in our patient is atypical for both disease duration and age of onset. Importantly, response to T may suggest T-cell mediated mechanisms underlying ILLA pathogenesis and warrants its further investigation as a potential treatment for ILLA.

#### P206 | Prevalence of coeliac disease in children with type 1 diabetes mellitus: a cross sectional study from a single tertiary center in Oman

H. Alsaffar<sup>1</sup>, E. Atiq<sup>1</sup>, I. Ullah<sup>1</sup>, A. Al-Shidhani<sup>1</sup>, S. Al-Yaarubi<sup>1</sup>

<sup>1</sup>Sultan Qaboos University Hospital, Child Health Department, Pediatric Endocrine and Diabetes Unit, Muscat, Oman

**Introduction:** Coeliac disease (CD) is one of the autoimmune disorders that has been increasingly recognized to be associated with type 1 diabetes mellitus (T1DM). A 10 years ago, the prevalence of CD in T1DM patients was reported to be 5.5% in our center.

**Objectives:** To determine the prevalence of CD in T1DM in our cohort of patients who receive their medical care at Sultan Qaboos University Hospital.

**Methods:** Going through the electronic medical records of our patients and reviewing their immunology screen for CD that is performed routinely for all children diagnosed with T1DM.

**Results:** Out of 123 patients live with T1DM, currently aged between 4.3 to 18.8 years, whom received their medical care at pediatric diabetes unit in 2021; 20 patients (16.2%) had positive coeliac screen at some point during their course of management. A 5 of them had further testing which ruled out coeliac disease, 2 other patients are currently under further work up by pediatric gastroenterology team. Therefore there is 13 patients confirmed having CD giving a prevalence of 10.5% which is double the prevalence of what was reported 10 years ago.

**Conclusions:** There is an alarming increase in the prevalence of Coeliac disease among patients live with Type 1 Diabetes Mellitus in our cohort of patients in a single tertiary center in Oman. Further studies are needed to explore the reasons for doubling the prevalence.

#### P207 | Association of autoimmune disease with type 1 diabetes mellitus: clinical audit

M. Saleh<sup>1</sup>, M. Mustafa<sup>1</sup>, L. Al Marzooqi<sup>1</sup>, A. Rafakat<sup>2</sup>

<sup>1</sup>Al Jalila Hospital, Pediatric Endocrinology, Dubai, United Arab Emirates, <sup>2</sup>Al Jalila Hospital, Pediatrics, Dubai, United Arab Emirates

**Introduction:** Type 1 diabetes (T1D) is caused by an autoimmune-induced inflammatory destruction of the pancreatic tissue. Type 1 diabetes (T1DM) is often associated with autoimmune diseases such as: autoimmune thyroid disease (ATD), celiac disease (CD), autoimmune gastritis (AIG), pernicious anemia (PA) and vitiligo.

Autoimmune thyroid disease and celiac disease are the most prevalent endocrinopathy among diabetic patients.

**Objectives:** To assess the association of other autoimmune disease mainly celiac disease and thyroid dysfunction in our patient with Type 1 diabetes mellitus.

**Methods:** This was a retrospective study where all patients attended the pediatric diabetic clinic at LWCH from January 2019 till March 2021 were included. History, examination in addition to investigations including HBA1C, thyroid, and celiac screening were documented.

**Results:** Total number of patient enrolled were 120 child with type1 diabetes mellitus. Mean duration of disease was 3.5 years. All children were screened for celiac disease and thyroid function annually, 255 of the children had positive celiac screening, only 2 patients were symptomatic, 50% of these patients were confirmed celiac disease. 4% of the children with T1DM have hypothyroidism.

**Conclusions:** Association of other autoimmune disease should be assessed in T1DM mainly celiac disease and thyroid dysfunction annually, for early detection and prompt management.

#### P208 | Clinical Profile and association of coeliac disease in children with type 1 diabetes presenting in low middle income country

V. Rai<sup>1</sup>, D.D.K. Jokhio<sup>1</sup>, M. Riaz<sup>1</sup>, Z. Khoso<sup>1</sup>, D.T.M. Laghari<sup>1</sup>, S. Chachar<sup>1</sup>, P.M.N. Ibrahim<sup>1</sup>

<sup>1</sup>National Institute of Child Health, Pediatric Endocrinology and Diabetes, Karachi, Pakistan

**Introduction:** Celiac disease (CD) is an immune-mediated enteropathy caused by permanent intolerance to gliadin & related proteins present in gluten part of diet in genetically susceptible individuals. CD was often thought to be a disease of western people, however current data in India, the North Africa & Middle East reveal that it affects 0.13% to 1.16% of lower risk of people & 2.3% to 4.3% of higher risk of people. CD, also termed as gluten-sensitive enteropathy, is a hereditary condition that affects both adults & children.

**Objectives:** To determine Clinical Profile and Association of Celiac Disease in Children With Type 1 Diabetes.



**Methods:** Study design: This cross sectional study was conducted from 2 Jan 2019 to 2 Jul 2019 in NATIONAL INSTITUTE OF CHILD HEALTH (NICH).

**Material and methods:** Sample size is 126 cases of type 1 DM calculated on Open Epi software. By using prevalence 11.1%(19) of celiac disease in children with type 1 DM, Confidence interval of 95%, at margin of error 5.5%.

Patients with Type 1 diabetes mellitus (T1D) with age 1 to 18 years were included. Patients with diabetic ketoacidosis and evidence of pancreatic calcifications were excluded from the study.

**Results:** Out of 126 type 1 diabetes mellitus patients, 29(23.0%) were diagnosed to have celiac disease on the basis of positive serology. The mean age of the patients was  $9.31 \pm 4.40$ , 56(44.4%) patients were female and 70(55.6%) were male. A 30(23.81%) patients had diarrhea, 85(67.46%) patients were anemic, 26(20.6%) patients had abdominal pain.

**Conclusions:** Celiac disease is highly prevalent in patients with type1 diabetes mellitus (23%). In this study, CD was diagnosed with the help of Anti tissue transglutaminas. IgA, IgG, and Anti-DGPs (IgG). These data imply that the frequency of CD in children with type 1 diabetes is larger, and diabetic children should be screened on a regular basis to ensure early detection and treatment of Celiac disease.

#### POSTER TOUR 23—EPIDEMIOLOGY & PATHOGENESIS # 3

##### P210 | Prevalence of C-peptide and antibody levels (anti GAD, Islet cell antibodies, insulin auto antibodies) in type 1 diabetic children at National Institute of Child Health Hospital Karachi, Pakistan

M. Riaz<sup>1</sup>, T. Laghari<sup>1</sup>, Z. Khoso<sup>1</sup>, V. Rani<sup>1</sup>, M.N. Ibrahim<sup>1</sup>

<sup>1</sup>National Institute of Child Health, Peads Endocrinology, Karachi, Pakistan

**Introduction:** Type 1 diabetes mellitus (T1DM) is an autoimmune disease characterized by the loss of glycemic control. It is the autoimmune mechanism that has a latent period and results in destruction of pancreatic  $\beta$ -cells, which leads to the development of hyperglycemia

and lifelong dependency on daily insulin injections. This autoimmune disorder develops as a consequence of a synergistic combination of genetic pre-disposition, largely unknown environmental triggers, and immunologic events.

As T1D remains the most common form of diabetes in children so this data would help in better understanding of the disease and its pathophysiology in our population.

**Objectives:** To determine the prevalence of C-peptide and antibody levels (anti GAD, Islet cell antibodies, insulin auto antibodies) in type 1 diabetic children at tertiary care hospital.

**Methods:** 98 children of both genders, at National Institute of Child Health, Karachi with type 1 DM for >1 month were included in the study. Children who did not give informed consent and whose GFR <30 ml/min were excluded.

In all these enrolled patients, C-peptide, human islet cell antibody (ICA), insulin auto antibodies (IAA) and antiglutamic aciddecarboxylase (anti-GAD) were estimated. All demography, clinical history and laboratory data was recorded on a predesigned performa.

**Results:** In 77(78.3%) patients of Type 1 diabetes, C-peptide level was less than 0.8 and 47(48%) have positive anti-GAD level. There were 35(35.7%) patients who had positive IA2 level. Insulin auto antibodies were positive in 7(7.1%) patients and Islet Cell antibody level was negative in all 98(100%) of type 1 diabetic patients in this study.

**Conclusions:** Diabetic children had high levels of anti-GAD antibodies, insulin autoantibodies and islet cells antibodies but low level of C-peptide.

##### P212 | Analysis of the major histocompatibility complex (MHC) in type 1 diabetes patients from the United Arab Emirates using high-resolution family-phased haplotypes

H. Alnaqbi<sup>1</sup>, S. Chehadeh<sup>1</sup>, A. Deeb<sup>2</sup>, A. Ahli<sup>3</sup>, D. Almalood<sup>3</sup>, H. Alsafar<sup>1</sup>, G. Tay<sup>4</sup>

<sup>1</sup>Khalifa University of Science and Technology, Center for Biotechnology, Abu Dhabi, United Arab Emirates, <sup>2</sup>Mafraq Hospital, Department of Endocrinology, Abu Dhabi, United Arab Emirates, <sup>3</sup>Khalifa University of Science and Technology, College of Medicine and Health Sciences,

Anti-GAD	Negative	51	52
C-Peptide level	Less than 0.8	77	78.3
	0.8 or more(normal)	21	21.4
Insulinoma- associated antigen 2(IA2)	Negative	63	64.3
	Positive	35	35.7
Insulin auto antibodies	Negative	91	92.9
	Positive	7	7.1
Islet Cell antibody	Negative	98	100.0
	Positive	0	0.0

Abu Dhabi, United Arab Emirates, <sup>4</sup>Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates

**Introduction:** The Major Histocompatibility Complex (MHC) is a region containing major genetic risk factors for Type 1 Diabetes (T1D), a disease that is becoming more prevalent in the populations of the Arabian Peninsula. Family studies represent a robust method of disease association analysis, as they avoid a considerable source of ambiguity caused by un-detected population stratification biases that typically impact typical unrelated case-control studies.

**Objectives:** This study establishes a methodological example for future research on MHC-disease association and to improve our knowledge of the genetics of T1D in an understudied population.

**Methods:** In this study, Next Generation Sequencing (NGS) was used to genotype the Human leukocyte Antigens (HLA) class I and class II in 13 T1D patients from the United Arab Emirates (UAE), their unaffected family members (22 parents and 7 unaffected siblings), and 28 unrelated healthy UAE families (including one three-generations family). HLA haplotypes were assigned unequivocally by pedigree-based segregation analysis. A case-control analysis was conducted between pedigree-phased haplotypes of the patients and the control group using Bridging ImmunoGenomic Data-Analysis Workflow Gaps (BIGDAWG).

**Results:** Consistent with previous reports in Caucasian, North African, South Asian, and Middle Eastern populations, the MHC class II haplotype block marked by HLA-DRB1\*03:01-DQA1\*05:01-DQB1\*02:01 and HLA-DQB1\*03:02 showed significant associations with T1D. HLA-DQA1\*01:02 was found to be negatively associated to T1D. Further, a high excess of HLA-DR3 or HLA-DR4 homozygosity was detected in patients, which could be due to consanguinity, a factor that could potentially increase the susceptibility of Arabian children to T1D.

**Conclusions:** The current study is important as it contributes to understanding the genetic mechanisms that ultimately lead to T1D incidence in an understudied population. Genetic markers may help identify individuals at high risk before clinical manifestations.

#### P213 | DNA methyltransferase 3A and ten eleven translocase 2 in children with type 1 diabetes; role in disease pathogenesis and progression

N. Salah<sup>1</sup>, L. Salem<sup>1</sup>, S. Taha<sup>1</sup>, M. Youssef<sup>1</sup>, L. Annaka<sup>1</sup>, S. Hassan<sup>1</sup>, R. Mahmoud<sup>1</sup>

<sup>1</sup>Ain Shams University, Cairo, Egypt

**Introduction:** DNA methylation plays a pivotal role in autoimmunity and energy metabolism. However, its mechanistic role and clinical implications in type 1 diabetes (T1D) is still obscure.

**Objectives:** To assess the level of DNA methyl-transferase3A (DNMT3A) and ten-eleven translocase2 (TET2) in children with T1D compared to controls and to correlate them to disease duration, HbA1C and micro-vascular complications.

**Methods:** A 50 children with T1D and 50 matched controls were assessed for family history of T1D, diabetes duration, insulin therapy, anthropometric measures, fundus and the bedside neuropathy-disability score. TET2, DNMT3A, fasting lipids, glycated-hemoglobin (HbA1C) and urinary albumin-creatinine were measured.

**Results:** The mean TET2 of the studied children with T1D was 227.60 ng/ml and their mean DNMT3A was 2.59 ng/ml. Children with T1D had significantly higher TET2 ( $P = 0.015$ ) and DNMT3A ( $P < 0.001$ ) than controls. Children with T1D with diabetes duration  $\leq 5$  years had significantly higher TET2 than those with diabetes duration  $> 5$  years ( $P = 0.02$ ) and controls ( $P < 0.001$ ). TET2 was negatively correlated to diabetes duration ( $P < 0.001$ ) and HbA1C ( $P < 0.001$ ), while DNMT3A was positively correlated to diabetes duration ( $P < 0.001$ ) and HbA1C ( $P = 0.001$ ). TET2 was independently related to HbA1C ( $P = 0.001$ ) and diabetes duration ( $P = 0.038$ ), while DNMT3A was independently related to diabetes duration ( $P = 0.003$ ) in children with T1D. Micro-vascular complications were not related to TET2 ( $P = 0.535$ ) and DNMT3A ( $P = 0.310$ ).

**Conclusions:** TET2 and DNMT3A are significantly higher in children with T1D than controls. Moreover, they are correlated with diabetes duration and HbA1C in children with T1D. Thus, they could serve as potential therapeutic targets for prevention and treatment of T1D.

#### P214 | Impact of family history of diabetes on clinical features at onset of type 1 diabetes-Data from a national, prospective Swedish cohort

E. Hedlund<sup>1,2</sup>, J. Tojjar<sup>1</sup>, L. Lilja<sup>3</sup>, H. Elding Larsson<sup>4,5</sup>, G. Forsander<sup>6,7</sup>, S.A. Ivarsson<sup>4</sup>, J. Ludvigsson<sup>8,9</sup>, C. Marcus<sup>10</sup>, F. Norström<sup>11</sup>, U. Samuelsson<sup>8,9</sup>, M. Persson<sup>12,13</sup>, A. Carlsson<sup>1,3</sup>

<sup>1</sup>Lund University, Department of Clinical Sciences, Lund, Sweden, <sup>2</sup>Kristianstad Central Hospital, Kristianstad, Sweden, <sup>3</sup>Skåne University Hospital, Lund, Sweden, <sup>4</sup>Lund University, Department of Clinical Sciences, Malmö, Sweden, <sup>5</sup>Skåne University Hospital, Malmö, Sweden, <sup>6</sup>University of Gothenburg, Institute of Clinical Sciences, Gothenburg, Sweden, <sup>7</sup>Sahlgrenska University Hospital, The Queen Silvia Children's Hospital, Gothenburg, Sweden, <sup>8</sup>Linköping University Hospital, Crown Princess Victoria Children's Hospital, Linköping, Sweden, <sup>9</sup>Linköping University, Division of Pediatrics, Dept of Biomedical and Clinical Sciences (BKV), Linköping, Sweden, <sup>10</sup>Karolinska Institute, Department of Clinical Science Intervention and Technology, Division of Pediatrics, Stockholm, Sweden, <sup>11</sup>Umeå University, Department of Epidemiology and Global Health, Umeå, Sweden, <sup>12</sup>Karolinska Institute, Department of Medicine, Clinical Epidemiology, Stockholm, Sweden, <sup>13</sup>Karolinska Institute, Södersjukhuset, Department of Clinical Science and Education, Stockholm, Sweden

**Introduction:** Increasing evidence suggest that type 1 diabetes (T1D) is a heterogenous disease.

**Objectives:** The aim of this study is to describe heredity for T1D or type 2 diabetes (T2D), both or none, in Swedish children with T1D,

and to examine whether family history of diabetes influences the clinical picture at disease onset.

**Methods:** Blood samples and data on diabetes heredity (first and second generation) were collected at diagnosis of T1D in 3647 children (<18 year-olds) from the national Better Diabetes Diagnosis (BDD) cohort in Sweden. Data was split into groups based on heredity, and analyzed for differences in autoantibodies (GADA, IAA, IA-2A, and ZnT8A), HLA-genotype, age, sex, BMI, and HbA1c at diagnosis. Parental diabetes was compared for 11 to 13-year-olds in the BDD-cohort (n = 811) and data from previously published data on healthy 12-year-old controls (n = 11,050).

**Results:** Compared with children with heredity for T2D, children with heredity for T1D were diagnosed at a lower age (p < 0.001) and had a lower mean HbA1c at diagnosis (p < 0.001), while children with a heredity of T2D had a higher BMI than those without heredity for diabetes (p < 0.001), but not those with heredity for T1D (p = 0.357). There were no differences in HLA or autoantibody profile between children with or without a T1D or T2D family history of diabetes. The relative risk of parental T1D among children with T1D was 3.88 (95% CI 2.99–5.05) and for T2D 1.85 (95% CI 1.26–2.73) compared with the healthy controls.

**Conclusions:** Heredity not only for T1D, but also T2D is more common in children developing T1D. This may suggest that, in addition to predisposition to autoimmunity, factors such as insulin resistance and obesity might play a role in the development of T1D. Also, the results indicate that family history of T1D is associated with a more rapid disease process.

### P215 | 3 Screen ICA ELISA—A new tool to identify pre-clinical diabetes in first-degree relatives of patients with type 1 diabetes (pre-d1abetes study)

A. Bossowski<sup>1</sup>, K. Noiszewska<sup>2</sup>, A. Polkowska<sup>2</sup>, A. Zasi<sup>3</sup>, M. Mysliwiec<sup>4</sup>, A. Szadkowska<sup>5</sup>, A. Mazur<sup>6</sup>, A. Szybowska<sup>7</sup>, A. Chobot<sup>8</sup>, P. Chobot<sup>9</sup>, A. Noczynska<sup>10</sup>, J. Nazim<sup>11</sup>, A. Jozwa<sup>12</sup>, M. Walczak<sup>12</sup>, I. Ben-Skowronek<sup>13</sup>, M. Szalecki<sup>14</sup>, O. Pilecki<sup>15</sup>, E. Niechciał<sup>16</sup>, B.R. Smith<sup>17</sup>, M. Powell<sup>17</sup>, J. Furmaniak<sup>17</sup>

<sup>1</sup>Medical University in Białystok, Dep of Pediatric, Endocrinology and Diabetes with a Cardiology Division, Białystok, Poland, <sup>2</sup>Medical University in Białystok, Białystok, Poland, <sup>3</sup>University Children's Hospital in Białystok, Białystok, Poland, <sup>4</sup>Gdańsk Medical University, Gdanska, Poland, <sup>5</sup>Medical University in Lodz, Łódź, Poland, <sup>6</sup>Rzeszów Medical University, Rzeszow, Poland, <sup>7</sup>Medical University in Warszawa, Warsaw, Poland, <sup>8</sup>Opole Medical University, Opole, Poland, <sup>9</sup>Silesian Medical University, Katowice, Poland, <sup>10</sup>Medical University in Wrocław, Wrocław, Poland, <sup>11</sup>Jagielloński Medical University in Krakow, Krakow, Poland, <sup>12</sup>Pomorian Medical University in Szczecin, Szczecin, Poland, <sup>13</sup>Medical University in Lublin, Lublin, Poland, <sup>14</sup>Memorial Institute of Healthy Children, Warsaw, Poland, <sup>15</sup>Medical University in Bydgoszcz, Bydgoszcz, Poland, <sup>16</sup>Medical University in Poznan, Poznan, Poland, <sup>17</sup>FIRS Laboratories, RSR Ltd, Cardiff, Cardiff, United Kingdom

**Introduction:** Overt clinical symptoms of type 1 diabetes (T1D) are often preceded by a pre-clinical stage of varying duration. Diagnosis

of the pre-clinical stage is difficult and is based on the presence of specific islet autoantibodies in the subject's blood.

**Objectives:** Apparently healthy first-degree relatives of patients with T1D were tested using the 3 Screen ICAELISA (RSR Ltd) for combined testing for autoantibodies to GAD65 (glutamic acid decarboxylase, 65 kDa isoform), ZnT8 (zinc transporter 8), and the islet antigen IA-2. A 3 Screen positives were subsequently tested for individual auto antibodies. Potentially, approximately 70% of individuals with two or more types of diabetes associated auto antibodies (including insulin auto antibodies; IAA) will need insulin treatment over the next 10 years.

**Methods:** A total of 1056 subjects (age 1–18 years) were recruited from clinical Centers from Białystok (n = 237), Rzeszów (n = 80), Poznań (n = 74), Warsaw IP-CZD (n = 109), Warsaw (n = 42), Opole (n = 85), Wrocław (n = 90), Gdańsk (n = 55), Łódź (n = 118), Katowice (n = 46), Kraków (n = 14), Szczecin (n = 20), Bydgoszcz (n = 44), Lublin (n = 42). Serum samples collected by the coordinating clinics were tested by 3-Screen at FIRS Laboratories, RSR Ltd (Cardiff, UK). A 3 Screen positive serum samples were also assayed by GAD65 Ab ELISA, IA-2 Ab ELISA, ZnT8 Ab ELISA and the Insulin Ab RIA ([www.rsrltd.com](http://www.rsrltd.com)).

**Results:** Out of 1056 samples n = 85 (8.0%) were 3 Screen positive. Testing in individual autoantibody assays identified 59 children (5.6%) with multiple auto antibodies who were diagnosed with pre-clinical diabetes. These children were followed-up with a normal glucose tolerance test and glycated hemoglobin determinations.

**Conclusions:** Early detection of islet autoantibodies by 3 Screen identifies pre-clinical T1D preceding development of carbohydrate abnormalities. This opens up opportunities for the therapeutic interventions in innovative clinical programs. Patient follow up with early education and multidirectional diabetes care should prevent occurrence of ketoacidosis associated with severe clinical manifestations.

