DOI 10.1111/pedi.12451

WILEY ISPAD International Society for Pediatric and Adolescent Diabetes

# POSTER TOURS

## Poster Tour 1: Chronic Complications

### P001
### Diabetic eye complication screening of children in Kent, England: a multi-centre retrospective audit

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**Objectives:** To audit diabetic eye complication screening (DECS) in children across Kent, comparing prevalence of diabetic retinopathy (DR) against age and duration of diagnosis. Failure to attend screening to be compared with HbA1c and DR prevalence.
**Methods:** Outcomes of annual DECS were collected for all diabetic patients aged 12-19 yrs known to four hospitals managed by Medway NHS Foundation Trust (MFT) and East Kent Hospitals University NHS Foundation Trust (EKHUFT). Data was collected from the eye screening service database and from hospital databases.
**Results:** 1026 screening events were recorded: 901 reported no DR, 123 (12%) reported background retinopathy (BR) and 2 reported referable diabetic retinopathy (RDR), both maculopathy. Ophthalmology review reported no retinopathy in the first RDR case and minor retinopathy in the second with no intervention required.

These screens represented 366 patients: 82 (22.4%) had any DR on at least one screen. Of these 36 (45%) had no DR on subsequent screening.

202 screens were carried out at 12 yrs of age: 13 (6.4%) showed any DR. 10 (77%) of these had no DR on subsequent screening. Those with any DR on screens at 12-13 yrs had been diagnosed for longer than those with none (7.94 yrs vs 5.36 yrs, $p < 0.001$).

65 patients missed at least one annual screen; last known HbA1c was higher in this group (mean 79.6 mmol/mol vs 69.2 mmol/mol, $p = 0.0003$) and a greater proportion had DR on at least one screen (36% vs 21%).
**Conclusions:** Children are commonly reported to have BR, but this often resolves without intervention. Rates of BR at 12 yrs of age are low and the majority of cases do not persist. Risk can be stratified according to duration of diagnosis; this may justify less frequent screening for lower risk patients.

Those who failed to attend screening had higher mean HbA1c and increased DR prevalence; therefore prevalence of DR in those who attend screening will be skewed to underestimate true population prevalence.

### P002
### Autonomic neuropathy screening in children and adolescents with type1 diabetes mellitus

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**Background:** Diabetic neuropathy is among the least recognized complications of diabetes, despite its significant negative impact on survival and quality of life. Characteristic neuronal alterations may occur subclinically early in the course of the disease, even in childhood, with a prevalence ranging from 7.9 ~ 19%.
**Objectives:** Our objective was to study the prevalence of subclinical autonomic and peripheral neuropathy in T1DM children and adolescents and its correlations with associated factors.
**Materials and Methods:** We evaluated 97 T1DM children and adolescents (mean ± SD age 12.9 ± 2.8 years, T1DM duration: 5.14 ± 3.5years) and 80 age and gender-matched controls (mean ± SD age 11.9 ± 2.7 years). We examined pupillary dilatation (PD) in darkness, an index of autonomic neuropathy, using a Polaroid pupillometer and vibration sensation threshold (VST), an index of peripheral neuropathy, using a Biothesiometer. Abnormal cut-off values (>95% or < 5%) were calculated from control values distribution.
**Results:** PD impairment was more frequent in the T1DM group, compared to controls (31.6% vs 3.3%, $p < 0.001$). Moreover, in the T1DM group impaired VST were more frequent than in the controls in the lower (left: 23.3% vs 6.7%, $p < 0.001$, right: 28.3% vs 4%, $p < 0.001$) and upper limbs (left: 17.1% vs 2.67%, $p < 0.001$, right: 23.2% vs 2.6%, $p < 0.001$), respectively.

PD was associated with age ($r = 0.16$, $p = 0.038$), HbA1c: ($r = 0.23$, $p = 0.048$) and diabetes duration ($r = 0.20$, $p = 0.022$). Moreover in the whole group, older age ($p < 0.001$) and puberty were associated with greater proportion of abnormal VSTs in the lower limbs in pubertal vs prepubertal children (left: 17.7% vs 2.8%,$p = 0.001$, right: 19.4% vs 0.0%, $p < 0.001$).
**Conclusion:** Impaired indices of peripheral and autonomic neuropathy are present in a significant proportion of T1DM children and adolescents, although asymptomatic. Indices of diabetic neuropathy are associated with age, diabetes duration, puberty and the quality of glycaemic control.

### P003
### Joint mobility, flexibility and glycemic control in youths with type 1 diabetes mellitus

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**Objectives:** Diabetes mellitus can influence periarticular tissue and other major risks of limited joint mobility. The aim of this study was to investigate the presence of limited ankle joint mobility (AJM) and flexibility in young patients with type 1 diabetes mellitus (T1DM) and to verify its relationship with patients' historical values of glycosylated hemoglobin (HbA1c).
**Methods:** Foot plantar and dorsal flexion was evaluated using an inclinometer while flexibility was evaluated by the sit and reach test in 35 young patients with T1DM, (22/13:M/F), mean age 14.3 ± 3.7 yrs; diabetes duration 7.2 ± 3.9 yrs, BMI 20.2 ± 3.5 ($kg/m^2$), and in 53 young healthy subjects, (31/22:M/F), mean age 13.9 ± 3.5 yrs, BMI 19.4 ± 3.3 ($kg/m^2$). AJM and flexibility were compared to patients' HbA1c values of the previous two years (baseline, and the 8 previous quarters).
**Results:** The patients' ankle ROM was significantly lower than that in controls (140.0° ± 17.1° vs 121.4° ± 21°; $p < 0.001$). Both plantar

flexion (35.3° ± 6.5° vs 28.2° ± 7.3°; p < 0.001) and dorsal flexion (104.7° ± 12.8° vs 93.2° ± 16.2°; p < 0.001) were higher in control group than in the patient groups. Patients' AJM and the only dorsal flexion underlined a growing inverse correlation to HbA1c that becomes significant only on the basis of the values from 2 years before (r = −0.40; r = −0.41; p < 0.05). Patients' flexibility was not correlated with HbA1c values of the period considered (previous 2 years) but it was directly associated with the total AJM (r = 0.40; p < 0.05) and plantar flexion

(r = 0.50; p < 0.01). In healthy control subjects, flexibility was only correlated with the total AJM.

**Conclusions:** The most interesting result of this *pilot study* is the growing inverse relationship between the patient's AJM and the HbA1c values as they become progressively farther from the joint mobility evaluation date. The overall data, also indicate a typical negative effect of diabetes on ankle plantar flexion.

## P004

## Levels of connective tissue growth factor as an early marker of microvascular complications in type 1 diabetes mellitus

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**Background:** The risk for micro- and macrovascular complications is high in young patients with childhood-onset type 1 diabetes. Growth factors have been suggested to play a role in the development and progression of diabetic nephropathy.

**Aim:** To explore level of connective tissue growth factor (CTGF) in children and adolescents with type 1 diabetic patients and its relation to inflammation, glycemic control, microvascular complications and carotid intima media thickness (CIMT).

**Methods:** Sixty children and adolescents with type 1 diabetes were divided into 2 groups according to the presence of micro-vascular complications and compared with 30 age- and sex-matched healthy controls. High sensitivity C-reactive protein (hs-CRP), HbA1c, urinary albumin creatinine ratio (UACR), CTGF and CIMT were assessed.

**Results:** CTGF levels were significantly elevated in all diabetic patients whether patients with micro-vascular complications (85.26 ± 23.06 ng/ml) or those without complications (50.64 ± 11.47 ng/ml) compared with healthy controls (16.4 ± 7.3 ng/ml) with the highest levels found in patients with complications (p < 0.001). CIMT was significantly increased in patients with and without micro-vascular complications compared with controls (p < 0.001). CTGF levels and CIMT were significantly increased in relation to nephropathy (microalbuminuria), peripheral neuropathy or retinopathy. Multiple regression linear analysis showed that HbA1c, UACR and CIMT were independently related to CTGF. The cutoff value of CTGF at >65 ng/ml could differentiate patients with and without micro-vascular complications with a sensitivity of 100% and specificity of 93.3%.

**Conclusions:** CTGF may be considered as an early marker of microvascular complications and subclinical atherosclerosis that could identify normoalbuminuric patients at high risk for diabetic renal disease later in life.

## P005

## Adiposity and lipid intake, in addition to $HbA_{1c}$ levels, increase the cardiovascular risk in children and adolescents with type 1 diabetes

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**Objectives:** To test the hypothesis that diet composition and adiposity could independently contribute to increase the cardiovascular risk (CVR) of children/adolescents with type 1 diabetes (T1D), independently from confounders, in a sample of children and adolescents.

**Methods:** 180 children and adolescents with T1D (age range: 5–18 yrs) were enrolled. Diet (3-day weighed dietary record), physical (height, weight, WC, BIA) and biochemical ($HbA_{1c}$, lipid profile) parameters were measured. Energy intake (EI)/predicted basal metabolic rate (pBMR) was used for excluding food intake under-reporters. A multiple regression model, using non-HDL cholesterol as the dependent variable and HbA1c, FM%, lipid intake (%EI), and gender as independent ones was also calculated.

**Results:** Non-HDL-cholesterol was significantly associated with adiposity (FM; r = 0.27, P < 0.001), body fat distribution (WhtR, r = 0.16, P < 0.05), lipid (%EI; r = 0.25, P < 0.05) and carbohydrate (%EI; r = −0.24, P < 0.05) intake, and blood glucose control ($HbA_{1c}$; r = 0.24, P < 0.05). No significant correlation was found between non-HDL-cholesterol and age, duration of diabetes, energy, protein and carbohydrate intake, blood pressure, insulin requirements, EI/pBMR and biochemical parameters other than HbA1c. Multiple regression analysis showed that adiposity (FM), blood glucose control ($HbA_{1c}$) and lipid intake independently contributed to explain the inter-individual variability of the non-HDL cholesterol ($R^2$ = 0.164, p < 0.05).

**Conclusions:** Obesity, diet and HbA1c have an independent effect on the non-HDL cholesterol, a gross index of CVR, in children and adolescents with T1D. Therefore, intervention for reducing the CVR in T1D patients should be focused not only on glycometabolic control ($HbA_{1c}$), but also on adiposity and lipid intake.

## P007

## Glycoalbumin (GA) / HbA1c ratio as a non-glycemic predictor for complications

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**Objectives:** While HbA1c is established as a gold standard of glycemic control, we proposed GA/HbA1c ratio inversely highly related with glycation gap for complications predictor[1)]. We aimed to clarify GA/HbA1c ratio as a non-glycation index using the most suitable standardized HbA1c values.

**Methods:** We evaluated GA/HbA1c ratio as a non-glycation index using NGSP (A1C) or IFCC (GHb) numbers as internationally harmonized standardized HbA1c values, compared with GA/HbA1c ratio using KO500 (spA1C) number in Japan [2)]. Three standardized numbers were obtained by mutual master equations. Clinical data of simultaneously measured GA and HbA1c values in Japanese pediatric T1D patients (n = 396) and their siblings (n = 65) were analyzed.

**Results:** Correlations between GA/HbA1c ratios and HbA1c values in patients were:

r = +0.3($p$ < 0.0001), r = −0.12($p$ =0.0173) and r = 0.001 ($p$ =0.0983), using A1C, GHb and spA1C numbers respectively. Comparisons of means (SD) in GA/HbA1c ratios between patient and sibling groups were: 3.30(0.30) vs. 2.62(0.21), $p$ < 0.0001, 6.76(0.60) vs. 7.13(0.72), $p$ < 0.0001 and 8.11(0.71) vs. 8.27(0.77), $p$ not significant, using A1C, GHb and spA1C numbers respectively.

**Conclusions:** The spA1C number but neitherA1C nor GHb number may be applied for the GA/HbA1c ratio as a non-glycation index, depending on what is measured as HbA1c in each standardization. The spA1C detects specific single Hb molecule glycated only at N-terminal valine of beta-chain. The A1C partly includes non-glycated Hb molecules. The GHb measures all Hb molecules glycated at N-terminal valine but also glycated and modified at other sites. Thus we propose the individual intrinsic GA/spA1C ratio predicting complications risk in Japanese pediatric T1D population. If the distribution of

GA/spA1C ratio in other population were obtained, risk factors could be analyzed among populations, while glycation gap could not be compared each other. Ref. 1) Endocr J 62:161, 2015, 2) J Diabetes Invest 3:39,2012

## P008

## Do HLA-type, autoantibodies and C-peptide level at diagnosis of type 1 diabetes correlate to the risk of early microvascular complications?