### P216 | A retrospective study on diabetic ketoacidosis in children with newly diagnosed type 1 diabetes mellitus at Kantha Bopha Children's Hospital Phnom Penh during 5 years from 1 January 2014 to 31 December 2018

P. Laing<sup>1</sup>, M. Iv<sup>2</sup>, Y. Nguon<sup>3</sup>

<sup>1</sup>University of Health Sciences, Medicine, Phnom Penh, Cambodia, <sup>2</sup>Kantha Bopha Children's Hospital in Phnom Penh, Kantha Bopha II: Diabetic department, Phnom Penh, Cambodia, <sup>3</sup>Kantha Bopha Children's Hospital in Phnom Penh, Kantha Bopha IV, Phnom Penh, Cambodia

**Introduction:** Diabetic ketoacidosis (DKA) is a potentially severe and common condition in emergency rooms and pediatric intensive care units. It is one of the major complications in patients with type 1 diabetes mellitus (T1DM).

**Objectives:** To describe the prevalence, clinical characteristics at presentation, laboratory profiles, severity, and outcome of treatment as well as mortality rate of DKA with newly diagnosed T1DM in children.

**Methods:** It was a retrospective and descriptive study in 68 children presented as DKA with newly diagnosed T1DM treated at Kantha

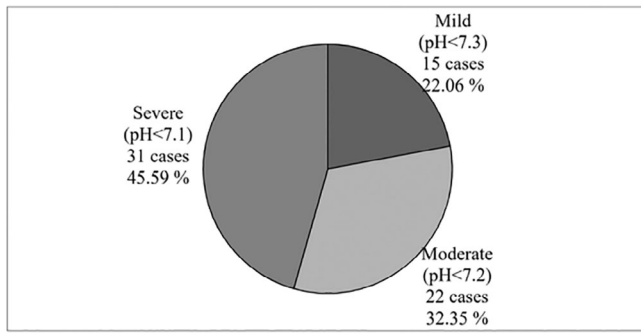


Figure 12: Severity of acidosis

Bopha Children's Hospital in Phnom Penh from 1 January 2014 to 31 December 2018.

**Results:** Of 138 children presenting with new onset T1DM over the 5-year period, 68 cases had DKA of any severity (49.28%) with the sex ratio (M:F) of 1:1.52 and the mean age of 7.8 years old. Mostly, patients were from rural area (69.12%). Dyspnea was complaint frequently (39.71%). Among all chief complaints, there were 10.29% of altered level of consciousness and 5.88% of coma. The mean duration of the symptoms was 8.44 days, and of hospitalization was 24.56 days. Mean level of laboratory results were serum glucose (33.51 mmol/L), HbA1C (12.93%), pH (7.10), and HCO<sub>3</sub> (7.45 mmol/L). The severity was divided into three categories like mild, moderate and severe (22.06%, 32.35%, and 45.59% respectively). During treatment, the mean time of DKA resolution was 21.09 h and complications were hypokalemia (29.41%), and hypoglycemia (22.06%). There were neither reported cases of cerebral edema nor mortality.

**Conclusions:** DKA at the time of T1DM diagnosis is accounted for almost half of all presented children and often severe. Children at admission mostly were from rural region and girls have high risk of DKA as well as those with the age of 10–15 years old. They had hypokalemia (29.41%) and hypoglycemia (22.06%) during the treatment, but no cases of cerebral edema or mortality.

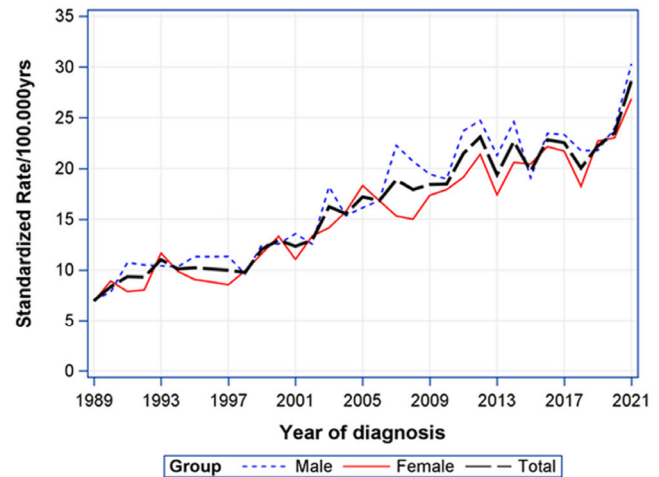
**P217 | Ongoing increase in incidence of diabetes mellitus in Austrian children and adolescents <15 years (1999–2021)**

B. Rami-Merhar<sup>1</sup>, S. Hofer<sup>2</sup>, E. Fröhlich-Reiterer<sup>3</sup>, T. Waldhör<sup>4</sup>, M. Fritsch<sup>3</sup>, K. Nagl<sup>1</sup>

<sup>1</sup>Medical University of Vienna, Dept. of Pediatric and Adolescent Medicine, Vienna, Austria, <sup>2</sup>Medical University of Innsbruck, Department of Pediatrics, Innsbruck, Austria, <sup>3</sup>Medical University of Graz, Department of Pediatrics and Adolescent Medicine, Graz, Austria, <sup>4</sup>Medical University of Vienna, Department of Epidemiology, Center of Public Health, Vienna, Austria

**Introduction:** Incidence trends for diabetes vary in different regions in the world and there is an ongoing discussion if the COVID-19 pandemic may have an influence in an increase in the diabetes incidence.

**Objectives:** To analyze the time trends of nationwide diabetes incidence <15 years of age from 1999 until 2021 in Austria.



**Methods:** The Austrian Diabetes Incidence Study Group registers all newly diagnosed persons with diabetes mellitus <15 years of age in a prospective population-based study. The diabetes type was classified on the basis of clinical and laboratory findings according to American Diabetes Association criteria.

**Results:** In the time period 1999–2021 5888 persons were diagnosed with diabetes. Type 1 diabetes (T1D) accounted for the majority of cases: 5550 (94.3%), (female = 46.2%), 108 (1.8%) were classified as type 2 (T2D) (f = 59.3%) and 230 (3.90%) as other specific types of diabetes (f = 50.9%). After observing a constant increase in T1D incidence in the years 1999–2010, a plateau was reached in the years 2011–2020, while in 2021 a further increase was recorded, mainly driven by the age group 5–9 yrs. The standardized T1D incidence rate reached the highest number ever (28.6, 95%CI: 25.7–31.6) observed in this Austrian population based registry. This increase coincides with the global COVID-19 pandemic. The registry does not include data for infections or vaccinations. The rate of onset-DKA (pH <7.3) remains very high with 46.1% in 2021. No increase of T2D <15 years was detected and other forms of diabetes accounted for twice as many cases compared to T2D.

**Conclusions:** In Austria the T1D incidence <15 years. is increasing with a peak in 2021, if this is related to infections within the COVID-19 pandemic remains still unclear. The rate of onset-DKA remains very high, indicating that the T1D diagnosis is delayed. Incidence of T2D did not increase and other specific types of diabetes were diagnosed more often compared to T2D.

**P218 | Partial remission in children with type 1 diabetes in Sweden: a retrospective, longitudinal study from 2007 to 2011 from the Swedish National Quality Register (SWEDIABKIDS)**

A.-L. Fureman<sup>1</sup>, M. Lilja<sup>2</sup>, S. Särnblad<sup>3</sup>, U. Samuelsson<sup>4</sup>, M. Bladh<sup>4</sup>, T. Lind<sup>1</sup>

<sup>1</sup>Umeå University, Clinical sciences, Umeå, Sweden, <sup>2</sup>Umeå University, Umeå, Sweden, <sup>3</sup>Örebro University, Örebro, Sweden, <sup>4</sup>Linköping University, Linköping, Sweden



**Introduction:** Metabolic control can be improved and the risk of acute and late complications be reduced if patients with type 1 diabetes go into partial remission (PREM).

**Objectives:** The study aimed to investigate what characterizes Swedish children with type 1 diabetes with PREM and whether method of insulin administration, that is, continuous subcutaneous insulin infusion (CSII) or multiple daily injections (MDI) affect the incidence and duration of the remission period.

**Methods:** Data on HbA1c, age at diagnosis, sex, duration of diabetes, insulin administration method, total daily dose insulin (TDDI), and episodes of severe hypoglycemia and ketoacidosis were extracted from SWEDIABKIDS, a nation-wide register for diabetes care from 2007–2011. PREM was defined as TDDI <0.5 U/kg/day and HbA1c <57 mmol/mol (7.4%). Mean annual HbA1c and TDDI was calculated stratified for age groups 0–6, 7–12 and 13–17 years old and duration, 0–3, 3–12, 12–24, 24–36 months. Multivariate analysis with multiple logistic regression with remission as dependent variable and age at onset, insulin method, sex and duration of diabetes as independent variables was performed.

**Results:** Of 3887 patients were 56% boys. More boys (39%) than girls (34.3%) were in PREM at 3 months,  $p < 0.005$ . Fewer children 0–6 years old, had remission at 3 months (20.7%) and at 12 months (17.6%) compared to older age groups, both  $p < 0.001$ . A larger proportion of patients using CSII at 12 and 24 months remained in PREM compared to those with MDI (18% vs. 14%,  $p = 0.008$  and 9% vs 4.5%,  $p < 0.001$ ). PREM was associated with CSII (OR:1.66 CI:1.29–2.12), shorter diabetes duration (OR:0.92 CI:0.87–0.98) and higher age at onset (OR:1.05 CI:1.03–1.08).

**Conclusions:** Young age, female sex, insulin through MDI, and longer duration of diabetes were associated with lower frequency of PREM. Use of CSII seem to contribute to longer PREM among Swedish children with type 1 diabetes, which in turn may affect acute and late complications.

#### P219 | Comparing inflammation and oxidative stress markers in adolescents with type 1 diabetes and healthy controls: Finding from the CARDEA study

M. Masse<sup>1</sup>, N. Silva Navarro<sup>1</sup>, V. McNealis<sup>1,2</sup>, S. Harnois-Leblanc<sup>1,3,4</sup>, J.-C. Lavoie<sup>1,5</sup>, M.G. Friedrich<sup>6,7</sup>, A. Van Hulst<sup>8</sup>, A.M. Nuyt<sup>1,9</sup>, J.-L. Bigras<sup>1,9</sup>, T.A Barnett<sup>1,10</sup>, A. Benedetti<sup>2</sup>, M.-È. Mathieu<sup>1,11</sup>, V. Drapeau<sup>12</sup>, M. Henderson<sup>1,3,9</sup>

<sup>1</sup>Research Center of CHU Sainte-Justine, Montréal, Canada, <sup>2</sup>McGill University, Department of Epidemiology, Biostatistics and Occupational Health, Montréal, Canada, <sup>3</sup>Université de Montréal, School of Public Health, Montréal, Canada, <sup>4</sup>Research Center of Center Hospitalier Universitaire de Montréal, Montréal, Canada, <sup>5</sup>Université de Montréal, Department of Nutrition, Montréal, Canada, <sup>6</sup>McGill University Health Center, Montréal, Canada, <sup>7</sup>McGill University, Department of Medicine and Diagnostic Radiology, Montréal, Canada, <sup>8</sup>McGill University, Ingram School of Nursing, Montréal, Canada, <sup>9</sup>Université de Montréal,

Department of Pediatrics, Montréal, Canada, <sup>10</sup>McGill University, Department of Family Medicine, Montréal, Canada, <sup>11</sup>Université de Montréal, School of Kinesiology and Physical Activity Sciences, Montréal, Canada, <sup>12</sup>Université Laval, Department of Physical Activity, Québec, Canada

**Introduction:** Inflammation and oxidative stress contribute to cardiovascular disease (CVD) in adults, particularly those with type 1 diabetes (T1D), but their role in pediatric T1D is understudied.

**Objectives:** We verified disruptions in inflammation and oxidative stress markers in adolescents with T1D compared to healthy controls.

**Methods:** Cross-sectional study of 100 adolescents (14–18 years) with T1D from Sainte-Justine Hospital Diabetes Clinic (Montreal, Canada) and 97 age and sex-matched controls. Fasting leptin, adiponectin, tumor necrosis factor  $\alpha$  (TNF- $\alpha$ ), TNF receptor 1, TNF receptor 2, interleukin 6 (IL-6), and C-reactive protein (CRP) were measured by ELISA. Capillary electrophoresis assessed hydrogen peroxide metabolism using oxidized glutathione (GSSG), reduced glutathione (GSH), total glutathione (GS<sub>T</sub>), and redox potential. To evaluate differences between groups, we estimated linear regression models between T1D status (yes/no) and each marker adjusting for age, sex, and BMI z-score. Leptin, IL-6 and CRP were 100 log<sub>e</sub> transformed to remedy skewness or nonlinearity (interpretation is % difference between groups).

**Results:** Adolescents with T1D had higher TNF- $\alpha$  (mean adjusted difference: 0.25 pg/ml [95% CI: 0.11; 0.39]), TNF receptor 2 (427 pg/ml [95% CI: 228; 625]), IL-6 (39.9% [95% CI: 20.1; 59.7]) and CRP (70.3% [95% CI: 38.5; 102.1]), but also higher adiponectin 2.77 ug/ml [95% CI: 1.40; 4.14]) than controls. Lower levels of GSSG (–0.06 nmol/mg [95% CI: –0.11; –0.001]), GSH (–0.83 nmol/mg [95% CI: –1.42; –0.25]), GS<sub>T</sub> (–0.94 nmol/mg [95% CI: –1.59; –0.30]), and a less favorable redox potential (–3.46 E<sup>o</sup>mV [95% CI: –7.07; 0.15]) were also seen in adolescents with T1D. No differences were observed between groups for other markers.

**Conclusions:** Marked differences in markers of inflammation and oxidative stress are evident in pediatric T1D as early as adolescence, which could contribute to the early and aggressive CVD noted in individuals living with T1D.

#### POSTER TOUR 24—MONOGENIC OTHER FORMS OF DIABETES # 2

#### P220 | Neonatal diabetes mellitus due to monogenic defects in infants: Experience from a tertiary care center of a resource limited country

M. Arif<sup>1</sup>, F. Memon<sup>1</sup>, M. haider<sup>1</sup>, S. Kirmani<sup>1</sup>, K.N. Humayun<sup>1</sup>  
<sup>1</sup>Aga Khan University, Pediatric Endocrinology, Karachi, Pakistan

**Introduction:** Neonatal diabetes mellitus (NDM) due to single gene defects, presenting within first 6 months of life mostly is extremely rare with >20 known mutations, including transient and permanent forms. Etiological heterogeneity exists, both dominant and recessive

forms are present. *KCNJ11* and *ABCC8* being most common. Genetic testing is challenging in Pakistan due to being resource limited but has implications on management, prognosis, and future pregnancies.

**Objectives:** To review the clinical and molecular genetics profile of infants with suspected monogenic diabetes who underwent genetic testing.

**Methods:** Infants with clinical diagnosis of monogenic and syndromic diabetes presenting to our center over last 10 years were recruited, blood samples were sent for molecular genetic testing for confirmation of diagnosis. We reviewed their clinical outcome, management challenges and long-term complications.

**Results:** Genetic testing was sent in overall 20 infants with clinical diagnosis of NDM, presenting at our center, with diabetic ketoacidosis in neonatal age. Mutations were identified in 12 patients. The most common genetic subtype was *KCNJ11* identified in 4 infants followed by 3 infants with Wolcott Rallison syndrome caused by *EIF2AK3*. *ABCC8* mutation was identified in 1 infant. All 4 infants with *KCNJ11* and 1 with *ABCC8* mutation were successfully transitioned from insulin to oral sulfonylurea with good glycemic control, no neurocognitive deficit except for one with *KCNJ11* mutation. Out of 3 infants with *EIF2AK3* mutation, 2 were lost to follow-up and later found to have expired due to hepatic failure with intercurrent illness, 3rd child is on regular follow-up and doing well. One infant with *INS* mutation was found and 2 with *FOXP3* and *LRBA* gene were identified on subsequent testing. One infant had *GCK* mutation and has no insulin requirement. No mutation were identified in 7 patients after extensive testing.

**Conclusions:** Genetic testing is essential to confirm a diagnosis of monogenic diabetes, which guides clinical management and future counseling.

#### P221 | Clinical characteristics and genetics of Wolfram syndrome in a series of Sudanese children

A. Ahmed<sup>1</sup>

<sup>1</sup>Jafar Ibn Auf Hospital, Pediatric Endocrinology, Khartoum, Sudan

**Introduction:** Wolfram syndrome is a progressive hereditary multi-system disease, characterized by the acronym DIDMOAD (Diabetes Insipidus (DI), Diabetes Mellitus (DM), Optic Atrophy (OA) and Deafness). Its main clinical symptoms are early onset non-immune diabetes mellitus and optic atrophy. More than 300 mutations in Wolfram Syndrome 1 gene (*WFS1*) were detected. Homozygous and compound heterozygous mutations in *WFS1* gene causes an autosomal recessive form. The genotype/phenotype relation is still not fully understood due to rarity of the disease. We hereby report a cases series of Wolfram syndrome, their characteristics, and genetic profile.

**Objectives:** We hereby report a cases series of Wolfram syndrome, their characteristics, and genetic profile.

**Methods:** Six patients from 3 different Sudanese families were enrolled. Clinical and biochemical features at presentation,

biochemical tests, hearing and ophthalmological assessment were documented. Genetic testing was done in collaboration with Exeter genetics.

**Results:** Five had phenotypic features of diabetes mellitus, optical atrophy, hearing loss and *WFS1* gene was sequenced. The sixth patient from the first family presented with only early onset non-immune diabetes mellitus, and showed the same mutation as her affected older siblings. All six patients harbored homozygous mutations in *WFS1* gene, and a heterozygous mutation in *WFS1* gene among all parents, and three different *WFS1* mutations were identified.

**Conclusions:** Wolfram syndrome should be considered in every diabetic child with optic atrophy. Early diagnosis enables better and more comprehensive care for these patients.

#### P222 | Acquired generalized lipodystrophy associated with autoimmune hepatitis: A case report

P. Konecna<sup>1</sup>, P. Jabandzic<sup>1</sup>, K. Hajkova<sup>1</sup>, J. Vyzralkova<sup>1</sup>, D. Prochazkova<sup>1,2</sup>

<sup>1</sup>Faculty Hospital Brno, Pediatrics Department, Brno, Czech Republic, <sup>2</sup>Faculty Hospital Brno, Department of Medical Genetics and Genomics, Brno, Czech Republic

**Introduction:** Lipodystrophies (LD) are a heterogeneous group of rare diseases characterized by a deficit of adipose tissue, decreased leptin levels, and metabolic abnormalities such as insulin resistance and diabetes. Lipodystrophies are classified as genetic or acquired and according to the distribution of fat to partial or generalized.

**Objectives:** To describe a case of acquired generalized lipodystrophy (AGL).

**Methods:** AGL appears during childhood or adolescence and is more common in women than men. We present a case report of a 14 year old girl diagnosed with autoimmune hepatitis who developed severe generalized loss of subcutaneous fat and muscular appearance with prominent veins. Signs of acanthosis nigricans were visible on the neck, in the axillae and around the navel. The abdomen was with hepatomegaly. Hyperinsulinemia, hypertriglyceridemia, low leptin level have been recorded in the laboratory. Performed glucose tolerance test with finding impaired glucose tolerance. We also noted positive autoantibodies (GAD, ZnT8) and reduced C4 level. Cardiological examination showed hypertrophic cardiomyopathy. Liver biopsy with finding steatofibrosis.

**Results:** Based on these signs, we diagnosed AGL. The patient was started on diet therapy. She also required insulin treatment for AIH relapse and corticosteroid therapy.

**Conclusions:** AGL is associated with autoimmune diseases both organ-specific and systemic. A number of positive autoantibodies are reported in patients with AGL, but may not be associated with clinical manifestations of the disease. We consider that it is necessary to monitor these patients to see if the disease does not manifest itself in time.

### P223 | Maturity-onset diabetes of the Young type 7 treated with the glucagon-like peptide-1 receptor agonist (Liraglutide)–First report

M. Al-Abdulsalam<sup>1</sup>, S. Kumar<sup>2</sup>, S. Al Gharabi<sup>2</sup>, A. Al-Shidhani<sup>1</sup>, S. Al-Yaarubi<sup>1</sup>, A. Al-Futaisi<sup>2</sup>, H. Alsaffar<sup>1</sup>

<sup>1</sup>Sultan Qaboos University Hospital, Child Health Department, Pediatric Endocrine and Diabetes Unit, Muscat, Oman, <sup>2</sup>Sultan Qaboos University Hospital, Medicine Department - Endocrine Unit, Muscat, Oman

**Introduction:** MODY is the most common form of monogenic diabetes and which usually manifests before 25 years of age. It accounts for 1%–2% of all diabetes. Liraglutide was reported to be effective in managing some types of MODY but never in patient with MODY-7.

**Objectives:** To describe the course of treatment in a patient diagnosed with MODY-7 stating the effect of Liraglutide during the management.

**Methods:** This is a case report of a 16-year-old girl diagnosed with diabetes at age of 8, when she presented with diabetic ketoacidosis and HbA1c of 12% (108 mmol/mol). Multiple daily injection regimen was commenced after diagnosis. Her glycemic control was challenging. We will explain her management.

**Results:** A strong family history of diabetes was noted and she had the same phenotypic features of her mother who is also on insulin therapy for her diabetes. Laboratory investigations revealed negative diabetes antibodies. Low C-peptide 0.73 ug/L (1.1–4.4). Insulin requirement was in the range of (1u/kg/day). Her obesity worsened reaching a BMI of 42 Kg/M<sup>2</sup> after being 30 kg/m<sup>2</sup> at diagnosis. Metformin was added with regular counseling about dietary intake and physical activity. Giving the course of management with going into a severe morbid obesity in presence of acanthosis nigricans, she underwent a genetic testing that revealed a heterozygous variant of the KLF11 gene which is known to cause MODY. Glibenclamide was tried at age of 14 during a hospital admission to monitor the glucose levels, but the trial failed as she ran severe and persistent hyperglycemia despite reaching a maximum dose. Later when Liraglutide became available, it was started on 0.6 mg subcutaneously, once daily, that was gradually increased reaching 1.8 mg daily. In response to that her weight reduced by 10Kg and the HBA1C improved to 7.5% (58 mmol/mol) over a 7-month period.