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**Objectives:** To study if HLA-type, autoantibodies (AAB) and c-peptide level at diagnosis correlate to microvascular complications in young adults.

**Methods:** Data on 314 subjects diagnosed with T1D in Sweden before 18 years of age was retrieved from the BDD (Better Diabetes Diagnosis) study regarding HLA-type, AAB (GADA, IAA, IA2A and ZNT8RA, −8WA, −8QA) and C-peptide. Data on microvascular complications was retrieved from the National Diabetes Registry (NDR).

**Results:** Lower C-peptide values at diagnosis and after 1 year were found in patients with AAB. Patients negative for all AAB at diagnosis had a mean C-peptide value of 1.21 $\pm$ 1.1 compared to 0.36 $\pm$ 0.28 in patients positive for one or several AAB, $p < 0.001$. The c-peptide level at diagnosis and after 1 year did not differ significantly between patients who developed microvascular complications or not. Only GADA related to retinopathy; 37.5% vs 27.9% in GADA negative patients, $p = 0.06$. Albuminuria showed an opposite pattern; 10% of GADA positive patients had albuminuria compared to 15 % of the GADA negative patients, $p = 0.06$. HLA was not related to retinopathy or albuminuria. A higher proportion of females was positive for GADA; 71.9 % vs 57.4%, $p < 0.01$. Females more often had retinopathy; 40% vs 29.9%, $p < 0.05$. There was no gender difference regarding albuminuria; 12 % vs 12.5 %.

**Conclusion:** The higher c-peptide level in those without AAB at diagnosis can indicate a lower degree of inflammation, but does not seem to protect against early microvascular complications. The risk of retinopathy is higher in those with GADA at diagnosis but there is no indication that HLA-type, other AAB or the c-peptide level influence the risk of early microvascular complications. The increased risk of retinopathy in females may be due to the fact that more girls are GADA positive. The GADA positive individuals, especially the females, might be a group that needs to be carefully followed with fundus photography.

# Poster Tour 2: Diabetes Care

## P009
## Total IgE levels are unexpectedly high in pediatric and adolescent type 1 diabetes patients

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According to the Th1/Th2 hypothesis it would be unlikely to have allergy in type 1 diabetes (T1DM) patients. The frequent clinical observation of high total immunoglobulin E (IgE) levels in many T1DM patients prompted us to study the epidemiology of IgE levels in our patient group.

**Objective:** We studied total IgE levels inT1DM patients together with other markers of auto-immunity.

**Methods:** Retrospective patient file analysis from our electronic patient management system. We evaluated the first total IgE measurement in the first decade after diagnosis in T1DM patients, who were treated in our diabetescenter between 2006 and 2016. Other types of diabetes were excluded. Distribution of IgE levels was assessed per age group and correlated with other markers of auto-immunity. IgE-levels > 100 kU/L were considered to indicate atopy. The upper limit of the total IgE assay was increased from 2000 to 5000 kU/L in the period of evaluation.

**Results:** n = 1388 patients (51.4% male), median age 12.1 years (IQR 7.61), median duration of T1DM 2.1 years (IQR 4.95). Distribution per age group: see table 1. In the youngest age group the 95% confidence interval did not exceed 100 kU/L

| Age group (yr) | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 |
|---|---|---|---|---|---|
| Number of patients | 136 | 345 | 502 | 297 | 69 |
| Total IgE-level (kU/L)(median [IQR] | 24.5 [67.0] | 89.0 [208.5] | 84.5 [247.5] | 80.0 [213.0] | 37.0 [127.5] |
| %patients with IgE > 100 kU/L | 21.3 | 47.0 | 45.0 | 46.1 | 33.3 |

*[Distribution total IgE levels]*

We did not find a significant correlation of total IgE level with GAD antibody level (n = 1129) nor with anti thyroid peroxidase (aTPO) level (n = 1370).

**Conclusions:** In patients with T1DM, total IgE levels are high when compared to reference values in most age groups. Nearly half of the patients between 5 and 20 years showed IgE levels in the atopic range. These data do not support the classical Th1/Th2 hypothesis and the reason for the high levels needs further clarification.

## P010
## Impact of telemedicine on glycemic control and family satisfaction in children and adolescents with type 1 diabetes: effects 1 year after stopping telemedicine support

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**Introduction:** Telemedicine (TM) offers potential solutions to connect providers and patients, especially those who are geographically distant. Although TM represents a useful and cost-effective solution to the strict follow-up required in pediatric diabetes type 1 (TD1) management, there are few applications of TM in the pediatric population.

**Objective:** To investigate family satisfaction and the impact on the glycemic control of TM support during 1 year (telephone consultations, text messages, e-mails) and 1 more year of follow up after interrupting the intervention, in pediatric patients with TD1

**Patients and Methods:** We included 32 patients in a program of TM glycemic control from December 2011 to December 2012:

**group 1** (≤1 year after diagnosis of TD1, n = 13; 7 girls and 6 boys) and

**group 2** (>1 year after diagnosis, n = 19, 8 girls and 11 boys) (6 and 12, respectively, in Tanner stage III). All patients received TM support for 1 year. Satisfaction scores were calculated by specific questionnaires (ESCP Europe) submitted at the end of the 1 year period. HbA1c (HPLC, Menarini, normal range 5.3 ± 0.2%) was measured at 6 months and 1 year after inclusion and 1 year after stopping TM support.

**Results:** TM support was generally well accepted by patients and their families and glycemic control was adequate in both groups during the intervention and 1 year after its interruption. However we found a significant increase in HbA1c levels between 6 months after initiating TM and 1 year after stopping it in both groups ($p < 0.05$)(Table 1).

**Conclusions**

**1.** TM support of patients with TD1 is well accepted by patients and their families.

**2.** TM could be an alternative to in-person visits for adequate glycemic control, especially during the first six months of follow up.

## P011
## Glycemic variability and metabolic control measured by CGMS in a sample of type 1 diabetics

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**Introduction:** The concept of glycemic variability has assumed an increasing importance as it has been documented an association with an increased risk of complications in patients with type 1 diabetes. HbA1c, a parameter used in clinical practice to assess metabolic control, does not allow to evaluate glycemic variability. Continuous glucose monitoring systems (CGMS) has an important role in the evaluation of this instability.

**Methods:** The data analyzed is obtained using a CGMS during 5 and 7 days in type 1 diabetic patients. The glycemic control is evaluated using HbA1c, glucose average, AUC > 140 and < 70 mg/dL. Glycemic variability is measured through SD and with the relation coefficient. It was analyzed the number of asymptomatic hypoglycemia and the percentage of time in hypoglycemia at night.

**Results:** Sample composed by 23 patients (average age - 11,9 years, 43.5% male), selected by clinical suspicion of glycemic instability, 18 patients in treatment with multiple insulin administrations and 5 patients in treatment with continuous insulin infusion system. The results were: HbA1c - 8%, glycaemia - 195 mg/dL, SD - 75, coefficient

| Group | Age (years) | Gender (girls/boy | Time after diagnosis (years | HbA1c (%) | HbA1c (%) | HbA1c (%) | HbA1c (%) |
|---|---|---|---|---|---|---|---|
| | | | | baseline | 6 months | 1 year | 1 year after stopping |
| 1 | 9.6 ± 4.2 | 7/6 | 0.6 ± 0.4 | 12.6 ± 0.1 | 6.7 ± 0.6 | 7.4 ± 0.6 | 7.5 ± 0.8 |
| 1 | 11.8 ± 3.9 | 8/11 | 2.8 ± 2.5 | 6.7 ± 0.1 | 6.9 ± 0.6 | 7.4 ± 0.9 | 7.5 ± 0.5 |

of variation - 0.38, asymptomatic hypoglycemia - 2.4, nocturnal hypoglycemia time - 10%, AUC < 140–66.37, AUC < 70–0.73. Comparing patients with HbA1c ≤ 7,5% and HbA1c > 7,5%, The authors did not find differences with statistical significance, regarding AUC > 140 or < 70, number of asymptomatic hypoglycemia, SD, coefficient of variation and the percentage of nocturnal hypoglycemia.

**Discussion:** Our sample shows that the glycemic variability is very important even in patients with HbA1c ≤ 7,5%. The AUC > 140 is high but AUC < 70 seems closer to the desirable, although there is an average of 2 asymptomatic hypoglycemia per patient and an average percentage of nocturnal hypoglycemia of 10%. Despite the small sample, the authors observed a huge glycemic instability and this evaluation provided important therapeutic settings.

## P012
## Unexplained hypoglycaemia in an adolescent with type 1 diabetes - simple insulin overdose or adnormal insulin binding?

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**Introduction:** A 12 year old girl with type 1 diabetes treated with insulin aspart via pump therapy presented with unexplained hypoglycaemia. This persisted after a change to basal bolus with aspart and detemir. Plasma insulin concentration was 914 pmol/L following hypoglycaemia on aspart alone, but 31,878 pmol/L following hypoglycaemia on basal bolus. Episodes were so frequent, the patient ceased prescribed insulin for 72 hours, culminating in hospital admission for investigation. Excess exogenous insulin was suspected but denied. During admission she was consistently hyperglycaemic and insulin was re-started. Serial plasma insulin levels over a 3 month period on basal bolus were 15,327-32,243 pmol/L, often without hypoglycaemia and despite close supervision of injections. Studies were undertaken to explain the excessive insulin levels found with detemir.

**Methods:**

- Direct measurement of anti-insulin IgG (ImmunoCAP human specific method)
- Polyethylene glycol insulin studies to estimate free monomeric insulin
- Gel filtration chromatography (GFC) studies to separate insulin species according to size

**Results:**

- Anti-insulin IgG level undetectable, < 0.02 mg/L
- Insulin recovery < 3% post PEG precipitation
- GFC showed predominantly high molecular weight insulin. Addition ex-vivo of high concentration detemir to control plasma did not replicate this
- Follow-up studies after 3 weeks of aspart monotherapy showed insulin level of 966 pmol/L and no high molecular weight insulin on GFC

**Conclusion:** 95-99% of detemir is bound to albumin, thus measured plasma detemir will overestimate free insulin. However, this patient´s levels were highly atypical. The results are consistent with insulin binding by an antibody not detected by the human specific assay. Immunosubtraction studies to support this theory are pending.

Insulin binding antibodies are rare but should be considered in cases of labile glycaemic control where the clinical features and biochemistry are suggestive.

## P013
## International $HbA_{1c}$ benchmarking in type 1 diabetes: Do we need to report between-clinic variation in addition to national average values?

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**Objectives:** To compare national $HbA_{1c}$ means and measures of between-clinic variation across eight countries.

**Methods:** Data were collected between 2013/14 from 63021 children < 18 years with type 1 diabetes across 527 clinics in Germany (n = 19732) and Austria (n = 1570) from the Prospective Diabetes Follow-up Registry, England (n = 20751) and Wales (n = 1281) from the National Paediatric Diabetes Audit, USA (n = 10815) from the T1D Exchange, Sweden (n = 4680) from the Swedish Pediatric Diabetes Quality Registry, Denmark (n = 1877) from the Danish National Diabetes Registry, and Norway (n = 2315) from the Norwegian Childhood Diabetes Registry. Completeness rates for $HbA_{1c}$ ranged from 77.2% to 99.8%. $HbA_{1c}$ means and measures of between-clinic variation were compared across countries before and after adjustment for case-mix (age, gender, diabetes duration, minority status). Multi-level models were used to calculate the % of total variance in $HbA_{1c}$ which occurs between clinics (intra-class correlation-ICC) in each country.

**Results:** The crude mean $HbA_{1c}$ ranged from 57 mmol/mol [7.4%] in Sweden to 72 mmol/mol [8.8%] in Wales. Germany had the second lowest mean $HbA_{1c}$ (61 mmol/mol [7.8%]) but showed the largest between-clinic variation (Interquartile Range-IQR = 57-65 mmol/mol [7.4-8.1%]). Norway and Sweden had the lowest between-clinic variation (IQR = 64-68 mmol/mol [8.0-8.3%] and 56-59 mmol/mol [7.3-7.6%]). When clinic characteristics in case-mix variables were compared, Germany showed the largest between-clinic variation in age and diabetes duration and England in ethnic minority status. Case-mix adjustment had a small impact on national averages. Adjusted ICC ranged from 1.8% in Norway to 16.6% in Germany.