**Conclusions:** Improvement of BMI and glycemic control with Liraglutide in a patient with KLF11 gene mutation (MODY-7) was evident. This is first report to our knowledge.

### P224 | Monogenic diabetes through a series of 35 cases and review of literature

Z. Imane<sup>1</sup>, F. Radi<sup>1</sup>, A. Boulmane<sup>1</sup>, A. Balafrej<sup>1</sup>

<sup>1</sup>UM5R, Children's Hospital of Rabat, Rabat, Morocco

**Introduction:** Monogenic diabetes is a rare form of diabetes (<5%). Until now, more than 40 different genetic subtypes of monogenic

diabetes have been identified, each having a typical phenotype and a specific pattern of inheritance. Molecular diagnostics is essential to improve the management of these patients.

**Objectives:** Our work consists of updating the epidemiological particularities, clinical, biological, and genetic therapy of monogenic diabetes in children through several cases collected in the unit of pediatric diabetology of the children's hospital in Rabat.

**Methods:** We performed a retrospective descriptive study in the unit of pediatric diabetology of children's hospital in Rabat. This study is based on a review of 35 cases of monogenic diabetes collected from January 2006 to February 2015 from clinical records and computer database. Genetic study was done in collaboration with molecular genetics laboratories from Exeter Hospital in England and INSERM in France Paris.

**Results:** In our study neonatal diabetes represents 37.14% (13 cases) monogenic diabetes, molecular genetic study has identified different mutations (EIF2AK3, FOXP3, ABCC8, the insulin gene) in which 4 cases the genetic study found no mutations. Wolfram syndrome accounted for 28.57% of the cases (10 cases). A 8 cases were genetically confirmed by the detection of the mutation WF1. Lipotrophic diabetes was found in two cases including one case corresponding to Berardinelli–Seip syndrome.

Our series also contained 28.57% (10 cases) of other monogenic diabetes whose genetic mutations have recently been reported (SLC19, SLC29), for the rest of the cases the genetic study is underway.

**Conclusions:** Monogenic diabetes is rare, but their frequency would be underestimated especially in Regions have the highest rate of consanguineous marriages. In addition, they are insufficiently sought because of the cost of genetic analysis and frequently misclassified as type 1 diabetes or type 2 diabetes.

### P225 | Broadening the clinical spectrum of GLIS3-associated neonatal diabetes mellitus: Neuroblastoma as an associated feature?

D. von Zezschwitz<sup>1</sup>, S. Kummer<sup>1</sup>, T. Meißner<sup>1</sup>, A. Welters<sup>1</sup>

<sup>1</sup>Medical Faculty and University Children's Hospital Düsseldorf, Heinrich-Heine-University, Department of General Pediatrics, Neonatology and Pediatric Cardiology, Düsseldorf, Germany

**Introduction:** GLI-similar 3 (GLIS3) gene mutations cause a rare syndrome primarily characterized by permanent neonatal diabetes (ND) and congenital hypothyroidism (NDH-syndrome). Additional features include intrauterine growth retardation, facial dysmorphism, hepatic fibrosis, polycystic kidneys, congenital glaucoma, exocrine pancreatic insufficiency, and developmental delay.

**Objectives:** We here report an individual with NDH-syndrome caused by a homozygous GLIS3 mutation ((c.1710 + 1)<sub>?</sub>(?\_c.2474-1)<sub>?</sub>, p.?, deletion of exons 5 to 9) that additionally presented with inguinal hernia and neuroblastoma.

**Methods:** Case report.

**Results:** At 1 month of age, severe feeding difficulties prompted us to perform abdominal ultrasound that revealed a solid tumor in the

retroperitoneal space highly suspicious of neuroblastoma. However, no urinary excretion of catecholamine metabolites could be detected on multiple samples. Diagnosis was obtained by histopathological examination after tumor resection. Metastases were limited to skin, and the disease was hence classified as stage 4S according to INSS criteria. Genetic testing showed absence of MYCN amplification. The tumor was closely monitored without further treatment (watch-and-wait strategy) and did spontaneously regress over the next couple of months.

**Conclusions:** This report emphasizes the variable clinical spectrum of GLIS3-associated NDH-syndrome, since the mutation detected in our patient has previously been described in two individuals with differing clinical phenotype. Furthermore, a causative link between GLIS3 mutation and neuroblastoma cannot be excluded, particularly since GLIS3 acts as a transcription factor involved in the regulation of various cellular processes during embryonic development, including during neurulation. In view of the rather unusual tumor localization and absence of urinary catecholamine excretion, we therefore suggest to consider neuroblastoma screening in all infants with NDH-syndrome.

**P226 | A case series of maturity onset diabetes of the young**

A. Srivastava<sup>1</sup>, N. K Bhat<sup>1</sup>

<sup>1</sup>Aster CMI Hospital, Pediatric Endocrinology, Bengaluru, India

**Introduction:** Maturity onset diabetes of young (MODY) is a collection of inherited disorders of non-immune-mediated diabetes mellitus that

remains insufficiently diagnosed. It is important to diagnose these cases accurately given the clinical implications of syndromic features, cost-effective treatment regimen, and potential impact on multiple family members.

**Objectives:** Our objective is to describe the phenotype in patients with genetically confirmed MODY.

**Methods:** A retrospective, descriptive analysis of patients attending pediatric diabetes clinic in a tertiary level hospital, whose molecular studies were consistent with the diagnosis of MODY.

**Results:** Age at diagnosis ranged from 3 years to 21 years. Two patients had HNF1A gene mutation. One patient with HNF1A gene mutation was 11 years old girl, asymptomatic, the second patient was 21 years old girl with retinopathy and nephropathy. A 3 year old girl had heterozygous mutation in PDX1 gene and had asymptomatic hyperglycemia, with frequent episodes of spontaneous hypoglycemia. The fourth patient, 14 years old girl, had GCK mutation and mild, asymptomatic fasting hyperglycemia and the fifth patient, 17 years old girl presented with osmotic symptoms, not in diabetic ketoacidosis and a very high HbA1C.

**Conclusions:** The differentiation between type 1, type 2, monogenic, and other forms of diabetes have important implications for both therapeutic decisions and educational approaches. Diagnosis of MODY should be suspected in cases with family history of diabetes in one parent and in antibody negative patient with diabetes. Next generation sequencing provides an optimal approach for clinical care in such patients as it provides a genetic diagnosis that often precedes

Clinical presentations:

Age at diagnosis (years)/sex	17/F	21/F	11/F	14/F	3/F
BMI at diagnosis kg/m <sup>2</sup> (SDS)	20.9 (-0.15)	20.9 (-0.17)	19 (0.5)	20.7 (-0.15)	15.8(0.12)
HbA1c at diagnosis (%)	13.7	7.5	9.6	6.3	9
Initial treatment	MDI	MDI	Metformin	Lifestyle modifications	MDI
MODY gene (mutation)	CEL	HNF1A	HNF1A	GCK	PDX1
Clinical features	Excess thirst Excess urination Weight loss Myopia	Excess thirst Excess urination Weight loss Nephropathy Retinopathy	Asymptomatic	Asymptomatic Keratosis pilaris Hyperhidrosis	Excess thirst, Excess urination Bilateral upper limbs and right lower limb polydactyly Febrile seizure Spontaneous hypoglycemia
Family history of diabetes/age at diagnosis(years)	Mother -22 Maternal grandmother-27	Father- 48 Paternal aunt- 45 Paternal grandfather- 50	Mother- 42 Father- 45 Maternal aunt- 32 Maternal grandmother-35 Paternal grandmother- 45	Mother- 26 Has same mutation	Maternal grandfather - 60
Diabetes antibodies	Negative	Negative	Negative	Negative	Negative



development of additional clinical features, informs prognosis and guides clinical management.

#### P227 | Blindness at initial presentation of new onset diabetes mellitus in a 13 year old girl

S.C. Lee<sup>1</sup>, J.C. Agwu<sup>1</sup>, C. Kallappa<sup>1</sup>, A.-J. Ghauri<sup>1</sup>

<sup>1</sup>Sandwell and West Birmingham Hospitals NHS Trust, Birmingham, United Kingdom

**Introduction:** Bilateral cataracts are rarely the initial symptom of diabetes mellitus (DM). Patients with DM who developed cataracts usually have DM for many years. The prevalence of early cataracts in pediatric DM ranges between 0.7% and 3.4%.

**Objectives:** We report a case of DM diagnosis following onset of blindness due to new bilateral cataracts.

**Methods:** 13-year-old Caucasian girl presented with rapidly declining vision for 2 months. She was blind 2 weeks prior to presentation. Examination showed significant posterior subcapsular cataracts and visual acuity of 1/60 bilaterally. Urgent cataract surgery was scheduled. A 3 days before surgery, she attended emergency department with HbA1c of >146 mmol/mol and polydipsia for 7 weeks. Blood glucose was 27.8 mmol/L; ketone was raised at 1.9 mmol/L but she was not in diabetic ketoacidosis. She had no dysmorphic features and no acanthosis nigricans. Her BMI was 26.1.

Anti-GAD, anti-IA2, and anti-ZnT8 were negative. C-peptide level was high at 813 pmol/L. There is family history of type 2 diabetes (T2D). Results of her genetic testing for monogenic diabetes are awaited.

Child had cataract surgery with lens implant in two stages and her vision improved significantly.

**Results:** The etiology of early cataract in children with diabetes is unknown. Several theories include osmotic damage to lens structure, polyol pathway, and oxidative stress. It is currently unclear what type of diabetes our patient has. Though she was ketotic on presentation, the negative autoantibody profile suggests she may not have Type 1 diabetes. T2D is a possibility given her high HbA1c, family history and raised BMI. Monogenic diabetes is not typically associated with cataracts. HNF1B (MODY5) mutation was recently linked with bilateral cataracts. In 2 other cases, patients with bilateral cataracts and negative autoantibodies had PRRC2A gene mutation and a de novo INS gene mutation.

**Conclusions:** New onset bilateral cataracts are rare in children and should raise suspicion of DM or other metabolic conditions.

#### P228 | A novel de novo mutation in a baby with Dend syndrome

J. Padmanabhan<sup>1</sup>, S.S. Bhattacharyya<sup>1</sup>, B. Banerjee<sup>2</sup>

<sup>1</sup>Manipal Hospital, Pediatric Endocrinology, Bengaluru, India, <sup>2</sup>Manipal Hospital, Pediatric Neurology, Bengaluru, India

**Introduction:** We report a case of a 4 month old infant girl, first born of a non-consanguineous marriage, diagnosed with mild global developmental delay and infantile spasms at 3 months of age.

**Objectives:** -.

**Methods:** -.

**Results:** Baby had failure to thrive, microcephaly, and hypertonia. Her MRI brain was normal. She was on vigabatrin with recent addition of prednisolone and clonazepam in view of refractory seizures. Antenatally she had IUGR, weighing 2.3 kg at birth and required hospital stay for asymptomatic hypoglycemia and feed intolerance. At 4 months of life, she developed drowsiness, lethargy, and vomiting. On examination, she had signs of dehydration and hyperglycemia with a blood glucose of 590 mg/dl. Intravenous fluids were started for correction of dehydration followed by insulin infusion at 0.04 U/kg/h. HbA1c was 12.8% and urine ketones were positive. A preliminary diagnosis of neonatal diabetes mellitus was made. Peripheral blood samples of baby and parents sent for genetic work-up. After 24 h, she was switched to subcutaneous insulin at 0.8 U/kg/day. Blood glucose levels were achieved in the range of 100-140 mg/dl. On 3rd of day hospital stay, baby was found pale, listless and unarousable in the morning. Immediately, CPR was initiated and during intubation milk was found in airway suggestive of aspiration. Despite best efforts, baby could not be revived. A novel heterozygous missense mutation in exon 1 of KCNJ11 gene resulting in amino acid substitution of alanine for threonine at codon 171 (p.Thr171Ala) was found. Segregation analysis showed that both parents did not have this variant indicating that the mutation is de novo in origin.

**Conclusions:** KCNJ11 gene encodes pore forming subunit (Kir6.2) of ATP-sensitive potassium channel. Only 20% of the mutations are associated with a triad of developmental delay, epilepsy and neonatal diabetes mellitus, collectively called as DEND syndrome. This rare and severe form of neonatal diabetes often responds to sulfonylurea therapy, which also helps in control of seizures.

#### POSTER TOUR 25—EPIDEMIOLOGY & PATHOGENESIS # 1

#### P229 | Epidemiological profile of type 1 diabetes in children: about 1000 patients in children's hospital of Rabat over 4 years

Z. Imane<sup>1</sup>, A. Khlifi<sup>1</sup>, A. Balafrej<sup>1</sup>

<sup>1</sup>UM5R, Children's Hospital of Rabat, Rabat, Morocco

**Introduction:** Diabetes is a chronic disease that is a public health problem. Its gravity is related to its acute and chronic complications. In children, this disease is becoming more and more common, with serious repercussions on the quality of life of the child, his family and his current and future health.

**Objectives:** The objective of this study is to define the epidemiological profile of the population of diabetic children identified in the endocrino-diabetology service at the Children's Hospital - Ibn Sina.

**Methods:** We conducted a retrospective cross-sectional study of diabetes mellitus in children under the age of 16 over a 4-year period from January 2015 to December 2018.

**Results:** From January 2015 to December 2018, 971 patients with type 1 diabetes were admitted to our service.

A comparative breakdown of the number of hospitalizations between the years 2015 and 2018 is carried out in favor of an increase in the hospitalization rate of 8% over the years.

**Conclusions:** Type 1 diabetes mellitus is a public health problem because of its high frequency, particularly in recent years, where environmental factors are mainly implicated in the onset of the disease; It can occur at any age, but much more frequently in young children or young adults who have just started their working life. It is a condition occurring on a genetically predisposed field whose prevention at the pre-diabetes stage must involve new technologies of molecular biology.

### P230 | Breastfeeding and dietary diversification in children with type 1 diabetes: About 117 cases

O. Elmehraoui<sup>1,2</sup>, S. Berrabeh<sup>1</sup>, S. Rouf<sup>1</sup>, H. Latrech<sup>1</sup>

<sup>1</sup>Mohammed VI University Hospital Center, Department of Endocrinology - Diabetology and Nutrition, Oujda, Morocco, <sup>2</sup>Faculty of Medicine and Pharmacy, Oujda, Morocco

**Introduction:** Type 1 diabetes (T1D) is the most common metabolic disease in children. Its incidence has recently increased, especially in children under the age of 5 years. The type of breastfeeding and the timing of introduction of Gluten are included among the modifiable risk factors of T1D.

**Objectives:** The objective of this work is to assess the duration of breastfeeding, as well as the early use of milk. Infant and gluten in children with type 1 diabetes.

**Methods:** This is a retrospective study including 117 patients aged between 1 year and 15 years with T1D, followed in the endocrinology-diabetology department of the Mohammed VI University Hospital Center of Oujda, Morocco. Data collection was compiled from the clinical patient diary and statistical analysis was performed by SPSS version 21 software.

**Results:** The middle age during diagnosis was  $10.18 \pm 4$  years, with a sex ratio M / F: 0.9. A family history of T1D was found in 13% of the patients. 98.2% of our children with type 1 diabetes were breastfed, 50.4% were weaned before the age of 3 months. Breastfeeding was continued for 3 to 6 months in 35.8% and for 6 to 12 months in 2.56. Furthermore, exclusive breastfeeding for 3 months was only successful in 17.09% of cases. The early introduction of formula milk before the age of 3 months was found in 69.23% of patients. Gluten exposure before the age of 4 months was observed in 2.56% of cases, between 4–6 months in 81.19%, and beyond 7 months in 16.23% of patients.

**Conclusions:** Despite controversies in the results of current studies regarding the role of breast milk in the development of type 1 diabetes, the promotion of breastfeeding should be encouraged especially in the first year of life.

### P231 | Features of negative-autoantibody and positive-autoantibody type 1 diabetes onset among children in Kuwait

F. Othman<sup>1</sup>, D. Al-Abdulrazzaq<sup>1,2</sup>, F. Al-Juaila<sup>1</sup>, H. Al-Kandari<sup>1,3</sup>

<sup>1</sup>Dasman Diabetes Institute, Population Health, Kuwait City, Kuwait, <sup>2</sup>Kuwait University, Faculty of Medicine, Kuwait City, Kuwait, <sup>3</sup>Farwaniya Hospital, Pediatrics, Kuwait City, Kuwait

**Introduction:** Type 1 diabetes (T1D), is an autoimmune disease characterized by immune-mediated destruction of beta cells. This leads to insulin deficiency and hyperglycemia. The understanding of negative-autoantibody T1D, idiopathic is limited.

**Objectives:** To evaluate the baseline features of positive and negative-autoantibody T1D onset among children in Kuwait using data from the Childhood Diabetes Onset electronic Registry (CODeR).

**Methods:** Children aged  $\leq 14$  years diagnosed with T1D onset between (Jan 1 2017–Feb 23 2022) were included. Diagnosis of T1D is according to the ISPAD guidelines 2018 with at least a positive-autoantibody. In this study, negative-autoantibody T1D is classified as the absence of GAD, IAA, and ICA antibodies. IA-2 antibody is excluded due to the test's unavailability.

**Results:** A 660 children with a positive autoantibody and 79 with negative autoantibody were identified. The median age at diagnosis was similar in both groups (8 (5.35–9.9) vs. 7.9 (5.36–10.03),  $p$ -value = 0.86, respectively) as well as the gender distribution,  $p$ -value 0.81. There was no significant difference between the HbA1c levels in both groups (11.3 (10.0–12.7) vs. 11.7(9.5–10.7),  $p$ -value = 0.42). However, a slightly significant difference in DKA was observed in the negative-autoantibody group (44.7% vs 58%,  $p$ -value 0.07); and they were more likely to require ICU admission (18.7% vs. 31%,  $p$ -value = 0.03 respectively). No significant differences were observed in mean of BMI ( $z$ -scores) (0.18(1.913) vs. 0.41(1.910),  $p$ -value = 0.51) as well as plasma insulin and c-peptide levels ( $p$  values = 0.29, 0.16 respectively).

**Conclusions:** Although both groups have similar clinical features at onset; the presence of DKA was slightly higher among the negative-autoantibody group and more likely to require ICU admission compared to positive-autoantibody group. To better understand the etiology of its distinctive T1D sub-types, further studies are needed to evaluate the disease course, clinical presentation, outcome, and other possible factors.

### P232 | Infants with type 1 diabetes: What are the particularities?

A. Ourdi<sup>1</sup>, N. Messaoudi<sup>1</sup>, H. Charif<sup>1</sup>, L. Yagoubi<sup>1</sup>, S. Rouf<sup>1,2</sup>, H. Latrech<sup>1,2</sup>

<sup>1</sup>University Hospital Mohammed VI, Endocrinology Diabetology and Nutrition Department, Oujda, Morocco, <sup>2</sup>Mohammed 1st University Oujda, Laboratory of Epidemiology, Clinical Research and Public Health, Faculty of Medicine and Pharmacy, Oujda, Morocco

**Introduction:** Children's type 1-diabetes is a rare entity, its prevalence is still poorly known, which makes its diagnosis-therapeutic-management and prognosis increasingly difficult and uncodified.

**Objectives:** The purpose of our study is to report the experience of the Endocrinology-Diabetology-Nutrition-Department in the management of diabetes-type 1 in children.

**Methods:** This is a retrospective-descriptive study including 12 children hospitalized in the Endocrinology-Diabetology-Nutrition-Department for the management of diabetes diagnosed before the age of 24 months. All patients underwent a clinical examination and a biological check-up. The statistical analysis was performed with SPSS-Version-21-software.

**Results:** The average age was  $24 \pm 9,6$  months, and  $12 \pm 6$  months at diagnosis, with a clear male predominance, (sex-ratio M/F: 2,1). Consanguinity was present in only one case, diabetes in the family was present in 83.8% of cases. Reasons of hospitalization were various; 8 cases for inaugural diabetes (66.7%), and 4 cases for unbalanced diabetes (33%). Diabetes was revealed by an episode of ketoacidosis decompensation in 66.7% of the cases. Cardinal syndrome was present in 83.3% of cases before diagnosis. Mean HBA1C was  $10\% \pm 1.2\%$ . Anti-GAD antibodies were positive in 50% of cases, and Anti IA2 antibodies were positive in 41.6% of cases. Only 58.3% of cases benefited from the rest of autoimmunity biological-analysis, we found anti-TPO antibodies positive in 1 case, and anti-transglutaminase antibodies positive in 2 cases. In terms of therapy, 50% of our patients were under basal bolus insulin therapy with rapid and long acting insulin analogs, and 50% was treated with Rapid acting insulin plus NPH twice daily, afterwards 3 patients benefited from the insulin pump therapy.

**Conclusions:** Nowadays the incidence of diabetes in infant is clearly increasing, it is a diagnostic emergency that requires urgent and specialized management, hence the need for a global awareness of the medical staff on the different ways of discovery.