**Conclusion:** Differences in $HbA_{1c}$ between countries are better understood if national averages are interpreted together with measures of between-center variation. Exploring sources of this variation should be a key priority for improving glycemic control in children with type 1 diabetes.

## P014

## Impact of glycemic control and diabetic complications or comorbidities on health related quality of life (HRQoL) in pediatric patients with type 1 diabetes mellitus (T1DM) and their caregivers in Spain

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**Objective:** To assess HRQoL for paediatric patients with T1DM and their caregivers, and evaluate how glycaemic control and diabetic complications or comorbidities (DCC) affect HRQoL in this population.

**Methods:** CHRYSTAL observational study was conducted in 2014 on a representative sample of 275 patients aged 1–17 years diagnosed with T1DM in Spain. Patient/caregiver pairs were stratified by patient's glycaemic control based on HbA1c level and by the presence or absence of DCC. The generic preference-weighted instrument EQ-5D was used to evaluate quality of life. EQ-5D measures 5 dimensions (mobility, self-care, daily activities, pain/discomfort, and depression/anxiety). Responses were converted into utility scores along a continuum extending from death (0.0) to full health (1.0).

**Results:** HRQoL measured by EQ-5D for overall population and stratified by glycaemic control and presence or absence of DCC are shown in table 1. In the overall population, the most affected HRQoL dimension in caregivers was depression/anxiety (34.8% of respondents reported some degree), followed by pain/discomfort (34.3%). In children, the most affected dimension was pain/discomfort (18.2% experienced "some" or "a lot"), followed by depression/anxiety (14.6%).

**Conclusions:** Glycaemic control and the presence of DCC may impact HRQoL of paediatric patients with T1DM and their caregivers. Health care professionals should consider these results in their interactions with T1D children and their caregivers.

Table 1: HRQoL measured by EQ-5D for overall population and stratified by glycaemic control (HbA1c < 7.5% or ≥ 7.5%) and presence or absence of DCC.

Abbreviations: HRQoL = Health-related quality of life; EQ5D5L = EuroQol 5 dimensions 5 levels; EQ5D3L = EuroQol 5 dimensions 3 levels; VAS = visual analogue scale; SD = standard deviation.

a- Range 0 to 1, higher scores indicate better quality of life.

b- Range 0 to 100. Information inside the VAS box was used (instead of the VAS line on the scale), as it was considered more reliable (analysts had access only to the bottom page of the scale) and it also had more valid cases. When information inside the box was missing, information on the VAS line was used.

## P015

## Body mass at type 1 diabetes (T1D) onset - a "player" in the remission phase in children intensively treated

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**Objectives:** Analyze frequency of T1D remission (daily insulin requirement (DIR) < 0.5U/kg/24 hrs and HbA1c < 7%) and assess its relation to selected clinical parameters at diagnosis.

**Methods:** Study covered all children (98; 50♀ ; mean age 8.0 ± 4.1 yrs) newly diagnosed (T1D) in the regional diabetes center (Katowice, Poland) in 2013. We analyzed at T1DM onset: gender, age, age groups (0-4/4-9/10-14/>15 yrs), weight, height, HbA1c, C-peptide, blood pH, GAD, IAA, IA2, ICA antibodies and presence of other autoimmune diseases. All children received initially insulin intravenously and continued directly with intensive insulin treatment targeting nearly normoglycemia (with CHO counting). Patients were followed up every 3 months: HbA1c, DIR. Statistica (StatSoft, Inc.) was used for analysis, $p < 0.05$ considered as significant.

**Results:** At T1D onset mean weight and height were 0.24 ± 0.99 and 0.88 ± 1.31 SDS respectively. Mean HbA1c was 11.6 ± 2.2% and C-peptide 0.48 ± 0.4 ng/ml; 34(35%) children had diabetes ketoacidosis (DKA). 17(17%), 27(28%) and 54(55%) children had respectively 1, 2 or ≥3 positive autoantibodies and 17(17%) had an additional autoimmune disease.

60(61%) patients (33♀ ) entered remission that started 2.2 ± 2.68 (0–10) mths after diagnosis. Its duration was 9.7 ± 6.26 (2–31) mths. Remitters had higher body mass than non-remitters (0.44 ± 1.02 vs −0.07 ± 0.86 SDS, $p = 0.011$) and were less common to have another autoimmune disease (10 vs 29%, $p = 0.019$). Other parameters did not impact remission occurrence (tendency that children with DKA at onset are less likely to enter remission than those without DKA, not significant: 45 vs 29%, $p = 0.11$). Duration of remission and time to its occurrence were not related to the analyzed parameters. Multivariate analysis confirmed the results of the univariate analysis.

**Conclusions:** Remission occurred in more than half children with newly diagnosed T1D. Weight seems to be a factor influencing remission occurrence in intensively treated children.

MNiSW grant IP2012 007672

## P016

## Improving the use of medical identification devices (MID) in children with type 1 diabetes (T1DM)

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**Background:** Children with T1DM are at risk for acute diabetes-related morbidity and mortality. The use of MIDs improves the

| Primary Caregiver HRQoL (EQ-5D-5 L) | Overall Mean (SD) | HbA1c <7.5% Mean (SD) | HbA1c ≥7.5% Mean (SD) | No DCC Mean (SD) | DCC Mean (SD) |
|---|---|---|---|---|---|
| UTILITY INDEX -a | 0.92 (0.14) | 0.92 (0.13) | 0.91 (0.14) | 0.92 (0.14) | 0.90 (0.12) |
| VAS SCORE -b | 81.68 (15.89) | 83.62 (15.32) | 78.90 (16.33) | 82.78 (15.34) | 77.66 (17.29) |
| Proxy of Child´s HRQoL as Perceived by Caregiver (EQ5D3L) | Overall Mean (SD) | HbA1c <7.5% Mean (SD) | HbA1c ≥7.5% Mean (SD) | No DCC Mean (SD) | DCC Mean (SD) |
| UTILITY INDEX -a | 0.94 (0.15) | 0.94 (0.15) | 0.93 (0.16) | 0.95 (0.14) | 0.90 (0.19) |
| VAS SCORE -b | 86.13 (13.57) | 88.03 (12.94) | 83.34 (14.03) | 86.84 (13.09) | 83.59 (15.02) |

chances of receiving prompt and adequate treatment for diabetes related emergencies or during a catastrophic event. It has been shown that compliance to MIDs in children with TIDM is low, but to our knowledge, studies evaluating the barriers for compliance to MIDs in this population have not been published in the English literature.

**Objective:** We conducted a quality improvement study to

1) evaluate patient compliance to the use of MIDs and

2) to understand the barriers and limitations for its use in order to focus efforts to improve patient adherence in the future.

**Method:** Patients and their families in a large Diabetes Center in the US filled out a questionnaire

(Figure 1) during a routine diabetes clinic visit. The questions assessed patients' and families' awareness of MIDs, compliance to its use, and barriers to using it for those of them not using one.

**Results:** A total of 516 families completed the questionnaire, 437 families (84.5%) reported awareness of MIDs and 41.7% (n = 215) of patients were not using a MID. The main barriers identified were a lost or damaged MID and financial difficulties to purchasing MID, followed by patient refusal to wear an MID. One hundred and sixty two families (31.4%) endorsed interest in learning about MIDs or receiving resources to obtain one.

**Conclusion:** Compliance to the use of MIDs in the pediatric diabetic population in our Diabetes Center is poor and lack of access due to financial reasons seems to be a significant limitation for its use. Our data is likely a reflection of the use of MIDs in other centers around the country. We speculate that mandatory insurance coverage for MIDs would improve compliance to its use, and thus, decrease diabetes related morbidity and mortality in acute or catastrophic situations. Education on the importance of wearing a MID should be part of ongoing diabetes education.

# Poster Tour 3: Diabetes Education

## P017
## A picture-based carbohydrate-counting resource for Somalis

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**Background:** Carbohydrate counting is an essential routine task in effectively managing type 1 diabetes (T1D). Carbohydrate-counting references specific to the Somali diet are lacking and this has been identified by families as a barrier to effective diabetes control.
**Objective:** To develop a picture-based carbohydrate-counting resource for individuals with T1D in the Somali community.
**Methods:** The traditional Somali foods described in this project were selected using a variety of methods. Serving sizes and carbohydrate calculations were tabulated using the United States Department of Agriculture National Nutrient Database for Standard Reference. Calculations of carbohydrate content of home-prepared foods were made by measuring total yield and total carbohydrates of all ingredients in the recipe, divided by the number of servings and the serving size to be consumed. When a recipe was available, the food item was prepared and analyzed for more accurate carbohydrate estimation.
**Results:** Photos of prepared Somali foods were compiled into a PDF file in 2 languages, English and Somali. While the introductions are written in text, the focus was to make this resource primarily picture-based, where possible, to be useful to individuals with limited literacy.

The resource will be shared free-of-charge via Open Access. We will update the resource annually with new information.
**Conclusion:** There is a need to tailor educational materials to meet the needs of Somali children with diabetes. We have created a picture-based nutrition resource for carbohydrate-counting traditional Somali foods, and have made this freely available online through Open Access to individuals around the world.

## P018
## The development of an e-learning package to support education staff with the management of type 1 diabetes

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Currently in the UK children and young people with diabetes receive variable provision of care and support in educational settings. There are concerns that this impacts on the young person's glycaemic control, their quality of life, and their educational performance and outcome. Whilst most paediatric diabetes teams provide training for school staff, it may take several days, even weeks, after diagnosis before a diabetes educator is able to attend the school to provide education and support.

The aims of this project were to develop a comprehensive, consensus-based, e-learning package that would inform education providers about diabetes and provide a framework for the best practice management and support of young people with type 1 diabetes in schools. This package was not intended to replace the visit from the specialist nurse but to complement this and allow the young person to return to education at the earliest possible opportunity. This was achieved by convening a series of multi-agency stakeholder workshops including clinicians, patients / families, teachers, and voluntary sector representatives, to discuss the content and format that this package should take. These discussions were then developed into two e-learning modules (basic and advanced) by a core team of diabetes educators from 3 regional diabetes networks.

The modules provide guidance to all key parties involved in the day to day support of young people with diabetes, including expected roles and responsibilities, and legal obligations. The basic module is aimed at all staff to raise their general awareness of type 1 diabetes. The advanced module is for those staff designated specific responsibilities for supporting the young person with type 1 and goes into greater depth regarding the management and treatment of diabetes in the school setting. These modules have been positively received by education providers, and are endorsed by the National Children and Young Person's Diabetes Network.

## P019
## SPECTRUM - the worldwide first manufacturer independent education program for continuous glucose monitoring (CGM) for all age groups

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Continuous glucose monitoring (CGM) is used by an increasing number of children, adolescents and adults with type-1 diabetes in Germany, however the total number is still small. Limited uptake of CGM in Germany includes economic and behavioural barriers, but also the lack of a manufacturer independent structured education program for all age groups.

Based on intensive experiences in education for decades we therefore developed such a program called **SPECTRUM** ("**S**tructured **p**atient **e**du**c**ation and **t**reatment program for self-reliant continuous gl**u**cose **m**onitoring"). It combines technical understanding with appropriate interpretations of monitoring results. It is available in 3 versions: one for adults and two adapted for pediatric patients (parents with their children and adolescents).

In several modules (each is intended to last 90 min with detailed curricula) all aspects of CGM use will be discussed interactively with the users. Module 0 (introduction) informs the patients and /or their parents about positive and possible negative experiences in long-term CGM use to provide them with a realistic view of the benefits of this technology beforehand. The main modules 1 to 5 cover basic knowledge about CGM, alarm-settings, glucose trend arrows, CGM usage in everyday life and CGM software. The patients and/or their parents get trained how to assess and download CGM data, improve CGM use and implement it in their daily life.

Spectrum provides patients, parents and their diabetes-teams with the opportunity to optimize CGM use in an independent and effective way. Important conditions of this new education program are independency of manufacturers, product-neutrality and qualified, structured information also for young people with type-1- diabetes and their families. An evaluation of SPECTRUM will be done within the framework of a clinical trial.

## P020

## Factors associated with glycemic control in children, adolescents, and young adults diagnosed with type 1 diabetes (T1D) under 8 years of age: the global TEENs study

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**Objectives:** Early age at T1D onset is associated with fulminant beta cell loss, leading to future challenges with glycemic control. The TEENs study offers a means to assess factors related to target A1c attainment in 2503 children, adolescent and young adults diagnosed with T1D under 8 y/o.