#### P233 | Have we identified all the autoantibodies associated with diabetes? Cases of the isolated positive presence of autoantibodies to islet cells (ICA) in children with type 1 diabetes

A. Ochocimska<sup>1</sup>, J. Świdarska<sup>2</sup>

<sup>1</sup>Children's Memorial Health Institute, Department of Biochemistry, Radioimmunology and Experimental Medicine, Warsaw, Poland, <sup>2</sup>Children's Memorial Health Institute, Department of Endocrinology and Diabetology, Warsaw, Poland

**Introduction:** Autoantibodies to specific beta-cell antigens of the pancreatic islets are characteristic for pathogenesis of type 1 diabetes mellitus (T1D). ICA test that detects the presence of a group of polyclonal autoantibodies against all pancreatic beta cells ( $\alpha$ ,  $\beta$ ,  $\delta$  and PP cells). In recent years, there has been a tendency to replace the ICA test with the measurement of autoantibodies against biochemically defined pancreatic islet antigens: glutamic acid decarboxylase (GADA), protein tyrosine phosphatase (IA-2A), zinc transporter (ZnT8A) and

insulin (IAA). The isolated positive presence of ICA despite negative results for GADA, IA2A, ZnT8A, and IAA suggests.

**Objectives:** Isolated positive presence of ICA despite negative results for GADA, IA2A, ZnT8A, and IAA was checked.

**Methods:** Laboratory results of 800 patients diagnosed for T1D in The Children's Memorial Health Institute from January 2020 to April 2022 (460 girls, 340 boys) aged 3 to 18 (mean age  $8 \pm 2$  years) who were to have a complete set of lab tests: glucose, c-peptide, ICA, GADA, IA2A, ZnT8A were analyzed retrospectively. Both ICA and specific autoantibodies were analyzed in all samples using manual tests (RIA or ELISA) by MedipanGMBH, Dahlewitz, Germany.

**Results:** Isolated positive results for ICA were observed in 38 cases (4.75%) of 800 analyzed patients. Most of the ICA screening positive patients were positive for multiple antibodies, with 624 children (78%) positive for both GADA and IA2A and 408 children (51%) positive for the three autoantibodies (GADA, IA-2A and ZnT8A). Insulin autoantibodies (IAA, measured by radioimmunoassay) were positive in 13 patients (1.6%).

**Conclusions:** The discovery of an isolated positive ICA result despite negative results for GADA, IA-2A, ZnT8A and IAA may suggest the existence of another, as yet unidentified, self-antigen or self-antigens. Therefore, ICA testing appears to be still important for children and adolescents diagnosed for T1D who would otherwise be negative for specific islet autoantibodies.

#### P234 | Combined SPINK1 mutations induce early onset severe chronic pancreatitis in a morbidly obese child

M. Abass<sup>1</sup>, A. Al Shamsi<sup>2</sup>, A. Deeb<sup>3</sup>

<sup>1</sup>SSMC Pediatrics Residency Program/Pediatric Endocrinology Division, Sheikh Shakhbout Medical City, Abu Dhabi, United Arab Emirates, <sup>2</sup>Clinical Genetics Department, Tawam Hospital, AlAin, United Arab Emirates, <sup>3</sup>Collage of Medicine and Health Sciences, Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates

**Introduction:** The most frequent causes of pancreatitis classically is gallstones or alcohol. Although underlying genetic mutation can have severe disease with high morbidity rate and frequent hospitalization.

**Objectives:** To illustrates the importance of diagnosing the underlying genetic mutation in the absence of other known causes of pancreatitis.

**Methods:** A14 years old female, presented with severe abdominal pain at the age of 7 years and was diagnosed with acute pancreatitis. She used to be admitted 3 times /year with severe epigastric, right hypochondriac pain radiating to the back with nausea and vomiting, receiving conservative management. She is obese since she was 2.5 years.

At the age of 12 years was diagnosed with type 2 diabetes on metformin.

Consanguineous parents but no family history of pancreatitis, diabetes, or obesity. Her younger sister has a global developmental delay with undiagnosed underlying etiology.

Examination wise she has been obese with epigastric tenderness.

**Results:** She used to have high amylase 288 IU/L normal range 28–100 IU/L and lipase 2800 IU/L (13–60 IU/L).

An abdominal CT scan showed an oedematous pancreas with peripancreatic edema, fluid and possible head necrosis.

ERCP and MRCP showed no evidence of pseudocyst or bile duct abnormalities.

Her whole exome sequencing showed 2 mutations SPINK1, c.101A > G p(Asn34Ser) at position 34 and SPINK1, c.56-37 T > C. The 2 mutations were detected in the mother without pancreatitis.

**Conclusions:** Genetics can also play a key role in predisposing patients to both chronic and acute pancreatitis.

The SPINK 1 gene is known to be strongly associated with pancreatitis.

### P235 | 7-year incidence of diabetic ketoacidosis at type 1 diabetes onset in children

K. Dzygala<sup>1</sup>, M. Dymińska<sup>1</sup>, E. Kowalczyk-Korcz<sup>1</sup>, A. Kowalska<sup>1</sup>

<sup>1</sup>Medical University of Warsaw, Department of Pediatrics, Warsaw, Poland

**Introduction:** The signs and symptoms of type 1 diabetes (T1D) in children usually develop quickly. The presence of diabetic ketoacidosis (DKA) is predominantly a consequence of delayed initiation of insulin therapy. Determining the incidence of DKA is important for further attempts to prevent this life-threatening complication.

**Objectives:** The aim of the study was to evaluate the frequency of DKA at the onset of T1D in children over a 7-year period in a large regional center.

**Methods:** We collected data of children with newly diagnosed T1D diagnosed in our department between 2015 and 2021. DKA was defined according to ISPAD 2018 guidelines.

**Results:** The study cohort comprised 1243 children (54, 9% boys) with an average age  $9.33 \pm 4.3$  years (0.8–17.8). Approximately 4% of children were less than 2 years of age at T1D diagnosis. The number of children with newly diagnosed T1D progressively rose from approximately 167 cases/year in 2015–18 to 189 cases/year in 2019–21 ( $\approx 1.2$ -fold increase). Mean DKA incidence was 36.8%. There was a significant difference between each year in DKA incidence ( $p = 0.033$ ) with highest rate in 2019 and 2020 (over 43%). There was no significant difference in DKA rate between genders ( $p = 0.133$ ). Children below 2 years of age showed almost two times higher DKA rate compared to other age groups (65.1% vs. 35.7%;  $p = 0.002$ ).

**Conclusions:** The number of children diagnosed with T1D at our regional center increased over the study period. The incidence of DKA at T1D onset remains high, more than one-third of children were diagnosed with DKA. During the analyzed period, the DKA rate has increased over 40% in 2019–2020. The risk of DKA at the time of diagnosis of diabetes was greater with younger age. Regular education of the whole society about the symptoms of diabetes could contribute

to faster diagnosis of T1D and reduction of DKA prevalence, especially <2 years of age.

### P236 | Multifunctional nanoconstructs for peroral delivery of Insulin

S. Bhargava<sup>1</sup>

<sup>1</sup>United Institute of Pharmacy, Pharmacy, Allahabad, India

**Introduction:** India is fast on its way to becoming a global diabetes hub of the world. Insulin therapy is most appropriate choice for treatment of diabetes mellitus, but has several disadvantages as I.V. injection of insulin results in inactivation by proteolytic enzymes in liver, frequent hyperglycemia & hypoglycemia, local reactions like swelling, erythema.

**Objectives:** The aim of present work was to prepare a biodegradable system to deliver insulin through Concanavillin-A (Con-A) anchored PEGylated-PLGA nanoparticles, which would possibly, lead to enhance stability of system; prolong insulin fate in blood & enhance oral bioavailability of insulin by enhancing its lymphatic uptake using targeted approach.

**Methods:** PLGA Nanoparticles were prepared by Double Emulsification Method. Insulin loaded nanoparticles were characterized for their shape, size via electron microscopy. Prepared nanoparticles were activated & conjugated to Con-A. Conjugated system was again characterized in-vitro for conjugation efficiency with ligand, entrapment efficiency, & stability. Studies like x-ray diffraction, differential scanning calorimetry, & integrity of entrapped insulin was assessed using circular dichroism spectrum & *in-vitro* lig and agglutination assay.

**Results:** Ex-vivo study was performed, which exhibited higher intestinal uptake of Con-A conjugated nanoparticles. System was found to be effective in protecting drug in GIT environment & with good release profile. *In-vivo* studies suggested that developed system lowered blood glucose levels within a safer limit over prolonged duration of action.

**Conclusions:** The developed nanoparticulate system can be a promising drug delivery carrier for oral insulin delivery in treatment of diabetes. Targeted approach led to better uptake of system & increasing oral bioavailability of drug as inferred from blood glucose profile, additionally it also prolongs circulation time due to PEG attachment. Thus the potential for use developed system as oral drug delivery system can be further investigated.

### POSTER TOUR 26—EPIDEMIOLOGY & PATHOGENESIS # 2

#### P239 | Characteristics and presentation at diagnosis of familial type 1 diabetes in Kuwait

D. Khalifa<sup>1,2</sup>, T. Alqaisi<sup>1</sup>, F. Othman<sup>1</sup>, F. Al-Juaila<sup>1</sup>, D. Al-Abdulrazzaq<sup>1,3</sup>, H. Al-Kandari<sup>1,4</sup>



<sup>1</sup>Dasman Diabetes Institute, Population Health, Kuwait City, Kuwait, <sup>2</sup>Ministry of Health, Kuwait City, Kuwait, <sup>3</sup>Kuwait University, Faculty of Medicine, Kuwait City, Kuwait, <sup>4</sup>Farwaniya Hospital, Pediatrics, Kuwait City, Kuwait

**Introduction:** Research on familial type 1 diabetes (FT1D), which is divided into parent-child and sibling-pair subgroups, in comparison to sporadic T1D (ST1D), is limited globally and in Kuwait, considering the high incidence rate.

**Objectives:** To evaluate the baseline features at onset in FT1D vs ST1D in Kuwaiti children.

**Methods:** Children aged  $\leq 14$  years diagnosed with T1D between 2011 and 2021 were included. FT1D was defined as having an affected father and/or affected mother and/or affected sibling. ST1D was defined as having no first-degree relatives with T1D.

**Results:** Over the 10-year period, 1734 patients with T1D were included, (18.74%) had FT1D, and (81.26%) had ST1D. Around 3% ( $n = 65$ , 3.75%) had an affected father, 2.31% ( $n = 40$ ) had an affected mother, 11.19% ( $n = 194$ ) had an affected sibling, and 1.50% ( $n = 26$ ) had two or more affected family members. ST1D presented with DKA at a higher rate compared to FT1D (39.0% vs. 23.4%;  $p$ -value  $< 0.001$ ). Children with an affected father were more likely to present with DKA compared to the other groups; and were close to those diagnosed with ST1D (affected father 31.25%, affected mother 15.38%, affected sibling 22.92%,  $\geq 2$  affected family members 19.23%; ST1D 39%,  $p$ -value  $< 0.001$ ). There was no significant difference between both groups regarding age at onset, gender distribution, and PICU admission. A statistical, but not clinical, significant difference was found between HbA1c values across the groups (ST1D 11.4%, affected father 10.6%, affected mother 9.65%, affected sibling 10.5%,  $\geq 2$  affected family members 10.3%;  $p$ -value = 0.001). FT1D group was at a lower risk of presenting with DKA at onset.

**Conclusions:** This is the first study in Kuwait to review the features of FT1D and ST1D among Kuwaiti children. FT1D is associated with a lower risk of DKA. Children with an affected father were more likely to present with DKA compared to other familial groups. Further studies are needed to better understand the role of family history of diabetes on the natural course, disease management, and outcomes.

#### P240 | The status of type 1 diabetes in children, UAE Eastern Region

W. Kaplan<sup>1</sup>, L. Al Oum<sup>2</sup>

<sup>1</sup>Tawam Hospital, Pediatrics, Al Ain, United Arab Emirates, <sup>2</sup>Tawam Hospital, Al Ain, United Arab Emirates

**Introduction:** Type 1 diabetes mellitus (T1DM) accounts for the majority of newly diagnosed diabetes in children, and it is known to be globally under-controlled; several factors have been linked to

diabetes control. No one has looked at this data in the UAE Eastern Region.

**Objectives:** Explore Patients' demographic, level of diabetes control, associated comorbidities, and correlation between diabetes control and potential factors.

**Methods:** Data collection for patient  $\leq 18$  years with T1DM between January 2008 and June 2021. We analyzed patients' demographics, DKA at presentation, insulin regimen, method of glucose monitoring, other autoimmune comorbidities and diabetes complications. HbA1c was compared across demographics, insulin regimen, and glucose monitoring.

**Results:** Out of the 243 eligible patients, 63% were Emiratis, 54% female, and 18% had positive history of T1DM in 1st degree relatives. Mean age at presentation was  $6.6 \pm 3.9$  years, and the duration of diabetes was  $5.2 \pm 3.7$  years. Autoantibodies were positive in 76% of patients, and 33% first presented with DKA.

HbA1c at presentation was  $11.06 \pm 2.30\%$ , and the most recent was  $8.64 \pm 1.58\%$ . HbA1c increased linearly from the end of 1st year to the last year.

65% of the patients were on MDI and 35% on CSII. Glucose monitoring was done by isCGM, SMBG, and CGM in 48%, 33%, and 19% of the patients, respectively. Autoimmune comorbidities and diabetes complications were found in 32% and 5.3% of the patients, respectively.

Males, prepubertal patients, and Non-UAE Nationals had lower HbA1c while no difference was seen between MDI and CSII or between SMBG, CGM, and isCGM groups. Frequency of glucose monitoring was associated with lower HbA1c. Finally, positive history of T1DM in 1st degree relatives correlated with a higher HbA1c.

**Conclusions:** T1DM is under-controlled in children in UAE Eastern Region. Age, gender, nationality, and presence of other household members with T1DM correlated with HbA1c level, while treatment regimen and method of glucose monitoring showed no correlation.

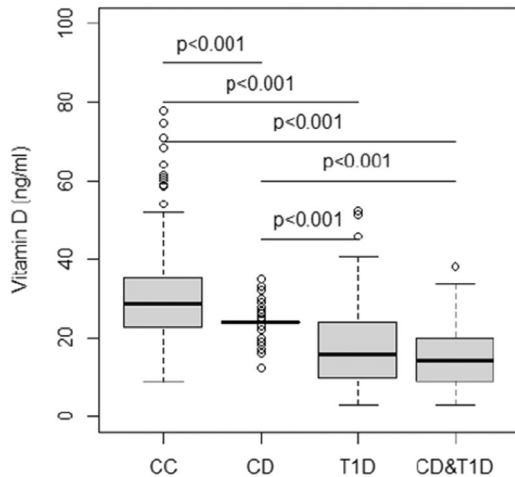
#### P241 | Plasma 25-Hydroxyvitamin D in children with celiac disease, type 1 diabetes, and with both celiac disease and type 1 diabetes compared with healthy subjects

M. Marino<sup>1</sup>, T. Galeazzi<sup>2</sup>, S. Gatti<sup>2</sup>, R. Gesuita<sup>3</sup>, V. Cherubini<sup>1</sup>, C. Catassi<sup>2</sup>, E. Lionetti<sup>2</sup>

<sup>1</sup>AOU Ospedali Riuniti, G.Salesi Hospital, Children and Motherhood Department, Pediatric Diabetology Unit, Ancona, Italy, <sup>2</sup>Marche Polytechnic University, Department of Pediatrics, Ancona, Italy, <sup>3</sup>Marche Polytechnic University, Interdepartmental Center of Epidemiology, Biostatistics and Medical Informatics (EBI Center), Ancona, Italy

**Introduction:** Vitamin D deficiency has been observed in celiac disease (CD) diagnosis and in type 1 diabetes (T1D) onset in previous studies.

**Figure 1. Vitamin D distribution in the four groups**



Kruskal-Wallis test. p-values refer to multiple comparisons  
 CC: Controls; CD: Celiac Disease; T1D: Type 1 diabetes

**Objectives:** To evaluate the vitamin D status of children with newly diagnosed CD, children with T1D at onset, and children with both CD and T1D.

**Methods:** In this cross-sectional study, we recruited 3 groups of children and adolescents with CD, T1D, both CD&T1D. Healthy school children screened during a prevention campaign for CD were enrolled as control group (CC). Plasma 25-hydroxyvitamin D was measured as the index of vitamin D nutritional status. Kruskal-Wallis test was used to compare the groups. The association of vitamin D levels with health conditions and the season of vitamin D measurement was analyzed by a multiple linear regression model.

**Results:** Overall, 393 children were included: 131 CG, 131 CD, 109 T1D, and 22 CD&T1D. The distributions of vitamin D levels in the four groups is shown in Figure 1. Children with CD, with T1D, or with both the diseases had significantly lower levels of vitamin D than controls. Vitamin D values were significantly higher in summer and in autumn than in winter and spring in healthy children, as expected, while no significant differences were observed in the presence of CD and/or T1D. Results of multiple regression analysis showed that T1D and T1D & CD groups on average had lower vitamin D levels than healthy children. Children with CD and with T1D also had significantly

Table 2. Association of Vitamin D with health conditions and seasons

	Regression coefficients	95% CI	p
Intercept	24.0	21.1;26.9	<0.001
Summer	14.4	9.7;19.1	<0.001
Autumn	16.5	12.5;20.5	<0.001
CD in summer	-14.6	-21.2;-8.0	<0.001
T1D in summer	-11.1	18.0;-4.2	0.002
CD in autumn	-15.9	-21.6;-10.2	<0.001
T1D in autumn	-9.9	-16.0;-3.8	0.002

Note: Multiple linear regression analysis. R<sup>2</sup> = 0.43.  
 Abbreviations: CC, controls; CD, celiac disease; T1D, Type 1 diabetes.

lower mean vitamin D values in summer and in autumn than CC in the same seasons (Table 1).

**Conclusions:** Our study shows that vitamin D is lower in children with CD or T1D as compared with healthy children, particularly in the most sun-exposed seasons. These findings support the hypothesis that vitamin D deficiency is associated with these both autoimmune diseases. Further studies are required to investigate if Vitamin D deficiency plays a role in the pathogenesis of these diseases.

**P242 | Cases series: A description of clinical phenotypes and metreleptin effects in congenital generalized lipodystrophy**

L. Aletani<sup>1</sup>, A. Alsaghier<sup>1</sup>

<sup>1</sup>King Faisal Specialist Hospital and Research Center, Pediatric Endocrine, Riyadh, Saudi Arabia

**Introduction:** Congenital generalized lipodystrophy (CGL) also known as berardinelli-seip congenital lipodystrophy, it is a rare genetic disorder characterized by the partial or total loss of adipose tissue and has a distinctive physical appearance of lipodystrophy, its classified into four types which are distinguished by their genetic cause. Most of the cases diagnosed at birth or soon thereafter, insulin resistant and hypertriglyceridemia is an associated metabolic complication related to CGL.

**Objectives:** A description of clinical phenotypes and metreleptin effects in Congenital generalized lipodystrophy.

**Methods:** Case series enrolled seven patients of pediatric age group.

**Results:** Case serious presentation: we report seven cases of pediatric age group with CGL all patients were presented with features of lipid dystrophy (loss of subcutaneous tissue and Masculinization of body), we performed genetic analysis on all our patients, six was confirmed with genetic mutations and one has all the characteristics feature and complications without underlying genetic mutation. Five out of seven were diagnosed in first year of life, and the other two one after two year of age, and one after three year of age, All patients complicated with hypertriglyceridemia four of them at same year of diagnosis and two with diabetes mellitus which required insulin therapy, Four of them started on metreleptin were showed significant improvement in their clinical manifestations.

**Conclusions:** Loss of subcutaneous tissue is consistent and a key diagnostic feature of lipodystrophy so as reported cases are increased worldwide,more recognition and early detection are emphasized, in order to early initiation of treatment and prevent associated metabolic disturbance. While seems Metreleptin is the only medication has been effective treatment on CGL.

**P243 | The diagnosis and management of congenital lipodystrophy syndromes/Berardinelli-Seip syndrome**

A. Abdul Razzaq<sup>1</sup>, G. Shahid<sup>1</sup>, R. Waris<sup>1</sup>

<sup>1</sup>Pakistan Institute of Medical Sciences, Pediatrics, Islamabad, Pakistan

**Introduction:** Berardinelli-Seip congenital lipodystrophy (BSCL) is characterized by near total fat atrophy since birth, associated with the progressive development of metabolic complications. The most common are diabetes, severe hypertriglyceridemia, acute pancreatitis, hepatic steatosis, and hepatomegaly, which are usually detected during infancy and adolescence; other features include muscle pseudo-hypertrophy and acromegaloid appearance, umbilical hernia, polycystic ovary syndrome, cysts in the appendicular bones, cardiopathies, and cardiac rhythm disorders.

**Objectives:** We discuss a case report of 22 years old girl, presented to our endocrine clinic with diabetes mellitus and acute pancreatitis, and later on diagnosed as Berardinelli-Seip syndrome on basis of genetic tests.

**Methods:** Our patient, presented in endocrine clinic at 8 years of age due to polyuria and polydipsia and not gaining weight, diagnosed as diabetes mellitus, started on insulin and oral hypoglycemics. At 12 years of age, presented with severe abdominal pain and vomiting and diagnosed as acute pancreatitis. At 22 years of age she again presented due to absence of menarche. On examination, she has coarse acromegaloid facies, prominent supraorbital ridge, hollowing of cheeks, prognathism with dry thick hairs. She had large hands and feet with muscular hypertrophy in upper and lower limbs. She had acanthosis nigricans, umbilical hernia, hepatomegaly. SMR stage shows Breast stage I, pubic hair stage II, mild clitoromegaly.

**Results:** Investigations show HbA1c 8%, deranged LFTs with hypercholesterolemia and hypertriglyceridemia. USG abdomen shows Fatty hepatomegaly. Later on genetic test came out to be BSCL2 gene consistent with Berardinelli-Seip Syndrome. Treatment includes Insulin 8 U/kg/day and Pogliitazone, low fat diet, fish oil, statins.

**Conclusions:** Our diagnosis is **Congenital lipodystrophy syndrome**, with associated consequences like diabetes mellitus, nonalcoholic steatohepatitis (NASH), delayed puberty and pancreatitis.

#### P244 | Possible autoimmune polyglandular syndrome Type II transfer between siblings after allogeneic bone marrow transplant

F. Scialabba<sup>1,2</sup>, G. Frontino<sup>1,2</sup>, R. Di Tonno<sup>1,2</sup>, A. Rigamonti<sup>1,2</sup>, V. Castorani<sup>1,2</sup>, E. Morotti<sup>1,2</sup>, F. Sandullo<sup>1,2</sup>, R. Foglino<sup>1,2</sup>, F. Arrigoni<sup>1,2</sup>, B. Dionisi<sup>1,2</sup>, F. Meschi<sup>1,2</sup>, R. Bonfanti<sup>1,2,3</sup>

<sup>1</sup>IRCCS San Raffaele Hospital, Department of Pediatrics, Milano, Italy, <sup>2</sup>IRCCS San Raffaele Hospital, Diabetes Research Institute, Milano, Italy, <sup>3</sup>Università Vita-Salute San Raffaele, School of Medicine, Milano, Italy

**Introduction:** Autoimmune polyglandular syndrome type II (APS II) is the combination of Addison disease (AD) and autoimmune thyroid disease (AT), type 1 autoimmune diabetes mellitus (T1D), or both. This syndrome also can be associated with vitiligo; chronic atrophic gastritis (AG), with or without pernicious anemia; hyper gonadotropic hypogonadism; chronic autoimmune hepatitis; and celiac disease (CD).

**Objectives:** We report a case of APS II that developed in a patient with sickle cell disease after allogeneic bone marrow transplant (BMT)

from his human leukocyte antigen (HLA)-identical sister who later developed T1D and AT.

**Methods:** Patient data was recorded from the patent registry.

**Results:** A 7-year old boy with homozygous sickle cell disease underwent allogeneic bone marrow transplant from his 9 years old HLA-identical healthy sister. Children were born from consanguineous parents. Full donor engraftment was documented. A year after BMT, the donor developed T1D (GADA >100 U.A) and AT (anti-TPO 341 U/ml), yearly screening CD and AG was negative. A 5 years after BMT, the recipient developed T1D (ZnT8A 1426 U/ml, GADA 234 U.A). Screening for AT, CD and AG was negative. A 9 years after BMT, the recipient developed AD (confirmed by ACTH test) with positive anti-adrenal antibodies. We presume that the recipient developed autoimmune polyglandular syndrome type II after bone marrow transplant from his sister, who was probably affected by the same syndrome (autoantibody screening is ongoing).

**Conclusions:** Persistent full donor chimerism may suggest that specific effector donor T cells could trigger autoimmunity. Consequently, our case possibly represents a real adoptive transfer. Interestingly, AD presented only in the recipient and not yet in the donor. BMT may therefore represent a trigger for accelerated autoimmunity in the context of HLA-matched siblings with persistent chimerism.

#### P245 | Evolution and determinants of glycemic control in children and adolescents with type 1 diabetes in Belgium: A 10-year period observational real-world study

S. Chao<sup>1</sup>, D. Beckers<sup>2</sup>, K. Casteels<sup>3</sup>, M. Den Brinker<sup>4</sup>, S. Depoorter<sup>5</sup>, L. Dooms<sup>6</sup>, D. Klink<sup>7</sup>, M.-C. Lebrethon<sup>8</sup>, K. Logghe<sup>9</sup>, J. Louis<sup>10</sup>, P. Lysy<sup>11</sup>, N. Seret<sup>12</sup>, G. Smeets<sup>13</sup>, S. Tenoutasse<sup>14</sup>, S. Van Aken<sup>15</sup>, J. Vanbesien<sup>16</sup>, V. Van Elshocht<sup>17</sup>, A.-S. Vanherwegen<sup>1</sup>

<sup>1</sup>Sciensano, Belgian Scientific Institute of Public Health, Epidemiology and Public Health, Anderlecht, Belgium, <sup>2</sup>CHU de Mont-Godinne, Yvoir, Belgium, <sup>3</sup>UZ Leuven, Louvain, Belgium, <sup>4</sup>UZ Antwerpen, Antwerp, Belgium, <sup>5</sup>AZ Sint-Jan, Bruges, Belgium, <sup>6</sup>Ziekenhuis Maas en Kempen, Maaseik, Belgium, <sup>7</sup>ZNA Middelheim, Antwerp, Belgium, <sup>8</sup>CHR de la Citadelle, Liège, Belgium, <sup>9</sup>AZ Delta, Roulers, Belgium, <sup>10</sup>Grand Hôpital de Charleroi, Charleroi, Belgium, <sup>11</sup>CHU Saint-Luc, Bruxelles, Belgium, <sup>12</sup>Cliniques Saint-Joseph, Liège, Belgium, <sup>13</sup>Jessa Ziekenhuis, Hasselt, Belgium, <sup>14</sup>HUDERF, Bruxelles, Belgium, <sup>15</sup>UZ Gent, Gand, Belgium, <sup>16</sup>UZ Brussel, Bruxelles, Belgium, <sup>17</sup>INAMI, Bruxelles, Belgium

**Introduction:** Since 2008, all Belgian pediatric diabetes centers (PDCs) participate to a biennial audit/feedback, allowing to monitor the quality of care given in PDCs and to describe clinical and demographic characteristics of young patients with type 1 diabetes (T1D) on a national level.

**Objectives:** Here we present the evolution of the hemoglobin A1c (HbA1c) between 2008 and 2019 and investigate the determinants of HbA1c among children and adolescents with T1D.

**Methods:** Data were cross-sectionally and retrospectively collected between 2008 and 2019 from all Belgian PDCs (N = 16). The evolution over time of HbA1c was investigated on a continuous scale with generalized estimating equations (GEE). The association of HbA1c with age, gender, diabetes duration, presence of nuclear family, parent ethnicity, presence of a communication problem with the medical team, and insulin regimen were studied using GEE and Tukey–Kramer tests, as was the presence of psycho-social distress in the 2019 dataset.

**Results:** The number of patients with T1D (age 1–18 years) varied from 1948 in 2008 to 3777 in 2019. There was a linear decrease in HbA1c of  $0.026 \pm 0.008$  percentage points per year on average: from 63 mmol/mol (7.9%) in 2008 to 60 mmol/mol (7.7%) in 2019 ( $P < 0.0001$ , adjusted for gender, age and diabetes duration). In 2019, the oldest patients (aged between 16–18 years), patients with the highest diabetes duration (>8.25 years), not living in a nuclear family, with two parents of non-Caucasian ethnicity (versus having at least one parent of Caucasian ethnicity) or having psychosocial distress had higher HbA1c compared to the other groups ( $P < 0.0001$ , adjusted for gender, age and diabetes duration). The presence of a communication problem was also associated with higher HbA1c, although less pronounced ( $P < 0.05$ , adjusted for gender, age and diabetes duration).

**Conclusions:** Our data shows that glycemic control improved over the past 11 years, but several subgroups still have high HbA1c levels. These subgroups may have a higher risk for developing long-term complications and deserve particular attention.

#### P246 | Predictive factors of good metabolic control in children with type 1 diabetes

Z. Imane<sup>1</sup>, L. Saadaoui<sup>1</sup>, A. Balafrej<sup>1</sup>

<sup>1</sup>UM5R, Children's Hospital of Rabat, Rabat, Morocco

**Introduction:** The management of children with type 1 diabetes has been revolutionized first by the discovery of insulin and then by the development of new technologies. Nevertheless, the majority of patients still do not reach their glycemic target.

**Objectives:** The main objective of this study is to determine the predictive factors of good metabolic control in children with type I diabetes, in order to develop tailored approaches to improve the quality of management and prevent disease-related complications.

**Methods:** Prospective analytical and descriptive study spread over 6 years from January 2015 to January 2021 including type 1 diabetic children diagnosed between 2015 and 2019 and followed up at the “Maison du jeune diabétique” in collaboration with the diabetes department of the children's hospital (P2). Clinical and epidemiological data were obtained from patient records and the Freediab database.

**Results:** The number of patients meeting the inclusion criteria was 542. A mean HbA1c in the target range was associated in bivariate

analysis with patient age ( $p = 0.003$ ), parental socioeconomic and academic level ( $p = 0.001$ ), adherence to health coverage ( $p = 0.001$ ), initial HbA1c value ( $p = 0.001$ ), number of self-monitoring of blood glucose ( $p = 0.001$ ), and treatment regimen ( $p = 0.001$ ). In multivariate analysis, the association was statistically significant for 5 parameters: socioeconomic level ( $\beta$  0.10; 95%CI 0.10–0.26;  $p$  0.03), parents' academic level ( $\beta$  0.15; 95%CI 0.24–0.5;  $p = 0.002$ ), adherence to health coverage ( $\beta$  0.12; 95%CI 0.18–0.46;  $p = 0.001$ ), initial HbA1c level ( $\beta$  0.16; 95%CI 0.15–0.38;  $p < 0.001$ ) and number of self-monitoring of blood glucose ( $\beta$  0.46; 95%CI 0.21–0.3;  $p < 0.001$ ).

**Conclusions:** Our study demonstrates parameters related to good glycemic control that need to be taken into account to develop new management strategies for children with type 1 diabetes.

#### P247 | Rituximab role in preservation of pancreatic beta cells in patients newly diagnosed with type 1 diabetes mellitus: A report of 2 Palestinian cases

H. Eida<sup>1</sup>, A. Mansour<sup>1</sup>, T. Eleyan<sup>1</sup>

<sup>1</sup>Palestine Medical Complex, Ramallah, Palestine

**Introduction:** Type 1 diabetes mellitus (T1DM) is a condition caused by the clonal generation of autoantibodies by B cells. Rituximab, an immunosuppressive agent, has been shown in studies to protect pancreatic function in individuals newly diagnosed with type 1 diabetes mellitus (T1DM).

**Objectives:** We investigated the effects of rituximab in preserving beta cells function in two individuals with newly diagnosed T1DM.

**Methods:** For all cases, in order to be started on rituximab for the inhibition of the immune system and guard against pancreatic cell destruction, lab tests were done and were negative for both tuberculosis (TB) and Hepatitis B (Hep B). Premedications were given which included acetaminophen, antihistamine and corticosteroid, then 375 mg/m<sup>2</sup> of rituximab was administered four times at one-week intervals.

**Results:** In Case 1, HbA1c levels showed a significant drop on the same drugs and then steadily increased until returning to pre-rituximab levels 1 year later. In Case 2, however, HbA1c remained below 6.5% for 8 months following therapy and was below 7% after the second Rituximab dose. Both patients were administered a second Rituximab dose 1 year after the first one. While the second case remained on the same medications for maintenance of HbA1c, the first case was able to be maintained on just long-acting insulin without the need for the short-acting as before.

**Conclusions:** Rituximab as an immunosuppressive agent was able to protect pancreatic cells in patients with T1DM. However, the duration of effectiveness is variable.



POSTER TOUR 27—DIABETES NEW & ADJUNCTIVE  
TREATMENT AGENTSP248 | Glycemic control with ultra-rapid lispro  
(URLi) versus lispro in children and adolescents with T1D:  
PRONTO-peds

R.P. Wadwa<sup>1</sup>, L.M. Laffel<sup>2</sup>, D.R. Franco<sup>3</sup>, M.A. Dellva<sup>4</sup>, R.K. Pollom<sup>4</sup>  
<sup>1</sup>Barbara Davis Center for Diabetes, University of Colorado Anschutz  
Medical Campus, Aurora, United States, <sup>2</sup>Joslin Diabetes Center, Harvard  
Medical School, Boston, United States, <sup>3</sup>CPCLIN/DASA Clinical Research  
Center, São Paulo, Brazil, <sup>4</sup>Eli Lilly and Company, Indianapolis,  
United States

**Introduction:** URLi is a formulation developed to match physiological insulin secretion and improve PPG control. In a pooled analysis comparing pharmacokinetics and pharmacodynamics between URLi and lispro following subcutaneous injection, URLi showed better results compared with lispro.

**Objectives:** This phase 3, treat-to-target study evaluated efficacy and safety of URLi versus lispro in 716 pediatric patients (pts) with type 1 diabetes (T1D).

**Methods:** After 4-week lead-in to optimize basal insulin, pts were randomized to double-blind URLi (n = 280) or lispro (n = 298) injected 0–2 min prior to meals, or open-label URLi (n = 138) injected up to 20 min after meals (URLi+20). Pts remained on prestudy basal insulin (degludec, detemir, or glargine). Primary endpoint was HbA1c change from baseline after 26 weeks.

**Results:** Noninferiority was shown in HbA1c change with URLi vs lispro: estimated treatment difference (ETD) -0.02% (95% CI -0.17, 0.13) and with URLi+20 vs lispro: ETD -0.02% (95% CI -0.20, 0.17). Postprandial glucose (PPG) measured by self-monitored blood glucose was lower with URLi vs lispro 1 h after breakfast (p < 0.001) and dinner (p = 0.006). URLi significantly reduced 1 h postmeal glucose daily mean vs lispro (p = 0.001). Total daily insulin dose was similar between treatments.

Rate or incidence of severe, nocturnal or documented hypoglycemia (<54 mg/dl) was similar between treatments. With URLi vs

lispro, rate of postdose hypoglycemia (<54 mg/dl) was higher at ≤2 h (p = 0.034). Incidence of treatment-emergent adverse events was similar between groups. More pts reported an injection site reaction related event with URLi (7.9%) and URLi+20 (2.9%) versus lispro (2.7%).

**Conclusions:** In children and adolescents with T1D, URLi demonstrated similar overall glycemic control and greater PPG lowering with an acceptable safety and tolerability profile compared with lispro. When dosed at the start of meals, URLi showed noninferiority for HbA1c change from baseline versus lispro and lower PPG and 1 h postmeal glucose daily mean versus lispro.

P249 | Effect of BCG vaccination on immune-regulatory  
markers and glycemic control in children with new-onset type  
1 diabetes mellitus (T1DM): A randomized double-blinded placebo-  
controlled pilot trial

A. Babbar<sup>1</sup>, R. Kumar<sup>1</sup>, A. Rawat<sup>1</sup>, N. Sachdeva<sup>2</sup>, B. Bharti<sup>1</sup>, S. Gupta<sup>1</sup>,  
J. Yadav<sup>1</sup>, D. Dayal<sup>1</sup>

<sup>1</sup>Postgraduate Institute of Medical Education and Research,  
Chandigarh, Department of Pediatrics, Advanced Pediatrics Center,  
Chandigarh, India, <sup>2</sup>Postgraduate Institute of Medical  
Education and Research, Chandigarh, Department of Endocrinology,  
Chandigarh, India

**Introduction:** Upregulation of induced T-regs (iT-regs) and selective killing of the auto-reactive T cells has been postulated to occur after BCG vaccination. A few clinical trials have shown the effect of BCG on C-peptide secretion glycemic control.

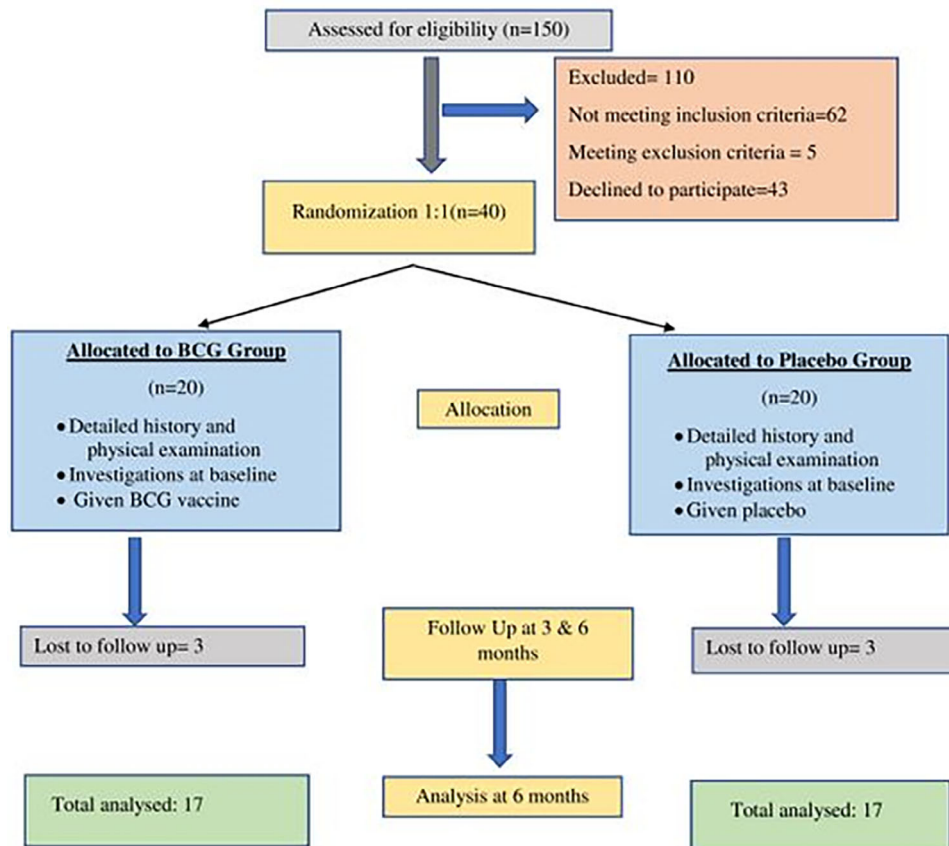
**Objectives:** To study the effect of 2 doses of BCG vaccination on immune-regulatory markers and glycemic control in patients with Type 1 Diabetes (T1D).

**Methods:** A single-center, double-blinded, randomized placebo-controlled pilot trial was conducted over one-and-a-half-year on 40 children (2–12 years) with new-onset T1D. Children were randomized 1:1 into BCG and Placebo groups. In the BCG group, children received BCG vaccine 0.1 ml intradermally (2 doses, 1 month apart).

Table 1. Comparison of outcome parameters in the two groups at the end of 6 months (Per-Protocol Analysis)\*

Outcome parameters median (IQR)	BCG group (n = 17)	Placebo group (n = 17)
iTregs (%) (CD3 <sup>+</sup> CD4 <sup>+</sup> CD25 <sup>+</sup> Foxp3 <sup>+</sup> )	1.65 (0.93–2.81)	1.74 (1.2–2.35)
Plasma IL-10 (pg/ml)	13.42 (13.13–13.68)	13.43 (13.29–13.53)
Plasma IL-17 (pg/ml)	14.3 (12.89–14.53)	13.79 (12.1–14.95)
Plasma TNF-Alpha (pg/ml)	16.21 (16.07–16.39)	16.18 (16.02–16.52)
Serum GAD 65 antibody (U/ml)	27.8 (15.8–30.19)	20.84 (15.3–27.72)
Serum IA 2 antibody (U/ml)	11.34 (11.2–6.52)	11.41 (11.29–8.94)
Serum IAA antibody (U/ml)	10.84 (7.04–13.4)	7.88 (6.56–9.57)
Plasma HbA1c (%)	7.5 (6.8–8.7)	7.5 (7.2–10)
Plasma HbA1c (mmol/mol)	58 (51–72)	58 (55–86)
Plasma C-peptide (mmol/L)	0.073(0.026–0.122)	0.113 (0.050–0.334)

Figure 1: Patient Flow diagram



The placebo group received 0.1 ml of normal saline intradermally. The 2 groups were compared at the end of 6 months for the percentage of induced regulatory T cells (iT-regs) in blood, serum IL10, IL-17 and TNF-alpha levels, serum titres of pancreatic autoantibodies, and various glycemetic control parameters.

**Results:** No significant difference was seen in the immune-regulatory markers in median (IQR) of IL-10, IL-17 and TNF-alpha and GAD-65, IA2 and IAA in the two groups at the end of 6 months. There was a higher reduction of HbA1c (p-value; 0.421) and lesser fall of C-peptide (p-value; 0.496) in the BCG group. The average fasting and random blood sugar and median total/basal/bolus insulin dose did not vary significantly between the two groups at 6 months.

**Conclusions:** BCG does not significantly improve immune-regulatory markers and glycemetic control among children with new-onset T1DM who have been vaccinated at birth.

#### P250 | Effects of zinc oxide nanoparticles on oxidative stress and renal function in fat-fed and streptozotocin-treated rats

P. Kumar<sup>1</sup>, N. Baquer<sup>1</sup>

<sup>1</sup>Jawaharlal Nehru University, School of Life Sciences, Delhi, India

**Introduction:** Diabetes mellitus is an inherited, chronic disorder in the endocrine system that constitutes a main public health problem all over the worldwide.

**Objectives:** The present study investigated the impact of zinc oxide nanoparticles (ZnONPs) on serum parameters of renal function, on oxidative stress markers (malondialdehyde [MDA] and 8-isoprostane), and on expression level of insulin receptor, glucose transporter 2 (GLUT2), glucokinase genes and heat-shock proteins (HSPs) in rats.

**Methods:** Male Wistar rats (n = 64, 10 weeks old) were divided into four groups. Group 1 received a standard diet (12% of calories as fat). Group 2 received a standard diet, plus ZnONPs; received a single daily oral dose of ZnONPs of 100 mg/kg in suspension. Group 3 received a high-fat diet (40% of calories as fat) for 2 weeks, and was then injected with streptozotocin (STZ) on day 14 (STZ, 40 mg/kg intraperitoneally). Group 4 was treated in the same way as group 3 (HFD/STZ), but was supplemented with ZnONPs 100 mg /kg/body weight/day. Oxidative stress in the kidneys of diabetic rats was evidenced by an elevation in levels of MDA and 8-isoprostane. Protein concentrations of insulin receptor, GLUT2, glucokinase genes and heat-shock (HSP60 and HSP70) in renal tissue were determined by Western blot analyzes.

**Results:** ZnONPs supplementation lowered kidney concentrations of MDA, 8-isoprostane levels, serum urea-N, and creatinine, and reduced the severity of renal damage in the STZ-treated group (i.e., the

diabetes-induced group). The expression of insulin receptor, GLUT-2, glucokinase genes, and HSPs was lower in the STZ group that received ZnONPs than in the group that did not. No significant effect of ZnONPs supplementation was detected in regard to the overall measured parameters in the control group.

**Conclusions:** This study supported the efficacy of ZnONPs in reducing renal risk factors and impairment because of diabetes and act as potent antidiabetic agent.