**Methods:** Participants received care in 219 centers in 20 countries; data were collected by interview, record review and survey. A1c was measured uniformly using A1cNow™ (Bayer). A1c was categorized: at target (<7.5%), needs improvement (7.5-8.9%) and at-risk (≥9%). Factors associated with A1c, adjusted for global region and age, included demographics, management and psychosocial issues.

**Results:** Participants (51% male) had a mean age of 13.6 ± 4.2 y (range 7–25), T1D duration of 9 ± 5 y (range 1–24) and A1c of 8.5 ± 1.7%; 29% attained A1c target, 30% had at-risk A1c. While age, T1D duration, sex distribution and BMI were similar across A1c groups, demographic/family factors, management characteristics, DKA occurrence and psychosocial issues differed significantly in the A1c groups, with high risk or unfavorable attributes associated with at-risk A1c (Table).

**Conclusions:** In this global T1D sample diagnosed < 8 y/o, >2/3 did not achieve A1c < 7.5%. Those with at-risk A1c ≥9% had many unmodifiable demographic/family characteristics, suggesting a need for more education and support. Opportunities exist to improve A1c by targeting modifiable management factors; in turn, psychosocial issues may improve.

Study was supported by Sanofi.

## P021

## Challenges in paediatric diabetic care - the effect of implementing an outpatient based new patient education programme

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**Objectives:** To assess the effect of an outpatient based new education programme for newly diagnosed patients with type 1 diabetes on their HbA1c in the first year following diagnosis. Poor HbA1c in the first year following diagnosis of type 1 diabetes is a predictor of poor metabolic control and early development of complications. Achieving good glycaemic control however requires compliant, well-educated patients. In October 2013, we introduced an outpatient based 'Newly Diagnosed Patient Education Programme' in which a total of 20 sessions are delivered by the multidisciplinary team.

**Methods:** All patients newly diagnosed with type 1 diabetes between October 2013-October 2014, who completed the new education programme were analysed and compared to a pre-intervention group diagnosed January-December 2010. Data obtained included HbA1c during the first year post diagnosis, patient demographics and psychosocial factors.

**Results:** 24 patients (8 males, 16 females) were included in the study group compared to 17 (6 males, 11 females) in the pre-intervention group. HbA1c at diagnosis was 11.4 % for the study group compared to 10.2% in the pre-intervention group. Whilst at 6–8 weeks similar HbA1c levels were achieved (8.1% vs. 8.0%), HbA1c at 12 months measured 8.1% vs. 7.6%, but a similar percentage of patients in both groups achieved an Hba1c < 7.5% (55% vs. 53%).

**Discussion:** Psychosocial factors varied greatly between groups, with the study group having higher numbers of social risk factors (split

| A1c group* (N = 2503) | Target A1c (<7.5%, <53 mmol/mol) (n = 734; 29%) | A1c Needs Improvement (7.5-8.9%) (n = 1024; 41%) | At-risk A1c (≥9%, ≥75 mmol/mol) (n = 745; 30%) |
|---|---|---|---|
| Demographic/Family Factors | | | |
| Living with 2 parents (%) | 85% | 82% | 75% |
| | 48% | 41% | 37% |
| Parent education: University (%) | | | |
| Financial problems due to T1D (%) | | | |
| | 19% | 21% | 34% |
| Diabetes Management | | | |
| Insulin dose U/kg (Mean ± SD) | 0.9 ± 0.3 | 1.0 ± 0.3 | 1.1 ± 0.4 |
| Frequency of daily BG checks (Mean ± SD) | 5.2 ± 2.4 | 4.7 ± 2.2 | 3.6 ± 1.9 |
| | 37% | 34% | 21% |
| Insulin pump Rx (%) | 47% | 46% | 35% |
| Carb. counting as diet management (%) | 65% | 65% | 58% |
| | 90% | 81% | 70% |
| Exercise ≥30 minutes, 3–7 days/week (%) | 3% | 4% | 10% |
| Rarely missing insulin (<1 time/week) (%) | | | |
| DKA in last 3 months (%) | | | |
| Psychosocial Issues | | | |
| Family conflict with checking BGs (%) | 36% | 45% | 55% |
| Family conflict with insulin Rx (%) | 33% | 38% | 46% |
| Diabetes QoL (Mean ± SD) | 75 ± 13 | 71 ± 13 | 67 ± 14 |

[1] * All comparisons significant, p < 0.003

*[Factors associated with glycemic control in youth]*

families 9 vs. 3, domestic violence 3 vs. 0, ongoing psychology support 8 vs. 2, clinical depression 2 vs. 0), impacting on diabetes management. It is encouraging that despite this, the percentage of patients achieving HbA1c levels < 7.5% one year after diagnosis is similar between groups.

**Conclusion:** Current data highlights that the service is providing care to a socially challenging population which will need further consideration and tailoring. Long term outcomes are awaited.

## P022

## Goals of diabetes education: a National UK Structured Self-Management Education Programme

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**Objective:** Goals of Diabetes Education is a structured education programme that was originally developed in 1996 in Denmark. It was translated and first published in the UK in 2012 to fulfil the requirements of the Paediatric Diabetes Best Practice Tariff. This original structured educational framework has been updated and enhanced following the recent publication of NICE Guidance 18:- *Diabetes (type 1 and type 2) in children and young people: diagnosis and management* (NICE 2015).

All Paediatric Diabetes Units (PDU) are required to implement a personalised, structured education programme with the aim that all Children & Young People (C&YP) with diabetes should receive consistent, age appropriate diabetes self-management education.

**Method:** A team of healthcare professionals (HCPs), supported by an educational grant from Novo Nordisk, updated the resources for 6–18 year olds based on social learning theory. PDU team members have received training on the use of the resources that include a written HCP guide with age related competencies, hand-outs for patients and parents and individual record sheets to track progress. An electronic version is also available to download and includes ability to add local hospital logo.

**Results:** The updated Goals of Diabetes Education Structured education programme was published in March 2016 and is endorsed by the National C&YP Diabetes Network. Over 482 copies have been distributed to PDU's across United Kingdom.

**Conclusion:** Goals of Diabetes Education is a structured education programme that has been designed to enhance the knowledge, confidence and skills of all C&YP with Type 1 diabetes and contribute to their physical, social and emotional wellbeing. The uptake and use of this programme will be monitored via the C&YP's National Diabetes Network the Diabetes Quality Improvement Information System and the annual National Paediatric Diabetes Audit.

## P023

## Number of daily blood glucose measurements is the most influential parameter associated with good metabolic control in children and adolescents with type 1 diabetes

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As only some children with type 1 diabetes (T1D) achieve target HbA1c levels, we tried to retrospectively study parameters associated either with good or bad metabolic control. Inclusion criteria: age 3–20 years, disease duration >2 yrs, at least 3 visits in the last year. We examined data about age, ethnic group, parental state, disease duration, diabetes management (CSII or MDI, daily blood glucose measurements and boluses, CHO counting), acute complications (nocturnal hypoglycemia -NH- in the last month, severe hypoglycemia -SH- or DKA in the last 3 yrs).

**Results:** 270 subjects were analyzed and divided in group A (n. 75, HbA1c < 7.5%) and B (n. 32, HbA1c > 9%). Older age (p = 0.002), disease duration (p = 0.035), being son of immigrants (p = 0.001) or separated parents (p = 0.0001) were associated with group B. Group B subjects had more NH (p = 0.0003), SH (p = 0.005) and DKA (p = 0.011). Significant differences were in daily BG measurements (p = 0.0001), daily boluses (p = 0.0005), CHO counting (p = 0.005). HbA1c increased significantly (p = 0.001) moving from 0–2 BG measurements (10 ± 1.3%), to 3–4 (8.2 ± 1.6%), 5–9 (7.3 ± 0.8%). CHO counters (49 vs 58) had a better HbA1c (7.4 ± 1.1 vs 8.4 ± 1.6%; p = 0.0002), measured BG more frequently (p = 0.0001), injected more boluses (p = 0.0001) and showed less SH (p = 0.02). Subjects on MDI (n.76) vs CSII (n.31) were not significantly distributed in the 2 groups. Multiple logistic regression identified n. of BG measurements as the most influential parameter (p = 0.005). Including the variable separated or immigrants parents, the strongest influence was of the former (p = 0.0007), followed by the latter (p = 0.009).

**Conclusions:** A higher number of BG measurements seems to be mostly associated with a good metabolic control, followed by use of CHO counting (probably reflecting a better compliance to a correct intensive management). Using a pump per se is not a guarantee for good metabolic control. Patients with separated parents or of immigrant origin are at higher risk.

## P024

## When pediatric patients with type 1 diabetes can get carbohydrate counting skills?

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Carbohydrate counting is the essential way of insulin dose adjustment for treatment of type 1 diabetes. It is unclear that when young patients can get carbohydrate counting skills.

We conducted a questionnaire survey about carbohydrate counting education to patients with type 1 diabetes and their parents, which contains 10 questions as follows; age, onset age, insulin regimen (MDI or insulin pump), who was educated carbohydrate counting skills at the onset, age patients started carbohydrate counting, age that patients can estimate carbohydrate amount, age that patients can calculate their insulin dose by carbohydrate counting etc…

172 patients returned questionnaire. Mean age was 18.2 ± 8.7 years old. Mean onset age was 8.5 ± 6.7 years old. 55.5% of patients use insulin pump. 43% of patients were initially educated carbohydrate counting skills for both patients and their parents, 28% were educated only patients, and 29% were educated only parents. 92 patients started to estimate carbohydrate amount from 7 to 15 years old. The age that patient could calculate their insulin dose with insulin to carbohydrate ratio and insulin sensitivity focused on from 10 to 15 years old (n = 78). The duration that patients can obtain carbohydrate counting skill (carbohydrate amount estimation and insulin dose calculation) was within 1 years (n = 70). In the group that patients and their parents received carbohydrate counting at the onset, many patients could completely obtain carbohydrate counting skills from 11 to 12 years old. In the group that only parents received carbohydrate counting, patients also learned carbohydrate counting skills around 11 years old.

We conclude that we should start to educate carbohydrate counting skills to pediatric patients around 11 years old, and most of them can obtain the skills within 1 to 2 years.

# Poster Tour 4: Diabetes in Developing Countries

## P025
## Improving diabetes care in developing countries: suggestions for ISPAD and IDF

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Diabetes Care in developing countries has always been hindered by limited resources. Egypt is a lower middle income country according to latest world bank classification. Charity fund raising is enormous in Egypt. Egypt hosted one ISPAD postgraduate course and several conferences of the Egyptian society of pediatric endocrinology and diabetes in association with the ISPAD.
**Objective:** To assess if providing adequate funding to a university diabetes clinic in Egypt and the ISPAD course and conferences held did improve diabetes care offered?
**Methods:** Questionnaires were used to assess process and outcome of DM care years after providing all needed insulin and supplies for all patients and providing doctors with detailed ISPAD-based guidelines.
**Results:** more than 90% of doctors were unaware of ISPAD poster of early DM symptoms and its´ value to prevent DKA, 80% of doctors answered that type 1 DM must present in DKA, and 56.7% of doctors answered it should be treated with premixed insulins. Baseline mean HbA1c before any funding or education was 9.12 ± 1.99% and turned years later after implementing changes to be 9.12 ± 1.7%, the change in frequency of severe hypoglycemia/ patient-years and of recurrent DKA were non significant despite the shift to using analogues by almost 50% of patients . All patients were on a fixed insulin regimen with frequent pitfalls in insulin dose/ timing ordering by 88% of doctors. Another study by Ogle GD, Middlehurst AC and Silink M assessing DM care in developing countries gave DM care in our clinic a score between 40–59 on a scale of 100.
**Conclusions:** poor **d**octor education rather than lack of resources is the main barrier against improving DM care in developing countries. Postgraduate courses and collaborative conferences do not seem to result in improved care. Perhaps integrating essential aspects of care into schools of medicine curricula is needed, integrating online exams as part of these courses as in West Africa courses may be useful.