#### P251 | Promoting adolescents' engagement in diabetes clinic encounters: Results from an RCT

I. Coyne<sup>1</sup>, J. Surdey<sup>1</sup>, B. Sleath<sup>2</sup>, S. Rafferty<sup>1</sup>, K. Chechalk<sup>3</sup>, M. Hughes<sup>1</sup>, M. Murphy<sup>1</sup>, M. Brenner<sup>1</sup>, C. Hilliard<sup>4</sup>, S. Pembroke<sup>1</sup>, S. Rogerson<sup>1</sup>, V. Burke<sup>1</sup>, E. Roche<sup>3</sup>, D. Cody<sup>5</sup>

<sup>1</sup>Trinity College Dublin, School of Nursing and Midwifery, Dublin, Ireland, <sup>2</sup>University of North Carolina at Chapel Hill, Division of Pharmaceutical Outcomes and Policy, UNC Eshelman School of Pharmacy, Chapel Hill, United States, <sup>3</sup>Trinity College Dublin, School of Medicine, Dublin, Ireland, <sup>4</sup>Children's Health Ireland, Department of Endocrinology and Diabetes, Tallaght, Dublin, Ireland, <sup>5</sup>Children's Health Ireland, Department of Diabetes and Endocrinology, Crumlin, Dublin, Ireland

**Introduction:** This paper presents the results of a pilot randomized controlled trial of a co-designed intervention, which sought to empower adolescents' understanding and successful management of their T1DM.

**Objectives:** To conduct a pilot randomized controlled trial to test the effectiveness of a diabetes educational video with a question prompt list to increase adolescents' question-asking and doctors' education during clinic encounters.

**Methods:** Adolescents ages 11 to 17 with type 1 diabetes and their parents were enrolled from two urban pediatric clinics. Adolescents were randomized to the intervention or usual care groups. All participants completed surveys (Self-Efficacy for Diabetes Management Scale (SEDM), Self-Management of Diabetes - Adolescents Scale (SMOD-A), Participatory Decision-Making Scale (PDM)), their HbA1c recorded, and consultations audio-recorded at three clinic appointments. The intervention group also completed a QPL and watched an educational video on a tablet with their parents before meeting their doctor and completed a short evaluation after the consultation. Data were analyzed with SPSS (v 27). Ethical approval was obtained.

#### Results:

	Without AGI (14 days)	With AGI (14 days)
Mean TIR (time in range)	48%	63%
Mean TBR (time below range)	20%	12%
Mean TAR (time above range)	32%	25%

Note: P value of TIR is <0.05; suggesting significant improvement.

**Results:** A 35 doctors and 99 adolescents participated. The intervention group were significantly more likely to be engaged and ask more questions than the adolescents in the usual care group. Doctors were significantly more likely to educate the intervention adolescents group. There were no significant differences between the intervention and usual care group in relation to HbA1C, self-efficacy, self-management of diabetes, and participatory decision-making.

**Conclusions:** This pilot RCT demonstrated that the intervention influenced adolescents' question asking and provider education in diabetes encounters. Adolescence is often a precarious period characterized by worsening HBA1c and disengagement with self-management; hence, it is essential that we find innovative ways to engage adolescents actively in healthcare encounters.

#### P252 | Time limited eating in new-onset type 1 diabetes: Feasibility, acceptability, and effect on $\beta$ -cell function

C. Berman<sup>1</sup>, A. Vidmar<sup>1</sup>, B. Miyazaki<sup>1</sup>, J. Raymond<sup>1</sup>  
<sup>1</sup>Children's Hospital Los Angeles, Endocrinology, Los Angeles, United States

**Introduction:** Time limited eating (TLE) improves  $\beta$ -cell responsiveness, decreases insulin resistance, lowers fasting glucose, and increases time in range on continuous glucose monitor (CGM) in adults with type 2 diabetes.

**Objectives:** The current study aims to evaluate TLE in pediatric type 1 diabetes (T1D), implemented within 6 months post-diagnosis. This period finds residual  $\beta$ -cell function, during which TLE may preserve and improve  $\beta$ -cell activity.

Aim (1) Assess feasibility, acceptability, and safety of TLE.

Aim (2) Test effectiveness of TLE on  $\beta$ -cell function, insulin sensitivity, and glucose utilization.

Aim (3) Test impact of TLE on glycemic control.

**Methods:** A randomized controlled trial of up to 40 youth aged 12–25 years with new-onset T1D will be conducted at an urban children's hospital. Subjects will be randomized to either intervention (8-h feed/16-h fast) or control group ( $\geq 12$ -h feeding window) for an 8-week period. Feasibility and acceptability will be evaluated using questionnaires, weekly check-ins, and intervention adherence. Safety will be reviewed by frequency of hypoglycemia.  $\beta$ -cell function will be evaluated by mixed meal tolerance test (MMTT) with C-peptide levels. Glycemic control will be evaluated by percent of total time in range (TIR 70–180 mg/dl) on CGM and HbA1c. Mean change in data will be compared between baseline and post-intervention across study

groups. Two-sample t-tests will be used to compare (a) area under stimulated C-peptide curve, and (b) change in %TIR between groups. Multiple regression analysis using a linear mixed model will be utilized to account for covariates.

**Results:** Based on 2021 data, we anticipate 80 eligible youth with T1D. A 32% female, 74% English speaking, 62% public insurance, 40% Latin-X. This study has been approved by the institutional review board and recruitment is underway.

**Conclusions:** To our knowledge, this is the first study of TLE in youth with T1D and has the potential to change management of T1D by incorporating meal timing early in diagnosis.

### P253 | Effect of AGI on time in range (TIR) in T1D

T. Vyas<sup>1</sup>, B. Saboo<sup>2</sup>, K. Chennamsetti<sup>2</sup>, M. Saiyed<sup>2</sup>, N. Joshi<sup>3</sup>, J. Khedawala<sup>2</sup>, H. Nayak<sup>4</sup>, K. Patel<sup>5</sup>

<sup>1</sup>Diacare-Diabetes Care and Hormone Clinic, Diabetology, Ahmedabad, India, <sup>2</sup>Diacare-Diabetes Care and Hormone Clinic, Ahmedabad, India, <sup>3</sup>GCS Medical College, Ahmedabad, India, <sup>4</sup>LG Hospital, Ahmedabad, India, <sup>5</sup>BJ Medical College, Ahmedabad, India

**Introduction:** AGIs lower the blood glucose levels by modifying the intestinal absorption of carbohydrates.

AGI may play a role as a part of combination regimen in people who consume high carbohydrate diet and have high postprandial glucose levels as long as GI side effects are tolerated.

Carbohydrates form a major portion of Indian meals.

**Objectives:** To study the effect of AGI (Acarbose) on glycemic variability by analyzing AGP (Libre pro) data of persons with T1D.

**Methods:** Consent from EC was taken. 20 persons aged 12–18 years with Type 1 diabetes having post meal excursions and variability who developed hypoglycemia on increasing bolus doses were enrolled. These persons were put on AGP (Libre pro) twice consequently. In the first 14 days they were just on basal bolus insulin and in the next 14 days period they were also prescribed AGI (Acarbose) thrice a day (with breakfast, lunch and dinner). Both the AGP data was analyzed to compare the post meal sugar control offered by AGI.

Exclusion criteria:

- BMI < 18
- HbA1c > 10
- Persons having pre-existing GI issue, diabetic nephropathy

**Conclusions:** AGI significantly helps in controlling post meal sugars as analyzed from AGP data. Additionally, insulin bolus dose requirements also decreased.

### P254 | DKA with severe hypertriglyceridemia in a toddler boy: A rare presentation

F. Memon<sup>1</sup>, M. Arif<sup>1</sup>, M. Haider<sup>1</sup>, S. Kirmani<sup>1</sup>, K.N. Humayun<sup>1</sup>

<sup>1</sup>Aga Khan University, Pediatric and Child Health, Karachi, Pakistan

**Introduction:** Diabetic ketoacidosis (DKA) is an acute metabolic complication occurring in patients with diabetes, especially in patients with type 1 diabetes (T1D) it can be life threatening. Moderate hypertriglyceridemia is commonly observed in DKA, but severe hypertriglyceridemia is rare, based on our review of the literature there are few cases reported previously of confirmed pediatric DKA with severe hypertriglyceridemia.

**Objectives:** none.

**Methods:** NA.

**Results:** Here we are presenting a case of a previously healthy 3-year-3-month-old toddler boy first time presented with diabetic ketoacidosis (DKA), Found to have grossly lipemic serum due to extremely high triglyceride (TG) levels observed without evidence of systemic complication, and cutaneous manifestation (e.g., xanthoma or xanthelasma). DKA was treated according to ISPAD guidelines, insulin was titrated according to blood sugar levels, and patients had an uneventful recovery with rapid resolving hypertriglyceridemia. Triglyceride levels were reduced from 10,749 mg/dl to 1431 mg/dl within 5 days after conventional treatment was commenced without plasmapheresis or anti-lipid medication. The patient had an uneventful recovery with rapid resolving hypertriglyceridemia.

**Conclusions:** In younger children, Diabetic ketoacidosis leads to a high risk of mortality, although severe hypertriglyceridemia is rare, it can increase this risk further. We suggest that lipid levels should be monitored in children who are presenting with DKA or uncontrolled diabetes regardless of age. Clinicians should be cautious while managing similar types of cases because of the possibility of associated acute pancreatitis which was absent in our case.

### P255 | Safety and effectiveness of insulin degludec in children with type 1 DM: Single center experience

A. Singh<sup>1</sup>, S. Bhattacharyya<sup>1</sup>

<sup>1</sup>Manipal Hospital, Pediatric, Bengaluru, India

**Introduction:** Insulin Degludec is an ultra-long acting basal insulin approved for use in children above 1 year of age for Type 1 Diabetes. It has a flat peakless profile, which offers less intra-day and inter-day variability with once daily dosing and reduced risk of hypoglycemia.

**Objectives:** We aimed to evaluate the safety and efficacy of insulin Degludec as a part of basal-bolus regimen in type 1 Diabetic pediatric population at a single tertiary care center.

**Methods:** A total of 50 children with type 1 Diabetes Mellitus (20 boys and 30 girls) were observed over a period of 1 year after initiation of Degludec as basal insulin along with as part as bolus insulin. Baseline and post 1 year characteristics were analyzed including glycated hemoglobin (HbA1c), basal and total daily insulin requirements, and adverse events.

**Results:** Basal and bolus Insulin dose was titrated according to the SMBG profile of children. A significant fall in HbA1c level was seen from the baseline mean value of 10.4% to 7.7% (p < 0.05). The mean total daily dose (TDD) of insulin decreased from a 0.93 U/kg/day to



0.82 U/kg/day at the end of 1 year, but it was not significant ( $p = 0.66$ ). The mean daily dose of insulin Degludec had significantly increased from 11.2 U/day to 12.6 U/day ( $p = 0.034$ ); whereas the dose of insulin as part had reduced from 19 U/day to 18.5 U/day, but this difference was not statistically significant ( $p = 0.58$ ). There were no episodes of diabetic ketoacidosis reported. No adverse events related to Degludec occurred over 1 year but 12% of children had mild asymptomatic hypoglycaemia (RBS between 50–70 mg/dl) following a higher bolus dose.

**Conclusions:** In our study, it was observed that insulin Degludec was well tolerated by pediatric population. Degludec improves glycemic control and compliance with reduced risk of symptomatic hypoglycaemia and DKA.

#### P256 | Preparation and characterization of polymeric nanoparticles for sustained delivery of insulin

M. Bhargava<sup>1</sup>, S. Bhargava<sup>2</sup>

<sup>1</sup>Himalayan University, Pharmacy, Kanpur, India, <sup>2</sup>United Institute of Pharmacy, Pharmacy, Allahabad, India

**Introduction:** Insulin is mainstay of drug therapy for patients with insulin-dependent diabetes mellitus, which is a syndrome of disordered metabolism, & resulting in abnormally high blood sugar levels. Oral insulin delivery has been major research issue, due to several advantages over other routes. However, this route poses several constraints for delivery of peptides & proteins, which are to be worked upon.

**Objectives:** Small intestine has been able to transport L-forms of amino acids against a concentration gradient and they compete for mechanism concerned. So, L-valine was used as a ligand for carrier-mediated transport of insulin-loaded poly(lactide-co-glycolic acid)(PLGA) nanoparticles(NPs).

**Methods:** L-Valine-conjugated-PLGA nanoparticles were prepared using double emulsion solvent evaporation method. Conjugated NPs were characterized for their surface morphology for shape & size by electron microscopy, drug entrapment efficiency, zeta potential, polydispersity index, in-vitro & in-vivo insulin release.

**Results:** Ex-vivo studies on intestine revealed that conjugated NPs showed greater insulin uptake as compared to non-conjugated NPs. In-vivo studies were performed on diabetic rabbits in which, Oral suspension of insulin-loaded PLGA-NPs reduced blood glucose level within 4 h which further decreased after 8 h. Ligand-conjugated formulation on oral administration produced hypoglycaemic effect within 4 h of administration, and this effect prolonged till 12 h of oral administration. Simultaneously, insulin concentration in withdrawn samples was also assessed & found that profile of insulin level is in compliance with blood glucose reduction profile.

**Conclusions:** L-valine NPs showed higher insulin uptake, as compared to NPs due to its relative high affinity for oligopeptide transporters present at intestine, which aids in increased bioavailability & better therapeutic response for orally administered insulin. Thus, L-valine NPs have potential for oral insulin delivery in effective management of Type-1 diabetes condition.

#### P257 | The association of vitamin D deficiency with poor glycemic control in children and adolescents with type 1 and type 2 diabetes

B. Zabeen<sup>1</sup>, B. Ahmed<sup>1</sup>, J. Nahar<sup>1</sup>, K. Azad<sup>1</sup>

<sup>1</sup>BIRDEM 2, Pediatrics, Dhaka, Bangladesh

**Introduction:** Multiple studies have previously shown that vitamin D deficiency is highly prevalent in type 1 and type 2 diabetes. Vitamin D (25OHD) effects on glycemic control are unclear in children and adolescents with type 1 diabetes.

**Objectives:** The study aimed to assess the vitamin D status and its relationship with the disease characteristics and glycemic status in children and adolescents with T1D and T2D.

**Methods:** A retrospective medical record review of children with T1DM and T2DM in Pediatric Diabetes Center in BIRDEM 2 hospital (Bangladesh Institute of Research and Rehabilitation of Diabetes Endocrine and Metabolic Disorders), was done over a 12-months period. The demographic and clinical data were collected through medical records with a structured questionnaire.

**Results:** Among 103 study participants, most had inadequate levels of vitamin D; deficiency 76 (73.8%), and sufficiency 27 (26.2%). The prevalence of vitamin D deficiency (VDD) was high in both types of diabetes; 55.3% were T1 D and 44.7% were T2 D. Majority female participants had vitamin D deficiency (VDD) compared to male participants. ( $p = 0.020$ ). Most of the participants were from higher socioeconomic status ( $p 0.013$ ). Median BMI was significantly higher in Vitamin D deficiency compared to the sufficient group ( $p 0.011$ ). While comparing VDD with glycaemic control, 60% of VDD patients had poor glycemic control; HbA1c > 9% compared to vitamin D sufficiency ( $p.017$ ). On logistic regression. Univariate analysis revealed positive association between vitamin D deficiency and poor glycemic control along with age at diagnosis, median BMI and median LDL which remained significant in multivariate analysis ( $p-0.003$ ).

**Conclusions:** The present study revealed that the prevalence of vitamin D deficiency and among T1 and T2 diabetes children was very high. Future studies in large sample are required to assess hypovitaminosis D in youth with T1D and T2D and also the possible relating factors of vitamin D deficiency.

#### POSTER TOUR 28—DIABETES IN DEVELOPING COUNTRIES & ACCESS TO CARE # 1

#### P258 | Initial home-based education and care for newly diagnosed T1DM children and adolescent: A health technology assessment

A. Alotaibi<sup>1</sup>, R. Al Khalifah<sup>2</sup>, H. Alfaradi<sup>3</sup>

<sup>1</sup>Princess Nourah bint Abdulrahman University, Pediatric, Riyadh, Saudi Arabia, <sup>2</sup>King Saud University, Pediatric, Riyadh, Saudi Arabia, <sup>3</sup>King Saud bin Abdulaziz University for Health Science, Pediatric, Riyadh, Saudi Arabia

**Introduction:** The initial education and care of newly diagnosed type 1 diabetes mellites (T1DM) patients is critically important as it set them on the right direction for managing chronic disease that need intensive education and treatment.

**Objectives:** We aimed to evaluate effectiveness, safety, and cost-effectiveness of home-based education compared to hospital-based education for newly diagnosed children with T1DM.

**Methods:** We performed health technology assessment based on systematic review and meta-analysis of RCT. We searched Ovid/MEDLINE, Ovid/Embase, Cochrane Library, and other databases from 1995 to October 2021. We evaluated in duplicate and the title, abstract and full text of relevant studies. The intervention was a home-based education and care (HBC) that is characterized by discharge on the same day of diagnosis followed by a serial of educational outpatient sessions. The comparison is a hospital-based education and care (HOBC) that is characterized by admission to hospital after diagnosis of T1DM and include serial of in-patient educational sessions.

**Results:** We included four RCT with a total of 376 children. All the studies used hybrid intervention except one study in which the intervention was purely HBC. The control group in all the studies used HOBC. The overall risk of bias across studies is low. There was no significantly reported difference in DKA, sever hypoglycemia, pediatric quality of life and family impact at 6 and 12 months in both groups. HbA1c was lower at 12 months in the HBC, MD of 0.2%, CI (0.06,0.34). Economic evaluation include two trials with a sample size of 263 participants. Both studies showed statistically significant lower cost favoring HBC with MD of (−2217£) and (−1574 €). The incremental cost-effectiveness ratio for each mmol/mol reduction in HgA1c was 7434 £ / each mmol/mol reduction in HbA1c).

**Conclusions:** Home based care is effective, safe, and cost-effective strategy for providing the initial diabetes care and education from a healthcare sector perspective.

**P259 | Barriers in insulin pump uptake among Hispanics and Black patients with type 1 diabetes: T1D exchange multicenter mixed-method study**

M.L. Scott<sup>1</sup>, G. Nelson<sup>2</sup>, K. Cossen<sup>3</sup>, O. Odugbesan<sup>4</sup>, A. Mungmode<sup>4</sup>, O. Ebekozien<sup>4</sup>, H. Hardison<sup>4</sup>, D. Buckingham<sup>5</sup>, M. Kamboj<sup>5</sup>, T1D Exchange QI Collaborative  
<sup>1</sup>UAB, Pediatric Endocrinology, Birmingham, United States, <sup>2</sup>University of Tennessee, Le Bonheur Children's Hospital, Pediatric Endocrinology, Memphis, United States, <sup>3</sup>Children's Healthcare of Atlanta, Pediatric Endocrinology, Atlanta, United States, <sup>4</sup>T1D Exchange, Boston, United States, <sup>5</sup>Nationwide Children's Hospital at The Ohio State University, Columbus, United States

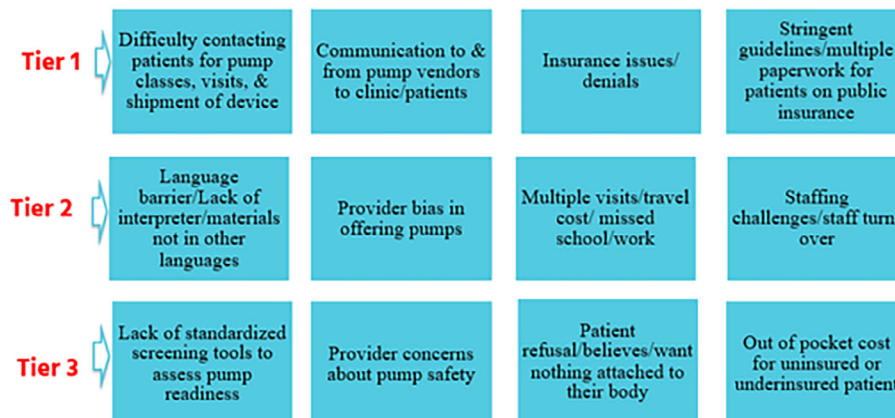
**Introduction:** This work is done on behalf of the T1D Exchange QI Collaborative.

**Objectives:** Multiple studies have shown HbA1c and insulin pump use are significantly different in patients with type 1 diabetes (T1D), between racial and ethnic groups, with lower A1c and higher insulin pump use noted in non-Hispanic whites compared to Non-Hispanic Black patients (NHB) and Hispanics. We aimed to identify the barriers to the uptake of insulin pumps among NHB and Hispanics with type 1 diabetes.

**Methods:** The T1D Exchange Quality Improvement Collaborative (T1DX-QI) identified six endocrinology centers to pilot an equity-focused Quality Improvement mixed-method study to address disparities in insulin pump use among NHB and Hispanic patients. Participating sites used process maps and the Ishikawa diagram to identify pain points and barriers in the processes. Barriers were categorized into tiers based on the frequency of occurrence among participating centers.

**Results:** All participating centers (100%) reported tier 1 barriers as contributors to inequities. A majority of participating centers

**Barriers/Inequities Contributors in Pump Uptake**



identified tier 2 barriers (80%) and 40% of participating centers reported tier 3 barriers as contributors to inequities seen. (see Figure 1).

**Conclusions:** Identifying and addressing barriers to insulin pump uptake and use is fundamental to increasing use of insulin pumps and implementing meaningful changes in the process to improve equity. These concepts can be extended to use of technology in patients with T1D in general and adoption of these technologies and advanced automated closed loop systems may result in improvement in diabetes care.

#### P260 | Food insecurity in pediatric type 1 and type 2 diabetes: The role for empathy and compassion

M. Desjardins<sup>1</sup>, Z. Boullil<sup>2</sup>, J. Parker<sup>2</sup>, C. Demeterco-Berggren<sup>1,2,3</sup>

<sup>1</sup>University of California, San Diego School of Medicine, La Jolla, United States, <sup>2</sup>Rady Children's Hospital, San Diego, United States, <sup>3</sup>UCSD Department of Pediatrics, Division of Pediatric Endocrinology, San Diego, United States

**Introduction:** Diet plays a critical role in type 1 (T1D) and type 2 diabetes (T2D) management. Healthcare providers and patients have reported discomfort discussing food insecurity due to the associated stigma.

**Objectives:** Here we aimed to evaluate the association between food insecurity status and glycemic management in pediatric diabetes. Furthermore, we aimed to evaluate compassion as a tool to improve the experience and perspective of patients regarding food insecurity screening.

**Methods:** This is a retrospective review of youth with T1D or T2D (age < 18 years) screened for food insecurity at RCHSD from July 2020 to June 2021 including data on sociodemographic variables and diabetes outcomes. Caregivers were surveyed on perspectives about food insecurity screening pre and post a 30 min compassion training session provided to medical assistants who administer the screening.

**Results:** Of 806 patients, 13% (80 with T1D and 23 with T2D) were positive for food insecurity. Among those, 83% were from minority racial/ethnic groups. Mean A1c ( $\pm$ SD) for the food insecure group was 9% ( $\pm$ 3) and 8% ( $\pm$ 2) for the food secure one. Logistic regression showed an association of positive food insecurity status with having public insurance (OR 1.4), speaking a language other than English (OR 1.2) and belonging to the Hispanic (OR 2.7) or the non-Hispanic Black race/ethnicity groups (OR 1.8). Caregivers (n = 50) reported feeling judged (9.6%), uncomfortable or very uncomfortable (7.9%) with the screening during the pre-intervention period. After intervention, 57 caregivers were surveyed with 3.5% feeling judged and 7.1% feeling uncomfortable or very uncomfortable with the screening.

**Conclusions:** This study highlights the impact of food insecurity in achieving equitable optimal glycemic management in youth with diabetes. Empathy and compassion interventions may have the potential to facilitate caregivers' screening experience and help identify families who can receive appropriate resources.

#### P261 | Injections site infections in a cohort of diabetic children and young adults in northern Haiti

M.-M. Exavier<sup>1</sup>, W. Joseph<sup>1</sup>, M. Canarie<sup>2</sup>, N. Dunbar<sup>3</sup>

<sup>1</sup>Hopital Sacre-Coeur, North, Cap-Haitien, Haiti, <sup>2</sup>Yale University School of Medicine, Pediatrics, New Haven, United States, <sup>3</sup>Connecticut Children's Hospital, Pediatrics, Hartford, United States

**Introduction:** None.

**Objectives:** There are many challenges to treating Type 1 Diabetes in resource limited settings beyond the provision of insulin. We sought to identify the frequency of injection site infections, describe these cases and possible consequences in children and young adults with Type 1 Diabetes in northern Haiti.

**Methods:** Chart review of children and young adults enrolled in the pediatric diabetes program at Hôpital Sacré Coeur in Milot, Haiti from 2019–2021. Data on age, gender, HbA1C, number and site of infection, and treatment required were noted.

**Results:** Charts of 86 children and young adults were reviewed. Twelve cases of wound infection in 10 (12%) patients were identified. There were 8 females and median age was 18 (IQR 16–19) years, with a mean duration of diabetes of 3 years. Mean HbA1c was 14.4% (SD 1.25) at the time of infection compared to 12.7% in the group. The most frequent location was the anterior thigh (6; 50%). All infections were treated with antibiotics, half of the patients were hospitalized (2 with concomitant DKA), and 25% of wounds were debrided. Factors thought to be associated with infections were aseptic practices, reuse of insulin syringes, lack of site rotation and poor access to small bore needles.

**Conclusions:** Injection site infection is common in children and young adults with type 1 Diabetes in northern Haiti. Further study is needed to establish clear risk factors, but improved glycemic control, increased emphasis on asepsis, site rotation, and access to small bore needles may decrease these infections.

#### P262 | An accidental pregnancy in type 1 diabetes mellitus

R. Gokalani<sup>1</sup>, H. Patel<sup>1</sup>, D. Panchal<sup>2</sup>, D. Chudasama<sup>3</sup>

<sup>1</sup>AHC Diabetes Clinic, Ahmedabad, India, <sup>2</sup>Diacare Diabetes and Hormone Clinic-Sabarmati, Ahmedabad, India, <sup>3</sup>Hope Diabetes Clinic, Junagadh, India

**Introduction:** Pregnancy with diabetes is one of the important topics as it deals with two lives, so pre-conceptional counseling becomes essential. But accidental pregnancy is common condition where patient with pre-existing diabetes carries a huge risk of fetal and maternal complications. Optimal blood glucose control in type-1 diabetes itself is a challenge due to high variability, and accidental pregnancy in type-1 diabetes becomes a greater challenge.

**Objectives:** To study a case of accidental pregnancy in type-1 diabetes.

Info	EMR		Lab		Records		3AM
	Breakfast		Lunch		Dinner		
	Pre	Post	Pre	Post	Pre	Post	
13 May	69						
12 May	89		125	139			
11 May	112		98		100		
09 May	71						
08 May	137						
05 May	117		100		95		
04 May	117		125				
03 May	145						
02 May	136						
28 Apr	132						
27 Apr	138	140	125	130			
26 Apr	113		95		147		
25 Apr	74	130		115		107	
23 Apr	94				168		

ALL VITALS SEEN

**Methods:** A case of 29 years old lady with type-1 diabetes for last 16 years and hypothyroidism had an accidental pregnancy with gestational age of 2 weeks with Hb1C of 8.7%. When she consulted at our tertiary care center, she was on premixed insulin of Aspart- 30/70 and thyroxine 75 mcg. She was irregular with SMBG (self-monitoring of blood glucose) 2–3 times in week. She had erratic meal pattern and inconsistent exercise.

She was advised to terminate the pregnancy due to uncontrolled diabetes on first visit to the obstetrician. But she wanted to continue with the pregnancy. So obstetrician immediately advised to visit diabetologist.

She was shifted to basal-bolus treatment. She was advised to follow structured 6 point SMBG. She was taught carbohydrate counting and insulin correction factor according to insulin sensitivity. She was also asked to follow the regular exercise regimen permitted by obstetrician. She was provided one application in her mobile phone to upload SMBG data. She was also explained hypoglycemia prevention and treatment. She was asked to use continuous glucose monitoring

intermittently. Her 1st anomaly scan at 12 weeks was done at 12 weeks which was absolutely normal. Her subsequent visits were planned every 45 days. She maintained her blood glucose with good SMBG, intermittent CGM and HbA1C.

**Conclusions:** Pregnancy and type1 diabetes needs the ultra-disciplinary care to have good outcome.

**P263 | Incidence and prevalence of type 1 diabetes in children and young adults in Burkina Faso**

Y. Sagna<sup>1,2</sup>, W.P.A.H. Bagbila<sup>1,2</sup>, L. Zoungrana<sup>3,4</sup>, M.E. Saloukou<sup>5</sup>, S. Traoré<sup>6</sup>, N. Sawadogo<sup>7</sup>, C.G. Kyelem<sup>1,2</sup>, O. Guira<sup>3,4</sup>, M.S. Ouedraogo<sup>1,2</sup>, J.Y. Drabo<sup>3,4</sup>

<sup>1</sup>Université Nazi Boni, INSSA, Bobo-Dioulasso, Burkina Faso, <sup>2</sup>CHU Sourô Sanou, Médecine Interne, Bobo-Dioulasso, Burkina Faso, <sup>3</sup>Université Joseph KI-ZERBO, UFR/SDS, Ouagadougou, Burkina Faso, <sup>4</sup>CHU Yalgado Ouedraogo, Médecine Interne, Ouagadougou, Burkina Faso, <sup>5</sup>CHR de Koudougou, Médecine, Koudougou, Burkina Faso, <sup>6</sup>CHR de Ziniaré, Médecine, Ziniaré, Burkina Faso, <sup>7</sup>Université de Ouahigouya, Faculté de Médecine, Ouahigouya, Burkina Faso

**Introduction:** There are no data on type 1 diabetes (T1D) incidence and prevalence in Burkina Faso. The Life For A Child (LFAC) program is the main provider of diabetes care for the vast majority of youth with diabetes in Burkina Faso.

**Objectives:** We aimed to determine T1D incidence and prevalence in persons aged <25 years since the implementation of the LFAC program.

**Methods:** This study presents data on children and young people <25 years who prospectively received care from the Burkina Faso LFAC program between 2013 and 2021. Data were collected from the prospective program register. Diagnosis of T1D was clinical, based on presentation, abrupt onset of symptomatic hyperglycemia, need for insulin replacement therapy from diagnosis, and no suggestion of other diabetes types.

**Results:** Total of 265 cases were diagnosed with T1D <25 years in 2013–2021. Male-to-female ratio was 0.99. T1D incidence <25 years per 100,000 population/year increased from 0.06 in 2013 to 0.35 in 2021. Incidence <15 years rose from 0.02 to 0.15 per 100,000/year in 2013 and 2021, respectively. Prevalence <25 years was 0.14/100,000 in 2013 and 1.36/100,000 by 2021 (p < 0.001). Prevalence <15 years was 0.19/100,000 in 2013 and 0.33/100,000 by 2021 (p < 0.001).

**Result:**

	1st visit (previous treatment)	2nd visit(after treatment initiation)	3rd visit(90	at 26 weeks	before delivery
HbA1C	8.7%	6.9%	6.4%	6.1%	6.3%
TSH	3.9mIU/L	—	1.9mIU/L	2.1mIU/L	2.6mIU/L
insulin units/ kg body weight	0.8 units/kgBW	0.95 units/kgBW	0.98 units/kgBW	1.1 units/kgBW	1.2 uints kg/BW



**Conclusions:** Our report of known T1D cases shows lower incidence and prevalence rates in Burkina Faso. Known incidence and prevalence of T1D in Burkina Faso increased rapidly from 2013 to 2021, contemporaneous with the introduction and development of the LFAC. However, true incidence and prevalence may be underestimated with some missed cases due to death before diagnosis.

#### P264 | Bridging gaps for pediatric diabetics community: NGO initiatives in developing countries

S Pramod<sup>1</sup>, B Patil<sup>1</sup>

<sup>1</sup>HAOI, Community Medicine, Dhule, India

**Introduction:** Diabetes in children's brings mental-trauma/depression in family. Focused treatment for pediatric age-group is unavailable in developing-countries. 26% of diagnosed diabetics are children's. Adequately trained physicians/Nurses in issues of pediatric-diabetes needed to treat depression and smooth transition from diagnosis to treatment. Qualitative collaborative needed to make diabetic child's life bearable. Our NGO-project highlights these issues.

Retrospective analysis of past studies shows—counseling improves QOL & attitude toward diabetes-treatment.

**Objectives:** To describe care issues in diabetic-children's. Observe/modify nature of relationship between nurse and child. To evolve comprehensive Rx for patients and families.

**Methods:** A retrospective analysis of data base from 7 rural health-clinics. Specialized therapy/support to pediatric-age-group not available at any center. Total 117 children's [4–13 years] diagnosed with diabetes. 23 had additional endocrine/metabolic problems. Nursing/medical care plan analyzed. No specialized trained personal in rural/tribal India. Opinion/needs from patients families collected on feedback questionnaire. Trained 10 nurses & 2 physicians in pediatric cases [4 weeks training].

**Results:** Out of 117, 41 discontinued Rx due to improper counseling/guidance. 3 died. Patient/family's feedback highlights: Better access to newer drugs-delivery-systems, psychosocial support, follow-up-plan. Nurses/physician be sensitized in pediatric care-issues. Main issues of concern were:

- [1] illness and coping with their feelings.
- [2] Initial impact of diagnosis and a search for solution? Expectations for future life & its quality?
- [3] Concerns of cost of RX.
- [4] Availability of proper follow-up centers in rural areas of developing nations.

**Conclusions:** Multifaceted Relationship between nurse and Diabetic-child is crucial. We show concerns/difficulties while working in Asian set-up to international experts/seniors at ISPAD-2022-congress.

#### P265 | Adolescent diabetes management: Role of NGO's in resource poor settings

S Pramod<sup>1</sup>, B Patil<sup>1</sup>

<sup>1</sup>HAOI, Community Medicine, Dhule, India

**Introduction:** Adolescent diabetes has social stigma in rural India. Such diabetics needs proper guidance/information/treatment-counseling outlets.

**Objectives:** This is burning issue in developing-nations. We all need to unite & form comprehensive diabetes care & counseling policy plan at ISPAD 2022. Treatment options must be suitable for developing-nations considering cost of Rx. Incorporating NGO's in such efforts is very effective.

**Methods:** Our 15 year-old-NGO started Diabetes education-project in rural India from 2005. We started s education & surveillance project to analyze social & anthropological issues facing those affected by adolescent diabetes. Total 62adolescents subjects enrolled by Feedback questionnaires to get their feedback on special needs, perceptions, social attitude on diagnosis of diabetes. Factors like community-inhibition, social-ostracism, economic-difficulties, marital discord, non-availability of treatment-guidance centers, lack of trained-staff analyzed & draft policy is recommended to Govt-agencies.

**Results:** Adolescent diabetes management must include care of nursing & psycho-social needs. Here role of NGO's in diabetes education is very effective in terms of cost-management, better impact & better-compliance of young diabetics. Community mass intervention projects has proven useful in rural communities of resource poor-nations. ISPAD participants can collaborate with NGO-activists to address this issue. Uniform public health policy needed to implement & expand newer strategies to include broader range of diabetes care-issues.

**Conclusions:** Promoting dialog between Government-health-services & NGO's accelerates diabetes education/awareness programs. NGO participation improves cost-efficacy of such initiatives in economically poor populations. This would reduce difficulties faced by young diabetics. WHO, ISPAD must form common guideline manual on this issue affecting developing-countries. We graphically present our NGO's project on diabetes education plan in four phases to participants.

#### P266 | Implementation of a diabetes management program to improve outcomes for young people with type 1 diabetes in Kashmir, India

C.M Lawrence<sup>1,2</sup>, S.R. Masoodi<sup>3</sup>, G.D Ogle<sup>4,5</sup>, B.R King<sup>1,2</sup>, K.A Vora<sup>1,2</sup>, C. Smart<sup>1,2</sup>, M. Paterson<sup>1</sup>, P.O. Ahmad<sup>3</sup>

<sup>1</sup>John Hunter Children's Hospital, Pediatric Endocrinology and Diabetes, New Lambton Heights, Australia, <sup>2</sup>University of Newcastle, Callaghan, Australia, <sup>3</sup>Sher-I-Kashmir Institute of Medical Sciences, Soura, Srinagar, India, <sup>4</sup>Life for a Child Program, Diabetes NSW and ACT, Glebe,

Australia,<sup>5</sup>University of Sydney, Medical Research Council Clinical Trials Center, Sydney, Australia

**Introduction:** The John Hunter Children's Hospital (JHCH) in Australia have developed a diabetes management program (Success With Intensive Insulin Management [SWIIM]). JHCH has achieved an average HbA1c of 7.0% with a population of over 400 young people. This program has been implemented at other regional centers in Australia where the average HbA1c has improved to 6.8%.

The Sher-I-Kashmir Institute of Medical Sciences (SKIMS) in Srenagar, India services 400 children with type 1 diabetes. The average HbA1c is 10.5% and the average life expectancy is 29 years. Access to blood glucose monitoring and diabetes education is limited.

**Objectives:** To demonstrate improvement in diabetes related outcomes through implementing a diabetes management program to a resource-limited population.

**Methods:** Medical, dietetic and patient education resources were developed as part of the SWIIM program and delivered to clinicians at SKIMS. Direct mentoring of SKIMS clinicians will be provided over the study period. Glucose monitors and strips were provided by the Life For A Child Foundation. Young people aged 0-18 years with type 1 diabetes attending SKIMS were recruited and baseline data was collected.

**Results:** 71 participants have been recruited to date (27 male, 44 female; 66 T1DM, 5 T2DM). At baseline, The average HbA1c was 9.9%; 13 participants (18%) had a HbA1c of 7.0% or less. Average number of blood glucose measurements per week was 8 (range 0-35). 1 patient had hypertension, 2 patients had cataracts, 1 patient had peripheral neuropathy. In the previous 12 months there have been 26 episodes of severe hypoglycemia (36.6%), 3 episodes of DKA (4.2%), and 21 diabetes related hospital admissions (29.6%).

**Conclusions:** We present a research plan for the implementation of a diabetes management program to improve type 1 diabetes related outcomes in a resource-limited population. Baseline data indicates most patients do not meet international targets for HbA1c and significant burden of diabetes related complications.

#### P267 | Outcomes of health care services provided to Egyptian patients with type 1 diabetes mellitus: A single center experience

S. Elhabashy<sup>1</sup>, N. Elbarbary<sup>1</sup>, A. Abdel-Hamid Hassan<sup>1</sup>, R. Thabet<sup>1</sup>

<sup>1</sup>Ain Shams University, Faculty of Medicine, Department of Pediatrics, Diabetes Unit, Cairo, Egypt

**Introduction:** Despite the existence of evidence-based guidelines for the care of children with diabetes, widespread gaps in knowledge, attitude, and practice remain.

**Objectives:** To evaluate the current health care services provided to patients with type 1 diabetes (T1D) registered in Pediatric and Adolescent Diabetology Unit (PADU) in terms of metabolic control and complications encountered.

**Methods:** From a developing country like Egypt, our center provided a description of the population of children with diabetes we serve according to benchmarking and data validation report that has been received from the international SWEET registry.

**Results:** Our center had contributed data for 672 patients (58.8% female). The mean age is  $12.63 \pm 3.41$  years, mean BMI is  $20.11 \pm 4.03$  (kg/m<sup>2</sup>) with a median diabetes duration of  $5.54 \pm 3.07$  years. Mean HbA1c of all patients was  $8.75 \pm 1.94\%$ , with 86.9% of patients having HbA1c >7%. The mean number of blood glucose monitoring is  $2.43 \pm 0.64$  times/day and mean insulin dose is  $1.17 \pm 0.27$  u/kg/day. In our population 30.5% of patients presented with DKA, 16.7% had severe hypoglycemia in the last year prior to enrollment.

Regarding microvascular complications 6.7% had nephropathy, 4.9% had peripheral neuropathy, no retinopathy and 10.85% had hyperlipidemia. Patients with more than 5-year-diabetes duration have significantly higher cholesterol level ( $167.58 \pm 38.02$  vs.  $163.23 \pm 35.54$  mg/dl), higher LDL ( $100.23 \pm 29.49$  vs.  $95.70 \pm 28.11$  mg/dl), and lower number of SMBG ( $2.24 \pm 0.66$  vs.  $2.58 \pm 0.57$  times/day,  $p < 0.05$  for all).

**Conclusions:** The results of our center are a testimony of the reality of managing diabetes by dynamic teams striving to achieve recommended standards of care for pediatric diabetes in an environment with limited resources. Dissemination of results and prospective projects serve as further motivation to improve outcome and more uniform care for patients with diabetes.

#### POSTER TOUR 29—GENERAL DIABETES CARE

##### P268 | The effect of quality of care on Hba1c

M. Saiyed<sup>1</sup>, B. Saboo<sup>1</sup>, M. Pancholi<sup>1</sup>, S. Shah<sup>1</sup>

<sup>1</sup>Diacare-Diabetes Care and Hormone Clinic, Ahmedabad, India

**Introduction:** Quality of care is the care received by an individual from his family and that depends on their socioeconomic condition. As type 1 diabetes is a condition that demands constant care and support from the families.

**Objectives:** To evaluate the quality of care on average glucose value.

**Methods:** Patients were divided into three strata based on their annual income. The lower income group, middle income, and the higher income group. Inclusion: all patients visiting the clinic between Jan 2022 to March 2022. Exclusion: patients unwillingness.

Mostly the lower and middle-income groups receive the benefits of diabetes essentials from our center. They are on NPN with regular insulin and use a glucose-monitoring device. The higher income group takes the benefits of basal-bolus therapy, use of AGP, and glucose meter.

A structured questionnaire was prepared to achieve the objective. It had questions on Socio economic status and diabetes care.

**Conclusions:** The poor quality of care is directly proportionate to the average glucose level.

The poor quality of care is not always linked with the income of the family.

## Result:

	No of subjects	Average HbA1c
Lower-income group	38	10.4%
Middle-income group	34	8.6%
Higher-income group	35	9.8%

### P269 | Longitudinal qualitative study of the experiences and effects of living in a Danish residential care facility for young people with diabetes

L.B. Johansen<sup>1</sup>, D. Grabowski<sup>1</sup>

<sup>1</sup>Steno Diabetes Center Copenhagen, Herlev, Denmark

**Introduction:** In Denmark, there is only one residential care home for children and young people with diabetes who, for various reasons, cannot stay at home and are unable to function and manage their diabetes on their own.

**Objectives:** The purpose of the study was to explore social identity variations over time and to conduct a sociological study of experiences and perceptions of everyday life in the context of a residential care facility for young people with diabetes.

**Methods:** The data consists of two sets of semi-structured interviews with residents (aged 15–21 years). We conducted nine interviews with residents in 2019 and 10 interviews 18 months later in 2021 (six repeats). The interview guide was focused on the individual experiences of living at the residential diabetes care facility as well as on the personal narratives. All interviews were transcribed verbatim and analyzed using the Pattern Oriented Analysis Approach (POLA) to identify groups of changes.

**Results:** The analysis produced three main themes:

- (1) Becoming more confident over time: The residents reported a high level of personal growth and maturity after moving to the residential care home,
- (2) Feeling different among peers: The residents reported a family-like community with diabetes as the common denominator - which enables new identity formations and,
- (3) Tacit knowledge of diabetes management and technology: The residents gained bodily knowledge of diabetes as it is not mentioned explicitly that often. The combined findings show that the residential care home is a potential way to normalcy, which enables new behaviors and new identities to be formed.

**Conclusions:** The results of our study are important steps toward understanding psychosocial challenges for diabetes management among children and young people without the traditional support from close relations. Furthermore, the results are also applicable to general clinical diabetes care of vulnerable or poorly regulated low-resource children and young people with diabetes.