## P026
## Cohort analysis for glycemic control and microvascular complications of resource constrained type 1 diabetics under regular follow up: interim analysis at 2 year (CARE 1 study)

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*[1]Centre for Diabetes and Endocrine Diseases, Kanpur, India, [2]Yagnik Diabetes Care Center, Kanpur, India, [3]AUW Global, Mumbai, India*

**Objectives:** To examine the glycemic trends of type 1 diabetics treated under a resource constrained setting with conventional insulin and correlate with microvascular complications of diabetic retinopathy and nephropathy
**Methodology:** All children, diagnosed in a geographically defined area around Kanpur, were identified using Kanpur Diabetes Registry Project. Patterns of HbA1c values were observed over a 2 year time point with regular monitoring of HbA1c with periodicity of 2 months to 4 months, as part of continuing 5 year population based study which evaluates impact of glycemic control early in disease and age at onset on the occurrence of incipient diabetic nephropathy and background retinopathy
**Results:** CARE 1 is the interim analysis of the follow up trends for the glycemic control at 2 years, diagnosed as T1DM between 2011–12 followed until 2012–13. These patients are under active 5 year follow up (CARE study). Data was analysed retrospectively for glycemic control pattern of 65 patients (36 M, 29 F), mean age 17 years ± SD 4.2, max 21.6 yrs and min 4 yrs (95% CI 15.94, 18.07 $p < 0.0001$). Mean duration of diabetes 8.53 years ± SD 3.6 years, min 1 year and max 18 years (95% CI 7.6, 9.4 $p < 0.0001$). Duration of diabetes was comparable between males and females ($p = 0.66$ NS). None of the patients at the first visit had diabetic retinopathy, which would be again investigated in 2016 to assess changes in the retina and microalbuminuria. 18 (27.6%) patients at the first visit were detected to have microalbuminuria and 2 patients were detected with clinical albuminuria. HbA1c trends demonstrate a decrease from visit 1 Vs Visit 4 (mean 10.46 % Vs 9.5%), with 6 (10%) of patients with Hba1c < 7 at the fourth visit.
**Conclusions:** The management of T1DM under resource constrained population is challenging. The glycemic control in the population detected early with the complications have to be customised with an intense follow up with regular patient education intervention.

## P027
## Socio-demographic profile of children with type 1 diabetes mellitus in a newly-created children diabetes clinic in a semi-urban Cameroonian setting

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**Objectives:** Type 1 diabetes mellitus represents about 5-10% of all cases of diabetes worldwide. Its incidence in Africa is growing due to improvement in diagnosis. Our main objective was to assess the socio-demographic profile of children diagnosed and followed up at a newly created diabetes clinic.
**Methods:** We carried out a descriptive cross-sectional study.
**Results:** A total of 28 children with T1DM were seen with 15 (53.6%) being female. The majority (71.4%) aged between 15–20 years. Twenty-one (75%) had secondary education and 68% resided in the village. Only 42.8% live with their biological parents. Fifteen (53.7%) had had T1DM for at least 2 years and 19 (67%) thought T1DM is caused by excessive sugar intake. The most common recognized symptom of diabetes was weight loss reported by 8 (28.6%). The majority 57.4% were diagnosed in the hospital following a severe illness. More than half, 20, have a glucose meter for self-monitoring of blood glucose (SMBG) and same number possess a urine dipstick for ketone analysis.
**Conclusions:** The social profile of children with type 1 diabetes can help to better adapt treatment options. The diagnosis of type 1 diabetes mellitus should be taught and encourage in primary healthcare centers followed by an adapted education platform to aid the children to better manage their diabetes.

## P028
## High prevalence of vitamin D deficiency among adolescents with type 1 diabetes in Indonesia and its association with diabetic retinopathy and nephropathy

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*Universitas Indonesia, Child Health Department, Paediatric Endocrinology, Jakarta, Indonesia*

**Objectives:** To assess the vitamin D profile in adolescents with T1DM and its association with diabetic retinopathy and nephropathy.

**Methods:** We conducted a cross sectional study involving T1DM adolescents aged 11–21 years old with duration of illness ≥ 1 year. Factors associated with vitamin D level were assessed using questionnaire. Blood sample was collected for 25(OH)D serum level and HbA1c measurement. Albumin/creatinine ratio was measured using urine sample. Fundal photography was performed to assess retinopathy. Serum 25(OH)D ≥ 30 ng/ml was considered sufficient, 21–29 ng/ml was considered insufficient, while ≤ 20 ng/ml was considered deficient.
**Results:** Forty nine subjects (34 female and 15 male) were recruited. Median duration of illness was five years (1–16 years). Median of HbA1c level was 9.5% (6.3%-18%). Mean of 25(OH)D level was 12.6 ± 5.4 ng/mL. None of the subject had sufficient 25(OH)D level, 12.2% had insufficient 25(OH)D level and 87.8% was having 25(OH)D deficiency. Duration of sun exposure was associated with 25(OH)D level (prevalence ratio of 13.3; 95% CI = 1.8-96, p = 0.019); while type of clothing, sunblock, body mass index, milk and juice intake were not associated with 25(OH)D level. Diabetic retinopathy was found in 4 subjects (8.2%), microalbuminuria in 14 subjects (28.5%), and nephropathy in 8 subjects (16.3%); all of which had 25(OH)D deficiency. There were no significant association between vitamin D level with diabetic retinopathy, microalbuminuria, or diabetic nephropathy.
**Conclusions:** The prevalence of vitamin D deficiency among adolescents with type 1 DM is high, despite of Indonesia´s title as a sun-rich country. There was no association between vitamin D level with diabetic retinopathy, microalbuminuria, or diabetic nephropathy.

## P030
## Clinical profile of diabetes among children and adolescents at a paediatric endocrine clinic in Ghana

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[1]*Komfo Anokye Teaching Hospital, Child Health, Kumasi, Ghana*

**Background:** Limited information is available on presentation characteristics and types of youth-onset diabetes in West Africa, with no publications from Ghana. This study determined the clinical features of children and adolescents presenting with diabetes at Komfo Anokye Teaching Hospital (KATH) in Kumasi, a tertiary referral centre for northern Ghana.
**Methods:** Retrospective review of clinical features of all children and adolescents with new-onset diabetes seen at KATH paediatric endocrine clinic from Jan. 2012-Jan. 2014.
**Results:** 47 subjects presented with diabetes. 43 (91.5%) were diagnosed by clinical features and family history as type 1 (T1D), and 4 (8.5%) type 2 (T2D).

For T1D subjects, age range at diagnosis was 0.9-19.9 year (y), peak age of onset 12–13 y, and 2.3% were < 5 y, 25.6% 5- < 10 y, 58.1% 10- < 15 y and 14.0% 15- < 20 y. 69.8% were female. Common clinical features were polyuria (100%), polydipsia (97.7%), and weight loss (67.4%). Mean BMI was −0.55, range −3.21-2.11. 65.1% presented in diabetic ketoacidosis (DKA). Seven had infections at onset (skin, abscess, leg ulcer). Mean ± SD blood glucose was 20.1 ± 3.9 mmol/L and HbA1c 12.1 ± 1.8% (109 ± 20 mmol/mol). Two have since died - one from osteosarcoma and one from a recurrent episode of DKA.

T2D cases were 75% female, age of onset age 13–19 y. All commenced treatment with metformin, with one also on insulin. One had substantial visual loss at diagnosis, cause not yet determined.

13.4% did not have home refrigeration, using clay pot evaporative cooling for insulin storage.
**Conclusion:** In this Ghanaian series, T1D has a female preponderance consistent with a low-incidence country, with high rates of DKA. T2D also occurs. Typology based on clinical features alone is difficult - atypical forms such as malnutrition-related diabetes may be occurring. Community and health professional awareness is warranted given high DKA rates - it is likely that some with T1D are dying misdiagnosed with another condition.

## P031
## Knowledge assessment of type 2 Diabetes in Pakistan

A. Fatima

*Fatima Jinnah Medical University, MBBS, Lahore, Pakistan*

**Objective:** We aim to access the baseline disease related knowledge in patients with type 2 diabetes about their disease, its risk factors, signs/symptoms, related complications and suitable diet. We also aim to find if there is an association between gender, duration of disease & age at diagnosis of diabetes and the above dependent variables.
**Methods:** A 20-item interview-based structured knowledge questionnaire was used to collect information in Sir Ganga Ram Hospital. A total of 100, diabetic patients, mean age 55.2 (11.4 S.D.) years, ranging from 35–80 years, were interviewed.
**Results:** Statistically significant association was found between age at diagnosis aJ1d better understanding of risk factors, (OR = 1.20, P = 0.012 with 95% CI 0.85- 0.98). Statistically significant association was found between gender and better understanding of word "diabetes" or "sugar" OR = 1.15, P = 0.051 with 95% Confidence interval 0.96-1.29). Statistically significant associations were found between gender and patients´ better understanding of disease signs/symptoms (OR = 1.35, P = 0.005 with 95% CI 0.40-0.56). No significant associations were found between gender, duration of diabetes, age at diagnosis and patients´ better understanding of disease related.
**Conclusion:** Priority needs to be given by WHO education programmes for the development of diabetes education program in rural areas to give patients a better knowledge of their disease, to prevent premature morbidity and mortality associated with diabetes.

## P032
## Thyroid dysfunction, celiac disease, economic impoverishment and childhood type 1 diabetes [T1DM] in India

R. Manjunath[1,2], S. Malhotra[1,2,3], S. Srikanta[1,4], V.A. Rao[5], L. Reddy[2], T. Kamala[5], K.L. Chetana[2], B.D. Thyagaraj[5], A. Hegde[5], R. Ashok[1], C.S. Muralidhara Krishna[5], K. Rajiv[5], T. Deepak[2], A. Sharda[6], Diabetes Collaborative Study Group: Samatvam Jnana Sanjeevini

[1]*Jnana Sanjeevini Medical Center and Diabetes Hospital, Diabetes, Community Health, Bangalore, India,* [2]*Samatvam Endocrinology Diabetes Center, Endocrinology Diabetes, Bangalore, India,* [3]*Disha Dosti Free Diabetes Clinic for the Poor, Diabetes, Community Health, Bengaluru, India,* [4]*Samatvam Endocrinology Diabetes Center, Diabetes, Community Health, Bangalore, India,* [5]*Jnana Sanjeevini Medical Center and Diabetes Hospital, Endocrinology Diabetes, Bangalore, India,* [6]*Samatvam Endocrinology Diabetes Center, Endocrinology Diabetes, Bengaluru, India*

**Objective:** To analyze the challenges of diagnosing hypothyroidism and celiac disease in economically underprivileged children with diabetes obtaining medical care at the **DISHA Free Clinic,** India.

**International Guidelines: Autoimmune thyroid disease:** All children with T1DM; Serum TSH level + thyroperoxidase antibodies, at diagnosis and every 2 years thereafter. If Positive thyroid antibodies, thyroid symptoms or goiter: Serum TSH level + thyroperoxidase antibodies, every 6–12 months.
**Methods: DISHA:** Since **1987,** 3000 children provided free insulin, syringes, health counseling, 24 h helplines. Since **2006**, BG meters, **5–10 strips**/month added. Basal bolus insulin 100%. Routine TSH testing unaffordable; done only if symptoms/signs strongly positive.

**DISHA + CDiC/LFAC: 2011-ongoing: [Changing Diabetes in Children and Life for a Child with Diabetes]** 292 children receiving **"enhanced support" - 100 BG strips/ month,** quarterly HbA1c, annual urine albumin: creatinine ratio, TSH on enrolment and once in 1–2 years. Thyroid peroxidase antibodies and celiac disease screening still unaffordable.

**Results: Hypothyroidism:**

Already diagnosed at enrollment to **DISHA + CDiC/LFAC:** 38 out of 292 [13%]

Newly diagnosed at enrollment to **DISHA + CDiC/LFAC:** 26 out of 292 [9%] [Mean TSH 32 uU/ml; range: 4.5 - 150]

Total number of hypothyroid type 1 diabetes children: 64 out of 292 [22%]

"**Growth decline**" was associated with younger age [prepubertal], better initial height and weight SDS and higher prevalence of newly diagnosed hypothyroidism.

**Conclusions:** There is high prevalence of hypothyroidism in T1DM children in India, similar to west. In resource limited setting, growth faltering in T1DM children is commonly related to undiagnosed and untreated hypothyroidism and possibly celiac disease; malnutrition and protein calorie deprivation are contributory. Aggressive poverty alleviation and better health and longevity of children with diabetes remain challenge and dream.