### P270 | A multinational study of numeracy skills in children with diabetes and their caregivers—An observational cross-sectional multi-center international case–control preliminary study of Hvidoere Study Group on Childhood Diabetes

P. Jarosz-Chobot<sup>1</sup>, C. de Beaufort<sup>2</sup>, T. Barrett<sup>3</sup>, M. Becker<sup>4</sup>, E. Bismuth<sup>5</sup>, F. Cameron<sup>6</sup>, L. Castaño<sup>7</sup>, C. Castro-Correia<sup>8</sup>, L. Fisher<sup>9</sup>, Z. Goslawska<sup>10</sup>, I. Kosteria<sup>11</sup>, M. Palmert<sup>12</sup>, J. Polanska<sup>13</sup>, M. Pulkkinen<sup>14</sup>, K. Raile<sup>15</sup>, E. Roche<sup>16</sup>, S. Särnblad<sup>17</sup>, S. Shlalitin<sup>18</sup>, T. Skinner<sup>19</sup>, J. Svensson<sup>20</sup>, S. Tenoutasse<sup>21</sup>, Hvidoere Study Group  
<sup>1</sup>Medical University of Silesia, Children's Diabetology, Katowice, Poland, <sup>2</sup>Faculty of Science, Technology and Medicine, Université de Luxembourg, DECCP, Clinique Pédiatrique, Luxembourg, Luxembourg, <sup>3</sup>University of Birmingham, Birmingham, United Kingdom, <sup>4</sup>Center Hospitalier de Luxembourg, Luxembourg, Luxembourg, <sup>5</sup>Hôpital Robert-Debré, Paris, France, <sup>6</sup>The Royal Children's Hospital, Victoria, Australia, <sup>7</sup>Cruces University Hospital, Bilbao, Spain, <sup>8</sup>University Hospital Center of São João, Porto, Portugal, <sup>9</sup>University of Southern California, Los Angeles, United States, <sup>10</sup>Central Teaching Hospital of the Medical University of Lodz, Lodz, Poland, <sup>11</sup>National and Kapodistrian University of Athens, Athens, Greece, <sup>12</sup>University of Toronto, Toronto, Canada, <sup>13</sup>Silesian University of Technology, Gliwice, Poland, <sup>14</sup>University of Helsinki, Helsinki, Finland, <sup>15</sup>Charité – Universitätsmedizin Berlin, Berlin, Germany, <sup>16</sup>University of Dublin, Dublin, Ireland, <sup>17</sup>Örebro University, Örebro, Sweden, <sup>18</sup>Schneider Children's Medical Center of Israel, Petah Tikva, Israel, <sup>19</sup>University of Copenhagen, Copenhagen, Denmark, <sup>20</sup>Steno Diabetes Center Copenhagen, Herlev, Denmark, <sup>21</sup>Hôpital Universitaire des Enfants Reine Fabiola, Brussels, Belgium

**Introduction:** Numeracy skills of children and their caregivers can be a modifiable important factor in diabetes care.

**Objectives:** To analyze associations between glycemic control and numeracy skills.

**Methods:** 328 children [53% boys, aged 12–18 (14.8 ± 2.0) years, with T1D for 6.4 ± 3.8 years, treated with MDI (43%, CSII (57%)] with their caregivers from 7 outpatient diabetes centers performed during a routine visit: Mathematical tasks – wordless, Diabetes Numeracy DNT5 and Psychological well-being WHO-5 tests, Diabetes Family Responsibility questionnaire. At the same time, a sample for HbA1c (central laboratory) was taken.

**Results:** Mean HbA1c was 61.8 ± 14.3 mmol/mol. There was a negative correlation between HbA1c and numeracy skills as assessed by the wordless test ( $r = -0.18$ ,  $p = 0.002$ ) and modest association of HbA1c with the results of caregivers' DNT5 test ( $r = -0.15$ ,  $p = 0.051$ ).

CSII children achieved significantly better results in the wordless test than those in the MDI group (81 ± 17 vs 76 ± 20%,  $p = 0.037$ ), having slightly lower HbA1c (60.4 ± 13.0 vs 63.6 ± 15.2,  $p = 0.063$ ). The wordless test was associated with HbA1c in the MDI ( $r = -0.19$ ,  $p = 0.033$ ) but not in the CSII group ( $r = -0.12$ ,  $p = 0.132$ ).

Wordless test correlated with the children's and caregivers' DNT5 scores ( $r = 0.29$ ,  $p < 0.001$ ,  $r = -0.35$ ,  $p < 0.001$ , respectively).

Children's DNT5 results were associated with children's WHO-5 well-being test ( $r = 0.17$ ,  $p = 0.007$ ) but not with caregivers' test results ( $r = 0.05$ ,  $p = 0.594$ ).

Center differences were strongest as to HbA1c ( $p < 0.000001$ ), children's DNT5 ( $p < 0.000001$ ), as well as children's WHO-5 test ( $p < 0.00005$ ), and weaker but still significant, as to the mathematical tasks - wordless test ( $p = 0.0061$ ).

Children's responsibility/co-responsibility was significantly related to higher results in wordless and DNT5 test ( $p = 0.003$ ,  $p = 0.036$  respectively).

**Conclusions:** Numeracy skills in children with T1D seem to be an essential factor in successful glycemic control and the well-being of children and their caregivers.

#### P271 | Quality of type 1 diabetes care in pediatric cohort treated at Farwaniya Outpatient Clinic

F. Al-Juaila<sup>1</sup>, D. Alhomaidah<sup>1,2</sup>, A. Al-Tarawah<sup>2</sup>, D. Mohammed<sup>2</sup>, A. Mohsen<sup>2</sup>, F. Othman<sup>1</sup>, D. Dalia Al-Abdulrazzaq<sup>1,3</sup>, H. Al-Kandari<sup>1,2</sup>  
<sup>1</sup>Dasman Diabetes Institute, Population Health, Kuwait City, Kuwait, <sup>2</sup>Farwaniya Hospital, Department of Pediatrics, Farwaniya, Kuwait, <sup>3</sup>Kuwait University, Department of Pediatrics, Faculty of Medicine, Jabriya, Kuwait

**Introduction:** The prevalence of Type 1 diabetes (T1D) is growing as a major healthcare problem in Kuwait. Primary health care centers contribute crucially to diabetes care. Consequently, optimal care is critical for the management and prevention of risk factors and complications of T1D.

**Objectives:** To evaluate the quality of diabetes care in T1D patients treated at Outpatient Clinic compared to ISPAD guidelines published in 2018.

**Methods:** Patients (aged  $\leq 16$ ) diagnosed with T1D and followed up in the Outpatient Clinic at Farwaniya regional hospital with at least one visit in 2021 were included. A retrospective medical chart review was performed to obtain glycemic control, lipid profile, autoantibody screening, and treatment regimen. Clinical data were evaluated as per clinical goals set by ISPAD guidelines. Statistical analysis was performed.

**Results:** A total of 164 patients were enrolled (median age 9.76 years IQR 7.03–12.1, diabetes duration 2.4 years IQR 0.0–4.68). In 2021, testing rates for HbA1c levels and annual thyroid functions were very high (93.9% and 92.1%, respectively). From the cohort, 35.4% measured their blood pressure and more than half of patients evaluated their LDL-C levels (62.8%) and screened for celiac disease (62.8%). Around two-thirds of children diagnosed with T1D for  $>2$  years performed urinary microalbumin tests (71.4%). Very few subjects (1.9%) met the recommended HbA1c target ( $<7.0\%$ ) compared to 35% met LDL-C target ( $<2.6$  mmol/L). Moreover, 16.5% of children had LDL-C

levels  $>3.4$  mmol/L and only 5.9% were receiving lipid-lowering therapy. At the most recent clinical visit, 1.2% of patients were on Angiotensin-converting enzyme (ACE) inhibitors and 6.7% were prescribed Levothyroxine treatment.

**Conclusions:** Overall, outpatient T1D care in Farwaniya hospital provides high-quality services in terms of testing rates. However, achieving the recommended targets safely is a major challenge for the pediatric population. Further and closer investigations on a larger population are essential to reflect the quality of diabetes care provided for children with T1D.

#### P273 | Role of glucose variability on linear growth in children with type 1 diabetes

V. Castorani<sup>1</sup>, L. Matonti<sup>1</sup>, A. Blasetti<sup>1</sup>, N. Polidori<sup>1</sup>, F. Chiarelli<sup>1</sup>, C. Giannini<sup>1</sup>

<sup>1</sup>University of Chieti, Department of Pediatrics, Chieti, Italy

**Introduction:** Linear growth is impaired in children with type 1 diabetes (T1D) and poor metabolic control. A good metabolic control is a key therapeutic goal to prevent vascular complications but also for ensuring an appropriate anthropometric development during childhood.

**Objectives:** In this study, we aimed to identify and characterize the effects of glycemic variability on linear growth in children with T1D.

**Methods:** Data from 144 prepubertal children with T1D were evaluated. Anthropometric measurements (weight, weight-SDS, height, height-SDS, BMI, BMI-SDS) were collected and glycosylated hemoglobin (HbA1c) was measured at admission and every 4 months over a 2-year period. Glycemic variability indexes (glycemic coefficient of variation [CV], glycemic CV percentage [CV%] and the product between HbA1c-mean and HbA1c-SDS/100 [ $M^*SDS-HbA1c/100$ ]) were calculated. According to height-SDS changes after 2-years of follow up, the study population was divided into three tertiles groups and differences across groups were investigated for variables of interest.

**Results:** The three groups were similar in terms of age, gender and follow up period. After 2 years, all prepubertal children showed a significant positive trend of anthropometric data. Across the three tertiles groups, HbA1c-SDS, CV, CV%, and  $M^*SDS-HbA1c$  significantly decreased from the first to the third tertiles of height-SDS. During follow-up children with lower  $\Delta$  height-SDS values, reported higher values of HbA1c-SDS, CV, CV%, and  $M^*SDS-HbA1c$  than subjects with higher linear growth.

**Conclusions:** Glycemic variability correlates with the linear growth in children with T1D. Low glycemic variability indexes were reported in higher height-SDS tertile.  $\Delta$ height-SDS is inversely correlated with glycemic CV, CV%, and  $M^*SDS-HbA1c$ .



P274 | The trend of glycemic control among children with type 1 diabetes (T1D) who are followed at King Abdullah Specialist Children Hospital (KASCH) over 4 years period (January 2016 to December 2019)

N. Alissa<sup>1</sup>, S. Al Humaidi<sup>1</sup>, S. Alzaid<sup>1</sup>, H. Al Faraldi<sup>1</sup>, O. Al Dibasi<sup>2</sup>, A. Al Mutair<sup>1</sup>

<sup>1</sup>MNGHA-KASCH, Pediatric, Riyadh, Saudi Arabia, <sup>2</sup>KAMIRC, Riyadh, Saudi Arabia

**Introduction:** Children and caregivers of T1D need continuous education and involvement in diabetes care. A multi-disciplinary team approach is essential to empower management and problem-solving skills to improve glycemic control.

**Objectives:**

1. Assess the trend of glycemic control reflected by A1c, and ER visits for children with T1D over 4 years (yrs) in a specialized children's hospital
2. Compare glycemic control and ER visits between patients on MDI with those on CSII

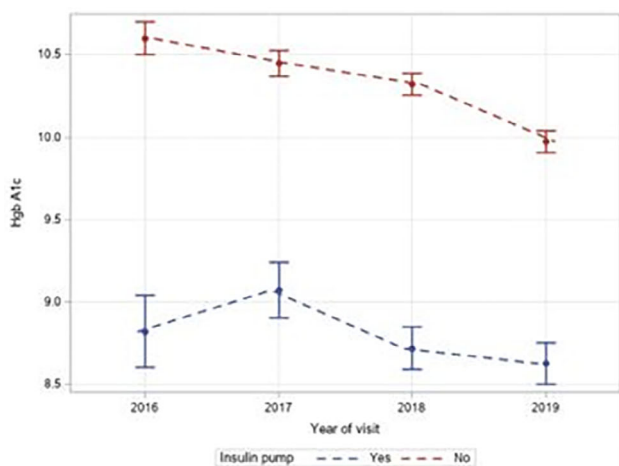


Figure 1. A: HgbA1C Trend

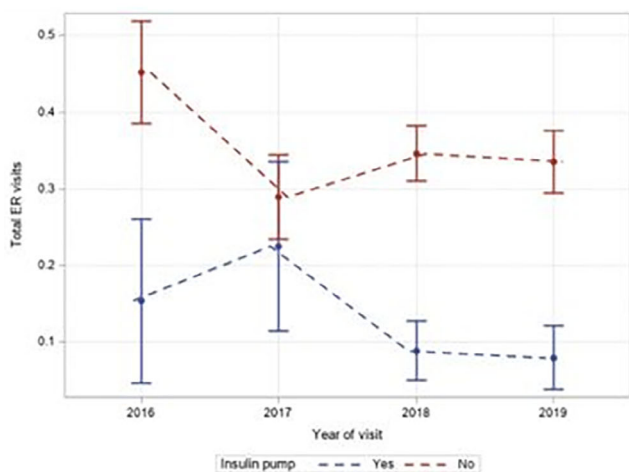


Figure 1. B Total ER visits

3. Evaluate the effect of expanding diabetic educators and nutrition services and a sub-specialized
4. children's hospital on glycemic control

**Methods:** Retrospective cohort study included children aged 1–16 yrs with T1D, diagnosed for at least 1 year. Were followed in KASCH in Riyadh, KSA. Those with social issues and other medical conditions were excluded. The study period was from Jan 2016 to 30 Dec 2019. Electronic charts were used. Descriptive statistics to explore the trend of A1c and total ER visits per patient per yr for 4 years for the two groups, CSII and MDI. Regression analyzes were conducted for A1c and ER visits. The significance level was declared at the alpha of 0.05, and SAS 9.4 was used.

**Results:** 499 patients with T1D were included in the study (49.9% Female). A 62 patients on CSII (12.42%) and 437 on MDI; their mean ages were (13.4 years in the CSII and 12.42 years in the MDI). A 3906 visits were reviewed (618 in the CSII, 3288 in the MDI). Mean A1c was 8.5% in CSII, 10.10% in the MDI ( $p < 0.0001$ ), with a significant decline in the A1c trend in the MDI (0.63%,  $p < 0.0001$ ). ER visits did not change but were significantly less in the CSII (Figure 1).

**Conclusions:** The trend of glycemic control in children with T1D showed improvement over 4 years, significantly so in the MDI. This can be explained by moving to a specialized children's hospital with an expansion in diabetes educators and a dedicated dietitian, which empower diabetes care. Glycemic control and ER visits were significantly lower in the CSII.

P275 | Perception of health care professionals and adolescents with type 1 diabetes regarding introduction of home-visits

P.-E. Kofoed<sup>1</sup>, S. Lisbjerg<sup>2</sup>, J. Thomsen<sup>1</sup>

<sup>1</sup>Lillebælt Hospital, University Hospital of Southern Denmark, Department of Pediatrics and Adolescent Medicine, Kolding, Denmark, <sup>2</sup>Nordsjællands Hospital, Department of Pediatrics and Adolescent Medicine, Hillerød, Denmark

**Introduction:** Despite advancements in diabetes management, a subgroup of patients does not achieve an acceptable level of metabolic control. To achieve treatment goals for high-risk patients, a higher frequency of contact with health care professionals is essential. However, socioeconomic challenges often lead to nonattendance at the outpatient clinic.

**Objectives:** To uncover the perception of patients, mothers, and health care professionals regarding home-visits versus consultations at an outpatient clinic in order to being able to improve the services offered.

**Methods:** Semi-structured interviews with patients, mothers, and health care professionals were conducted to explore the experiences and perspectives of the concept at two pediatric diabetes clinics in Denmark. Paired t-tests were used to compare the HbA1c levels at the start of the intervention with HbA1c 1 year before and HbA1c at the end of the intervention.

**Results:** Both patients, mothers, and health care professionals found consultations in familiar surroundings to result in stronger relationships between health care professionals and families, creating greater opportunities to discuss personal issues aimed at improving the outcome of diabetes. Furthermore, home-visits facilitated finding alternative methods of helping patients and families integrating diabetes into everyday life.

The mean HbA1c level 1 year prior to the intervention (HbA1c-1) was: 76.4 mmol/mol (25%–75% percentiles: 61–87), and the mean HbA1c level at baseline (HbA1c-2) was: 71.8 mmol/mol (25%–75% percentiles: 57–80) (HbA1c-1 vs. HbA1c-2:  $p = 0.25$ ). The mean HbA1c measured after the end of the intervention (HbA1c-3) was 83.9 mmol/mol (25%–75% percentiles: 73–89) (HbA1c-2 vs. HbA1c-3:  $p = 0.004$ ).

**Conclusions:** Overall, home-visits were found to contribute toward creating a more constructive relationship. However, it was still a challenge to keep the scheduled appointments, and during this short study, no improvement in metabolic control could be observed.

#### P276 | Predictive factors of optimal glycemic control over the first year follow-up of new onset type 1 diabetes in a pediatric population

J.-B. Pons Del Rey<sup>1</sup>, M. Borel<sup>1</sup>, A. Daussac<sup>1</sup>, M. Talvard<sup>1</sup>, C. Munzer<sup>2</sup>, J. Pelicand<sup>1</sup>, C. Morin<sup>1</sup>

<sup>1</sup>Hôpital des Enfants, Diabétologie Pédiatrique, Toulouse, France, <sup>2</sup>Hôpital des Enfants, Chef de Projet Statistiques, Toulouse, France

**Introduction:** Type 1 diabetes in the pediatric population corresponds to a serious pathology, potentially fatal, particularly in the event of delay or lack of appropriate care, resulting in a strong retemptation on the way of life and whose incidence is in constant increase. The impact of early glycemic control, from the 1st year, has been demonstrated.

**Objectives:** To identify predictive factors of optimal glycemic control over the first year follow-up of new-onset type 1 diabetes (T1D) in children in our Center.

**Methods:** The primary variable was HbA1c at 1 year follow-up. Clinical, biological, social management and follow-up measures over the first year following diagnosis were analyzed for 104 participants (mean age 8,46 ± 4,09 year, 50% female) in the aim to identify associations with HbA1c. Optimal glycemic control was defined with ISPAD guidelines. The follow-up was divided into four three months periods, 0–3, 3–6, 6–9, 9–12.

**Results:** At the onset, the HbA1c was 11.42 ± 2,27% with 7,69% hospitalizations in Pediatric ICU. 73,08% children are with MDI treatment and 79,81% with isGCM. And 34 families raised the local precarity score.

During the first year, 10,58% had more than 4 follow-up and 11,45% were hospitalized for educational reinforcement or acute complications.

A 30,6% were hospitalized for installation of insulin pumps and CGM. The unique variable associated with optimal HbA1c at 1 year in the multiple analysis was TIR ≥ 60% at second follow up. Among patients with optimal control at 1 year, 90% had TIR ≥ 60% at follow-up 2. Of those who were not on target TIR at follow-up 2, 92% were also not on target HbA1c at the end of the first year ( $p = 0.0018$ ).

**Conclusions:** Our study found that time in range at the 2nd follow-up (3 to 6 months) was predictive of glycemic control (HbA1c) at 1 year. It would allow us to propose a closer follow-up and an earlier intensification of the management, during the first year and especially during 3 to 6 months after the onset of T1D in children.

#### P277 | Association of individual and parental factors in relation to glycemic control in adolescents with type 1 diabetes

F. Memon<sup>1</sup>, M. Arif<sup>1</sup>, M. Haider<sup>1</sup>, S. Kirmani<sup>1</sup>, K.N. Humayun<sup>1</sup>  
<sup>1</sup>Aga Khan University, Pediatric and Child Health, Karachi, Pakistan

**Introduction:** Hyperglycemia is a major risk factor for the development of long-term complications in type 1 diabetes. Reasons for poor glycemic control in adolescents with type 1 diabetes are complex including poor adherence to diet and noncompliance with diabetes treatment regimens and parental involvement in diabetes management. This study aims to identify modifiable risk factors that influence glycemic control in adolescents with type 1 diabetes.

**Objectives:** To determine the association of individual and parental factors with glycemic control in adolescents with type 1 diabetes mellitus at the tertiary care center in Karachi.

**Methods:** This cross-sectional study included 139 participants aged 10–18 years with type 1 diabetes visiting the outpatient clinic, data was collected through face-to-face interviews after informed consent. Multiple variables linear regression models were applied to estimate the effect of the independent variables on the level of HbA1c.

**Results:** A 139 adolescents (mean age 13.7 years, range 10–18 years) with type 1 diabetes were included. (55% female and 45% male), mean length of diagnosis was 5.2 years, range (1–15 years). All patients

Variables	0–3 months	3–6 months	6–9 months	9–12 months
A1c Mean ± SD	7,68 ± 1,09	7,05 ± 0,87	7,37 ± 0,89	7,62 ± 0,86 <sup>a</sup>
TIR ≥ 60%	73,8 ± 13	65,9 ± 15,6 <sup>a</sup>	57,6 ± 16,4	49,9 ± 16,8

<sup>a</sup>  $p = 0,0018$  with fisher test

used basal/bolus injections (BBI). HbA1c levels reflecting poor glycemic control (HbA1c  $\geq$  9.5%) were found in 31% of the study population. Mean HbA1c level was high in adolescents  $>14$  years as compared to  $<14$  years 9% and 8.4% respectively (P-value 0.046) (CI - 1.17-0.0115). Our study revealed that less frequent blood glucose monitoring, fewer clinic visits per year, poor dietary compliance, less parental involvement in dietary management, glucose monitoring, and

insulin administration were all independently associated with poor glycemic control P-value  $<0.05$ .

**Conclusions:** Inadequate glycemic control is common among adolescents with type 1 diabetes in our center. Adequate dietary compliance, frequency of blood glucose monitoring, regular clinic follow-ups, and parents' involvement in child diabetes management will have a major impact on glycemic control.