# Poster Tour 5: Diabetes Technology

## P033

## Insulin pump therapy in children: bolus dosing accuracy of different insulin pumps

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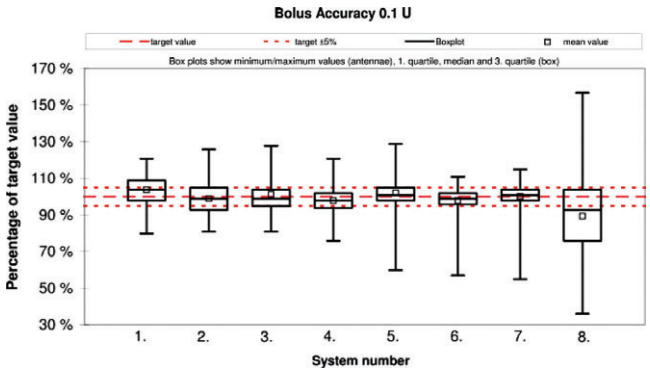
**Objectives:** Continuous subcutaneous insulin infusion is a common therapy for children with type 1 diabetes. Boluses are applied to cover meals and to correct elevated glucose values. In this study, accuracy of the delivery of bolus doses used when treating children, 0.1U and 1U, was evaluated.

**Methods:** In an experimental setting following EN 60601-2-24, 4 different pumps with different insulin infusion sets (IIS) were evaluated (Accu-Chek® Spirit Combo with Accu-Chek® FlexLink [1] and Accu-Chek® Rapid-D Link [2]; Accu-Chek® Insight with Accu-Chek® Insight Flex [3] and Accu-Chek® Insight Rapid [4]; Paradigm® Veo™ with MiniMed® Mio™ [5], MiniMed® Sure-T® [6] and MiniMed® Quick-set® [7]; mylife™ OmniPod® with its IIS [8]). Pumps were installed with the tip of the catheter in a water-filled, oil-covered beaker placed on an electronic balance. After a run-in period, 25 successive boluses were delivered and weighed individually. Each combination of pump and IIS was tested 9 times with each bolus dose.

**Results:** The maximal error of the median bolus was 7% for 0.1U (see Figure) and 2% for 1U.

For 0.1U the maximal deviation from target value was 64%, whereas for 1U it was 42%. In addition there were considerable differences in the scattering of single boluses.




*[Bolus Accuracy 0.1 Unit]*

**Conclusions:** The investigated insulin pumps delivered the smaller bolus dose less accurately than the larger dose. Dosing accuracy might be taken into account when selecting insulin pumps for the treatment of children.

## P034

## Continuous glucose monitoring (CGM) use in type 1 diabetes: an update from the T1D exchange clinic registry

K. Miller[1], N. Foster[1], D. DeSalvo[2], L. DiMeglio[3], L. Laffel[4], W. Tamborlane[5], R. Beck[1], for the T1D Exchange Clinic Registry

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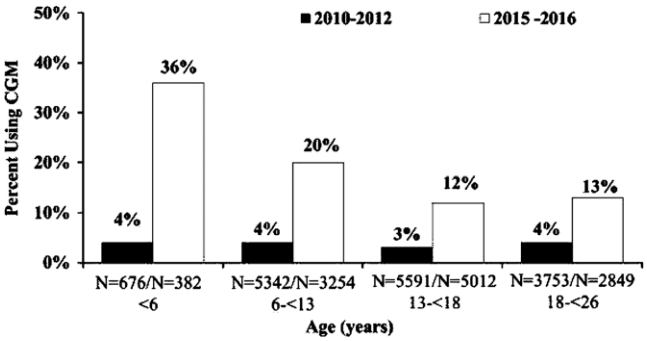
**Objective:** To determine if recent improvements in CGM performance have been associated with increased CGM use and to assess the association between CGM use and Hemoglobin A1c (HbA1c) among pediatric, adolescent and young adult participants in the T1D Exchange clinic registry.

**Methods:** Registry data from 11,497 participants 1- < 26 years of age with duration of T1D ≥1 year collected between May 1, 2015 and May 1, 2016 were compared with registry data collected on 15,362 participants between September 1, 2010 to August 1, 2012. CGM use and most recent HbA1c at each data collection time point were obtained from clinic medical records.

**Results:** The overall number of participants using CGM increased from 530 (3%) in 2010–2012 to 1,802 (16%) in 2015–2016. The largest increase was observed among youth 1- < 6 years old (Figure). In 2010–2012, 41% of CGM users reported using a Dexcom device compared with 78% among current CGM users. Mean HbA1c in 2010–2012 was 7.9% among CGM users compared with 8.6% in non- users (P < 0.001) and among CGM users in 2015–2016 the mean HbA1cc was 8.1% vs. 8.9% in non-users (P < 0.001).

**Conclusions:** CGM use has increased dramatically among youth and young adults with T1D over the past few years likely due to improved CGM performance. CGM users consistently have lower mean HbA1c than non-users. However, HbA1c has worsened among both CGM users and non-users which may be due in part to increased duration of diabetes in most participants.




## P036

## The role of professional continuous glucose monitoring in the management of type-1 diabetes by Ipro2 device at National Institute of Child Health Hospital, Karachi

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*National Institute of Child Health, Endocrinology, Karachi, Pakistan*

**Introduction:** Insulin dependent Type I Diabetes accounts for significant morbidity and mortality.Meanwhile, the value of achieving normoglycemia (or near-normoglycemia) is well-established. To that end, many medical organizations have established aggressive targets for glycemic control in individuals with Type-1, their HbA1c levels are above target in the majority of patients. Continuous glucose monitoring (CGM) is a 6 days test done to evaluate diabetes control by iPro2.

**Objective:** To analyze the importance of Professional CGM in comparison with Self-monitoring BG meters for the management of type 1 diabetes.

**Method:** In this study, CGM of 5 pediatric patients with type 1 diabetes were studied by ipro2 device. This CGM test uses interstitial glucose measurements done every 5 min with a glucose-oxidase-impregnated membrane. The CGM test by iPro2 evaluates glucose control retrospectively with the glucose results being unknown to the

patient until the results are downloaded after the testing period. During this period of study, we compared highs and lows Blood sugar level with Professional CGM and BG meters. The CGM test by iPro2 allows the practitioner and patient to evaluate the effect of diet, physical activity, medications, and lifestyle events on glucose control during the 6 days period.

**Result:** We analyzed the CGM reports of 5 patients with type 1 diabetes by ipro2 at NICH Hospital, CGMs revealed frequent and prolonged asymptomatic hypoglycemia (glucose < 60 mg/dl) and hyperglycemia (glucose >250 mg/dl). It was concluded that use of the CGM System may provide a means to optimize basal and bolus insulin replacement in patients with type 1 diabetes. Uncovering hyperglycemia and hypoglycemia with Professional CGM is relevant to improvement in diabetes management.

**Conclusion:** Professional CGM is a valuable tool in the evaluation of diabetes control by detecting episodes of hypoglycemia and hyperglycemia.

## P037

## How frequent are the dermatological and technical problems of continuous subcutaneous insulin infusion (CSII) and continuous glucose monitoring (CGM)?

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**Objectives:** To identify the frequency of dermatological and technical problems related to the CSII and CGM use in children, adolescents and young adults with type1 diabetes (T1D).

**Methods:** 58 consecutive subjects with T1D [23 males, mean age 12.8 (SD 6.9) years, median disease duration 6.4 (range 0.4-21.9) years, median pump duration 3.6 years (range 0.05-14.7), mean HbA1c 7.04 (SD 0.95)%], who were current or ex pump users, were questioned by the medical staff on the existence of technical and dermatological problems.

**Results:** The majority of children (96.5%) were satisfied with the pump, 3 (5.1%) discontinued. Mean duration of catheter change was 3.2 days (range 2–5). Lipohypertrophy had 25% of subjects, lipoatrophy 1.7% and various local reactions to infusion set 55.1% [10.3% white spots, 50% red spots, 16% red papules, 3.5% hyperpigmentation, 12% bruises, 31% pain at catheter insertion, 10.3% infection requiring local antibiotics , 5.2% infection requiring systematic antibiotics]. Furthermore, 74.1% reported catheter malfunction at least once during the last year (55.1% kinked catheter, 15.5% leaking, 72.4% catheter detachment). There was no difference between the Medtronic and Roche pump in frequency of catheter obstruction or detachment nor between aspart (39 subjects) and lispro(19) insulin groups. Mild DKA was reported by 23.6% (7% needed hospitalization) and 44.8% had pump malfunction (23.2% key board problems, 28.6% with batteries, 16% with stop functioning, 14.5% with rewind, 32.1 % with the clip, 3.7 % with the alarm). Reaction to the adhesive of the catheter was reported by 31.6%. Sensor augmented pump was used by 31% for a median duration of 0.56 years (range 0.21-5.32). Local reactions to the sensor (pruritus and red spots) were reported by 27.7% and 66.6% had difficulties to take away the specks of glue.

**Conclusions:** Technical problems are frequent amongst users of CSII and CGM, however, the majority of patients were satisfied with the treatment.

## P038

## Impact of continuous glucose monitoring system on therapy of cystic fibrosis related diabetes in children and young adults

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*Institute for Mother and Child Healthcare of Serbia Dr Vukan Cupic, Endocrinology, Belgrade, Serbia*

**Objective:** Cystic fibrosis related diabetes (CFRD) is one of the most common complications of CF. CFRD has great impact on progressive deterioration of lung function, poor growth and increased mortality. The need for early detection of disturbance in glucose metabolism was recognized long ago. Current recommendations include screening that begins at age of 10 by performing oral glucose tolerance test (OGTT) but it can`t reveal the initial glucose disturbances. Many centres are using continuous glucose monitoring system (CGMS) to discover hyperglycaemia in real time, during normal activities. There is still no agreement on the application of this method for diagnostic purposes, but it certainly contributes to earlier detection of hyperglycaemia and enables early initiation of insulin therapy. The aim of this study was to evaluate profile of glycaemia in patients with CF followed up in a single centre. The indications for CGMS were abnormalities during OGTT or hyperglycaemia detected during regular visits.

**Method:** Patients were recruited during 2015. Glucose meter and strips were provided to all patients; 4 blood glucose measurements (BGM) per day were required. CGMS was performed by iPro2 system during 7 days. Patients were instructed to record all BGM and dietary intake in the diary. None of them was on corticosteroid therapy.

**Results:** 10 patients were included, four males, with a mean age of 22.4 years (11.1-36.7). In all patients CGMS revealed peaks of glucose higher than 11 mmol/L, after meals even above 19 mmol/L. Asymptomatic hypoglycaemia was noticed in 9 patients. In 4 patients insulin treatment was introduced and all of them changed dietary habits.

**Conclusion:** We observed abnormal glucose values in almost all patients. According to this experience, it seems that CGMS allows better insight of glucose impairment than OGTT in patients with CF as well as early initiation of insulin therapy.

## P039

## Providing patient-friendly data improves insulin pump adherence

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[2]*Florida State University, College of Medicine, Tallahassee, United States*

**Objectives:** Providing patient-friendly data improves insulin pump adherence. Providing patient-friendly data improves insulin pump adherence.

To determine if providing patient-friendly intervention reports resulted in better insulin pump adherence than standard care.

**Methods:** Providing patient-friendly data improves insulin pump adherence

76 adolescents ($M_{age}$ = 14.2 ± 2.3 years; 53% female) with T1D ($M_{diabetes\ duration}$ = 6.8 ± 3.6 yrs) using Medtronic insulin pumps ($M_{pump\ duration}$ = 4.4 ± 3.2 years) and parents participated. All participants received re-education on use of insulin pumps and then were randomized to Patient Feedback or Treatment as Usual. Patient Feedback involved written feedback describing what the patient was doing well and areas needing improvement. Treatment as Usual involved providing the Medtronic report to the physician. Insulin pump adherence was monitored for 6 months.

**Results:** Participants with suboptimal adherence: 58% BGM (n = 44; < 4 readings/day), 45% carb counting (n = 34; < 3 entries/day), 23% bolusing (n = 18; < 3 boluses/day). For optimally adherent participants, adherence in the Patient Feedback group was similar to the Treatment as Usual group; average adherence behaviors remained stable, or declined slightly. However, in this small sample size with ongoing data collection, for suboptimally adherent participants who received Patient Feedback, their adherence appears to improve compared to the Treatment As Usual group (Table 1).

**Conclusions:** Providing patient-friendly data with recommendations may benefit adolescents with suboptimal insulin pump adherence. Data collection is ongoing and full intervention effects will be analyzed at study completion.

| | Suboptimal Adherence | | | | | |
|---|---|---|---|---|---|---|
| | *Treatment As Usual* | | | *Patient Feedback* | | |
| | *Education* | *Tx 1* | *Tx 2* | *Education* | *Tx 1* | *Tx 2* |
| ***Avg # BG Readings/Day*** | 2.2 | 2.1 | 1.9 | 2.6 | 2.7 | 2.9 |
| ***Avg # Carb Entries/Day*** | 1.5 | 1.6 | 1.6 | 1.9 | 2.0 | 2.1 |
| ***Avg # Boluses/Day*** | 1.8 | 2.0 | 2.2 | 2.0 | 2.6 | 2.8 |

*[Table 1. Insulin Pump Adherence at 3 Visits]*

## P040
## Mean blood sugar variability versus HbA1c in monitoring effective glycaemic control

B. Bassoy, G. Margabanthu

*Kettering General Hospital, Kettering, United Kingdom*

**Objectives:** The clinics use near patient HbA1c testing as well as SMART meter downloads to analyze patient compliance and treatment results. The MDT has an oversight of the process to actively facilitate the learning for patients and their families to review and make changes to their insulin regime. Glycaemic Variability was compared using mean blood sugar values and HbA1c.

**Methods:** A prospective analysis was undertaken from Jan 2014 to June 2014 to compare the A1c and average blood sugars alongside the standard deviation to analyze the correlation with glycaemic control and variability. All downloads had a mean of 5.3 tests a day.

**Results:** Mean A1C for 100 downloads was 61.67 mmol/mol (9.8 mmol/L) that was comparable to a mean blood sugar of 9.6 mmol/L with a mean standard deviation of 4.7. This correlation changed when the data was stratified based on Standard deviation.

When the standard deviation was less than 2 the average A1C was 45.75 mmol/l(7.6 mmol/L) versus 5.525 mmol/L average mean blood sugar. Standard deviation between 2–4 co- related to A1C of 53.9 mmol/mol (8.7 mmol/L) versus 7.9 mmol/L average mean blood sugar. Surprisingly both were the same when the standard deviation was more than 4 with a mean A1C of 63.4 mmol/mol (10 mmol/L) and the mean average blood sugars (9.97 mmol/L) . Gap widened in the opposite way when the Standard deviation was more than 6 with a A1C of 73.89mmool/mol (11.6 mmol/L) versus average mean blood sugar of 12.4 mmol/L.

There was 50% reduction of DKA and hypoglycemia admissions in this period.

**Conclusions:** Simple SMART meters are effective predictors for diabetes monitoring with average mean blood sugars, which are very different to the near patient A1c and it bears a correlation between standard deviation of 4–6 with increasing gaps both sides of the spectrum.

Smart meter download review is a good way of analyzing blood sugars targets, variability and control over a period of time with empowerment of patients.

# Poster Tour 6: Diabetes Technology & New Insulins and Pharmocologic Agents

## P041

### Initial experiences and learnings from the unique "first country in the world - India" novel libre pro continuous glucose monitoring [CGM] system: plea for approval in pediatric diabetes

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**Objective:** To present initial experiences / learnings from Libre Pro CGM, currently exclusively launched in India *[not available in any other country in the world].*

**Methods:** Abbott FreeStyle® Libre Pro Flash Glucose Monitoring System appears to be transformative. Superiority: Highest accuracy, most user friendly, tremendous ease of use, 14 day memory, non-requirement of calibrations with finger stick glucose.

We adapted Professional ["Pro"] version, into Personal mode [76 subjects; 262 sensor 14 day cycles; continuous/ intermittent use; local, national and international- USA, Australia, Indonesia- subjects - telemedicine - software downloads; parallel finger prick BG once daily / biweekly 7 point profiles - despite not recommended by manufacturers].

**Results:** Experiences from young adults with type 1 diabetes: *Currently Libre Pro is approved by Health Authority of India only for people above 18 years of age.*

**Indications:**

1. T1DM on pump/MDI;
2. Pregestational diabetes;
3. Prepregnancy counselling;
4. Educational/ motivational tool;
5. Challenging clinical scenarios [hypoglycemia unawareness, nocturnal hypoglycemia, dawn, renal / liver dysfunction, artificial reproduction technologies],
6. Special life situations [high altitude mountain climbing; underwater sports; recreational/ religious vacations].

**Complications:** malinsertion [1], bleeding during sensor insertion [2], premature disconnection of sensor [4]; true sensor malfunction [Nil].

**Benefits:** HbA1c improvements, decreased hypoglycemia, improved/ flexible lifestyles, better accuracy at high altitudes, improved motivation and very high patient satisfaction/ happiness [no finger pricks!].

**Conclusions:** With further continued technology improvements and decreasing costs, **Libre "Professional",** and more importantly **"Personal" CGM,** could foster "universal" and "affordable" CGM use [with special benefits in Pediatric Diabetes].

## P042

### Euglycemic diabetic ketosis in an adolescent with type 1 diabetes treated with insulin and Dapaglifozin an SGLT2 inhibitor

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We present an euglycemic diabetic ketosis in a female adolescent with Type 1 Diabetes (T1D) who was on Dapaglifozin, an inhibitor of the sodium-glucose cotransporter 2 (SGLT2). The patient was 17 years old, had T1D during 9 years, and was started on Dapaglifozin 10 mg/day with the aim to reduce her insulin dose, her weight and her clinical hyperandrogenism. She took the drug during 11,5 months with no adverse events, basal insulin was decreased from 40 to 17 U and she lost 8 kg reaching a BMI of 21,1 kg/m2 ( 174 cm 64 kg). In addition her metabolic control was improved (HbA1c 8,3 to 7,5%, mean blood glucose 175 to 161 mg/Dl and glucose variability blood glucose SD 85 to 77). She was on an insulin pump and continuous glucose monitoring (CGM). The glucose sensor was well calibrated and interstitial glucose readings were concordant with capillary blood glucose. Suddenly she presented with nausea and vomiting. The CGM showed stable glucose levels under 200 mg/dl. Capillary blood glucose was 180 mg/dl, and the pump delivered a correction insulin bolus. She had several vomits without hyperglycemia. Three hours later she was severely dehydrated and fainting. Capillary Betahydroxibutirate (ketones) was 4.6 nmol/l and blood glucose 224 mg/dl. She received IV physiological saline fluid, ondansetron, oral carbohydrates and SC insulin boluses. Hydratation and general condition improved soon, but despite several insulin doses, ketones production continued during 24 hours. Interestingly the pump was working well and the cannula was not changed, after the ketosis was resolved, she continued using the same cannula with good metabolic control and no ketones. We report an atypical case of euglycemic diabetic ketosis related to Dapaglifozin. In this case CGM confirmed that ketones were present without hyperglycemia. This condition may be life threating and must be suspected in the absence hyperglycemia.

## P043

### Paying the price for accessing insulin

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**Objective:** Approximately 50 million people globally have difficulties accessing insulin. We assessed insulin prices as they are thought to be a key barrier to accessing insulin.

**Methodology:** In mid-2015, insulin prices were collected from national key informants, individuals and price databases. Government procurement prices and patient prices (public and private sector) were analysed by insulin type, presentation and brand. Prices were standardized to 10 ml 100 IU/ml insulin in US dollars. Affordability was expressed as the number of days' wages needed by the lowest paid unskilled government worker to buy 10 ml insulin.

**Results:** Median government procurement prices of analogues ($34) were far higher than human insulins ($6). The same was seen for patient prices in the public sector ($45 vs $8) and private sectors ($39 vs $17). Vials were generally lower priced than cartridges and pens e.g. regular/isophane 30/70, private sector: $13 vial, $32 pen, $20 cartridge. In both sectors, some large price variations were seen across countries eg. glargine, private sector, ranged from $8 (India) to $196 (Venezuela). Insulin was unaffordable for those on low wages i.e. 2.5 vs 7.5 days' wages for human insulin and analogues, respectively, in the public sector and 3.5 vs 9.5 days' wages in the private sector.

**Conclusion:** Poor insulin availability has been reported previously forcing many people to access insulin in the private sector. Drivers of higher costs to individuals and health systems include using

analogues, and cartridges/pens. Efficient government procurement practices can lead to reduced prices, which need to be passed on to patients (where insulin is not free). Add-on charges, such as tariffs and taxes, can further increase prices and should be removed. In order to ensure that an affordable source of insulin is present, a global compact with the insulin industry is necessary to guarantee that human insulin in vials is not removed from the market.

## P044

## Glycemic variability estimated with time series analyses is associated with subclinical macrovascular damage

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**Hypothesis:** Glycemic Variability (GV) in children with type 1 diabetes (DM1) is related to subclinical macrovascular complications.

**Material and Methods:** A transversal, observational study, Diabetes Unit Hospital Sagunto. Cases-controls paired by age and sex. Exclusion criteria: under 6 years of age, less than 1 year disease progression time, microangiopathy. SPSS and R.

Variables

- GV: continuous monitoring of interstitial glucose. Classic indices: EasyGV program (standard deviation-SD, Coefficient Variation-CV, interquartile range-IQR, Mean Amplitude of the largest Glycemic Excursion-MAGE, Continuous Overlapping Net Glycemic Action-CONGA). Parameters derived from time series analysis (alpha coefficient of Detrended Fluctuation Analysis-α, minor axis-ma, major axis-MA and eccentricity-E of the Poincaré Plot).
- HbA1c.
- Peripheral and central Arterial Blood Pressure (ABP), Pulse Wave Velocity: 24 hours of outpatient monitoring with an oscillometer (Mobil-O-Graph). Data were interpreted with the aid of time series analyses.
- Carotid intima media thickness (cIMT)

**Results:** 41 subjects with DM1, median age 13.6 yrs, HbA1c 7.8%

*[Glycemic Variability]*

Diabetic cIMT 442.9 μm, no significant differences with controls. 7 DM1 subjects with high ABP

(5 masked), 50% no-dippers. The parameters for arterial rigidity were greater in diabetic patients than in controls. No association was observed between GV and cIMT. α for glucose was associated with variability in ABP and arterial rigidity, both estimated through time series analyses: β negative for ma-meanABP (p = 0.005, R2 = 0.180) and ma-central diastolicABP (p = 0.014, R2 = 0.256); β positive for α-central systolicABP (p = 0.01, R2 = 0.256).

**Conclusions:** Increased arterial rigidity precedes increases in cIMT. GV estimated with routine indices is not associated with vascular damage, but when both are evaluated with time series analyses, an association is observed.

## P045

## Our experience with sensor-augmented-pump therapy for children

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**Objectives:** To describe the use of sensor-augmented-pump (SUP) therapy with predictive low glucose suspension in type 1 diabetes (T1D) children and their influence on metabolic control and hypoglycaemia episodes.

**Methods:** Description of our experience in SUP use from 2015 summer in T1D children controlled in our Pediatric Diabetes Unit (>250 children followed-up) at University Miguel Servet Children's Hospital. We have analysed prior and post- SUP data: HbA1c, percentage of hypoglycaemia and severe hypoglycemia episodes, basal percentage and bolus number.

**Results:** 14 T1D patients are paying for the SUP treatment in our Unit. The indication for SUP was: 2 cases by unawereness hypoglycemia and severe hypoglycemia episodes. 1 case by permanent neonatal diabetes. 3 cases < 6 years old, 4 cases < 10 y, and 4 cases < 15 y. 57% were male. The average age was 8,95 years (range 3,7-13), average of age at onset of T1D was 3,94 years (0,1-11). Duration of diabetes average was 5,01 years (1–7,6). No cases had ketacidosis. Previous treatment to SUP was 42% with pump. The average HbA1c for the prior SUP treatment was 7,32%. And HbA1c after 3 months with SUP treatment was 7,2%, and 7,2% at 6 months. % of hypoglycemia before SUP: 10,2. After SUP < 8% (even longer than 3 months, statistically significative). The previous severe hypoglycemia cases have not presented any hypoglycemia episodes after SUP. 46,85% basal rate pre- SUP and 38,57% at 3 months and 39,75% at 6 months. Bolus number/day (pre-SUP, at 3 and 6 months): 6,7, 7,8 and 8 bous/d (p < 0,05). 3 patients have decided to finish SUP. One out of them was by recurrent site infections.

**Conclusions:** SUP improves metabolic control, even in pediatric children with good control, with less needs of basal rate. It is clear and fair, the SUP treatment in patients with unawareness hypoglycemia or severe hypoglycemia episodes is highly beneficial. Therefore, these families should receive some subsidy by health public system.

## P047

## Unsupervised home use of day-and-night closed-loop insulin delivery: a pooled analysis of randomized controlled studies in adolescents with type 1 diabetes

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**Objectives:** To compare day-and-night hybrid closed-loop insulin delivery and sensor-augmented pump therapy in adolescents with type 1 diabetes by combining data collected during free-living home studies without remote monitoring or supervision.

**Methods:** We evaluated two randomized crossover studies in 24 adolescents on insulin pump therapy (age 15.0 ± 2.8years; HbA1c 68 ± 8 mmol/mol [8.4 ± 0.8%]; duration of diabetes 8.0 ± 3.4years; mean ± SD). In both studies, each subject underwent a period of closed-loop insulin delivery and a period of sensor-augmented insulin pump therapy of identical duration in random order. In each study, interventions lasted 7 days or 21 days, respectively. During closed-loop, a model predictive algorithm automatically directed insulin delivery between meals and overnight; prandial boluses were administered by participants using a bolus calculator.

**Results:** The proportion of time that sensor glucose was in the target range (3.9 to 10 mmol/l, primary endpoint) was greater during closed-loop phase than with sensor-augmented pump therapy (67.1 ± 9.6% vs. 49.6 ± 12.1%, mean ± SD, p < 0.001). The mean glucose level was lower during closed-loop (8.7 ± 1.0 vs. 10.3 ± 1.6 mmol/l, p < 0.001), as was the time spent above target (29.2 ± 10.4% vs. 47.2 ± 13.8%, p < 0.001). The time spent with

| SD (mg/dL) | CV (%) | IQR (mg/dL) | MAGE (mmoL/L) | CONGA (mmoL/L) | α | ma (mg/dL) | MA (mg/dL) | E |
|---|---|---|---|---|---|---|---|---|
| 68.5 | 38.85 | 102 | 7.18 | 8.35 | 1.54 | 5.09 | 98.75 | 19.77 |

glucose levels below 3.9 mmol/l was low and comparable between interventions (3.3 [1.6 to 5.2] vs 1.8 [0.6 to 5.1]%, median [IQR], p = 0.12). Improved glucose control during closed-loop was related to increased variability of basal insulin delivery (p < 0.001) and an increase in total daily insulin (55.1 [41.9 to 66.5] vs. 53.8 [41.2 to 61.4]U/day; p = 0.040) compared to control intervention.

**Conclusions:** Free-living unsupervised home use of day-and-night hybrid closed-loop over period of one to three weeks in adolescents with type 1 diabetes is safe and feasible. Compared to sensor-augmented insulin pump therapy, closed-loop may improve glucose control without increasing the risk of hypoglycemia.

## P048

## Effects of Trigonella foenum graecum and sodium orthovanadate on antioxidant enzymes, membrane bound ATPases and glucose transporter expression in muscle, kidney and brain in female diabetic rats

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**Objectives:** Oxidative stress in diabetic tissues is accompanied by high level of free radicals and the simultaneously declined antioxidant enzymes status leading to cell membrane damage. In the present study, the effect of sodium orthovanadate (SOV) and *Trigonella foenum graecum* seed powder administration has been studied on blood glucose and insulin levels, membrane bound ATPases ($Na^+K^+$ATPase , $Ca^{2+}$ATPase) , antioxidant enzymes (superoxide dismutase, glutathione S-transferases), DNA degradation, lipid peroxidation, and distribution of glucose transporter in liver, muscle and brain tissues of the alloxan induced diabetic rats and to see whether the treatment with SOV and *Trigonella* is capable of reversing these effects.

**Methods:** Diabetes was induced by administration of alloxan monohydrate (15 mg/100 g b.wt.) and female rats were treated with 2 IU insulin, 0.6 mg/ml SOV, 5% *Trigonella* in the diet and a combination of 0.2 mg/ml SOV with 5% *Trigonella* separately for 21 days.

**Results:** Diabetic rats showed hyperglycemia with almost four fold high blood glucose levels. Hyperglycemia increases lipid peroxidation and DNA degradation, causing decreased activities of membrane bound ATPases , antioxidant enzymes and glucose transporter expression with diabetes in the rat tissue. Rats treated with combined dose of vanadate and *Trigonella* had glucose levels comparable to controls, similar results were obtained with the activities of antioxidant enzymes, membrane bound ATPases, DNA degradation, lipid peroxidation and glucose transporter in diabetic rats.

**Conclusion:** Our results showed that lower doses of vanadate (0.2 mg/ml) could be used in combination with *Trigonella* to effectively counter diabetic alterations without any toxic side effects.

# Poster Tour 7: Psychosocial Issues

## P049

### Diabetogenic and cardiometabolic risk factors of health-related quality of life among Taiwanese overweight and obese adolescents

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**Objectives:** The objective of this study is to demonstrate the association between diabetogenic and cardiometabolic risk factors and health-related quality of life (HRQOL) in a medically referred sample of Taiwanese overweight and obese adolescents.
**Methods:** Adolescents age 11–19 years with body mass index > 85 th % of age- and sex-adjusted weight were recruited in a tertiary hospital. We conducted anthropometric measurements and biochemical testing. Insulin sensitivity was represented by homeostasis model assessment-insulin resistance and quantitative insulin sensitivity check index. Body composition was measured by the dual-energy X-ray absorptiometry. HRQOL was assessed by the Pediatric Quality of Life Inventory (PedsQL). Student *t* test was used to compare the differences in the PedsQL scores between groups stratified by weight status and cardiovascular risks. Multiple linear regression models were further applied to identify predictive factors associated with PedsQL.
**Results:** Overweight and obese adolescents (n = 60) reported lower PedsQL scores as compared to that of non-obese participants. Further stratifying overweight/obese subjects by cardiometabolic risks, we observed larger negative effects in those with at least one cardiometabolic risk factor. Both BMI z-score and serum levels of alanine aminotransferase (ALT) were negatively correlated with overall and subscale scores of PedsQL with correlation coefficients being from −0.248 to −0.433. In multivariate linear models, ALT stood out as the most salient factors associated with poor obesity-related HRQOL with $\beta = -0.31$ ($p < 0.01$) and −0.39 ($p < 0.001$) for the overall score and physical subscale of PedsQL, respectively.
**Discussion:** Taiwanese overweight and obese adolescents, particularly those having additional cardiometabolic risk factors, reported lower HRQOL than did normal weight peers. Impaired liver functions may predispose overweight/obese subjects to even worse HRQOL, notably in their physical functioning.

## P050

### Lower executive functioning associated with greater diabetes-specific risk-taking in adolescents with type 1 diabetes

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**Objective:** Diabetes-specific risk-taking is a novel concept defined as a type of nonadherence in which youth make decisions about self-management that put them at risk for poor health outcomes (e.g., going 24 hours without insulin, drinking alcohol with no plan to check blood glucose overnight). Executive function deficits such as poor planning, problem-solving, and impulse-control have been associated with greater *general* risk-taking behavior (e.g., smoking, binge drinking) and poorer diabetes management. In this pilot study, we investigated whether poorer executive functioning was associated with *diabetes-specific* risk-taking, regimen adherence, and general risk-taking in youth with type 1 diabetes (T1D).
**Methods:** Thirty adolescents with T1D (age 15–19, 60% female, M A1c = 8.7 ± 1.4%, and 33% on insulin pumps) and his/her caregiver participated. Youth completed a new questionnaire: the Diabetes-Specific Risk-Taking Inventory (DSRI, $\alpha = .92$), in which they reported how often they engaged in 34 behaviors that placed them at risk for acute adverse events or poor glycemic control. Participants also completed general risk-taking items from the Risk-Taking and Self-Harm Inventory for Adolescents (RTSHI-A). Parents reported on their child's executive functioning, using the Behavior Rating Inventory of Executive Functioning (BRIEF), and general diabetes management with the Diabetes Management Questionnaire (DMQ).
**Results:** Results indicated a positive correlation between poor executive functioning (as measured with mean scores across all 86 items) and diabetes-specific risk-taking ($r = .46$, $p < .05$). Associations with general risk-taking and adherence were not statistically significant, but were in the expected direction.
**Conclusions:** Executive functioning may play an important role in understanding adolescent non-adherence and specifically risks that teens take with their diabetes care.

## P051

### Illness Intrusiveness in parents and glycemic control in youth with type 1 diabetes: intergenerational processes

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**Objectives:** Type 1 Diabetes (T1D) is a chronic condition imposing strict treatment regimens, impacting both patients and their parents. Despite an extensive diabetes literature on specific intergenerational links, comprehensive models relating broader parental functioning to patient functioning are scarce. The present study investigated an intergenerational path model, in which parental functioning (illness intrusiveness and depressive symptoms) was expected to relate to patient functioning (depressive symptoms, treatment adherence, and glycemic control) through parenting practices (overprotection and psychological control).
**Methods:** Selected through the Belgian Diabetes Registry, 316 - patient-mother dyads and 277 patient-father dyads completed questionnaires. All patients were diagnosed with T1D, were aged 14–25, and were living with their parents. Patients indicated their depressive symptoms and treatment adherence; treating physicians provided patients' HbA1c values. Parents reported on their experience of illness intrusiveness, their depressive symptoms, and the patient's treatment adherence. Parenting, as operationalized by the dimensions of overprotection and psychological control, was assessed in both parents and patients.
**Results:** Structural equation modelling favored our hypothesized path model to an alternative, child-driven model. An adequate fit was found for both patient-mother and patient-father dyads. Parental functioning seemed to predict patient functioning with parenting dimensions as intervening mechanisms. Parental illness intrusiveness was associated with parental depressive symptoms, both predicting overprotection and psychological control. Psychological control in particular predicted patient depressive symptoms, treatment adherence, and glycemic control.
**Conclusions:** These findings underscore the relevance of including parental functioning when assessing patient outcomes.

## P052

## Body emotional map: an innovative and useful tool to improve parents´ adaptation to the diagnosis of type 1 diabetes of their child

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**Objectives:** The diagnosis of type 1 diabetes mellitus (T1DM) in a child is a traumatic event for parents. The path of a good adaptation to the child´s disease is a purpose of the therapeutic education to attain and keep a good quality of life. Aim of this study was to demonstrate the effectiveness of the new tool Body Emotional Map (BEM) in helping parents to overcome the trauma of T1DM diagnosis and to achieve the best adaptation.

**Methods:** Sixty-two parents (29 mothers, 33 fathers) of 36 children with T1DM (age = 11.3 ± 3.3 yrs; T1DM duration >1 yr; HbA1c = 57 ± 11 mmol/mol) were recruited in a 3-days educational group intervention study. The re-examine of the traumatic event of the T1DM diagnosis through the BEM path included spatial and time-line anchorage, retrace of the future, emotional awareness, interactive discussion. Relaxing technique, diaphragmatic breathing, and guided visualization were used by 1 psychologist, 1 counselor and 1 pediatric diabetologist. Self-report questionnaires [Diabetes Related Distress (DRD), Parent Stress Index Short Form scale (PSI-SF), Fear of Hypoglycemia Survey (FHS), Parent Health Locus of Control Scale (PHLOC), and Health Survey Short Form-36 (SF-36)] were filled by parents at baseline, 1 month (M1), and 3 months (M3) after the intervention.

**Results:** Respect to baseline, at time M3 we found a significant score reduction of the "difficult child" subscale of the PSI-SF in both parents ($p < 0.05$), of the DRD in mothers (59.0 ± 2.6 *vs.* 52.4 ± 2.7 vs., $p = 0.03$), and of the "parental distress" subscale of the PSI-SF in fathers (24.9 ± 1.5 *vs.* 21.8 ± 1.5, $p = 0.04$) . Moreover, the social functioning score of the SF-36 was significantly improved in fathers at time M1 (81.3 ± 3.2 *vs.* 88.3 ± 3.2, $p = 0.03$).

**Conclusions:** In T1DM we must always to consider the emotional reaction occurring when the diagnosis is given both in children and parents. BEM path seems to reduce stress and to improve social functioning of parents of children and adolescents with T1DM.

## P053

## Parent-reported perceptions of educational opportunities to alleviate burden associated with the management of type 1 diabetes (T1D) in children < 8 years old

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**Objective:** Management of T1D in youth < 8 years old places substantial stress upon parents. We interviewed parents of children < 8 in an effort to identify educational opportunities to relieve their perceived burdens of care.

**Methods:** Semi-structured qualitative interviews were conducted with parents (81% mothers) of 79 children with T1D, aged 1 to < 8 years old, from 4 diverse sites. All youth (77% White) had T1D for ≥6 months; mean age was 5.2 ± 1.5 years, T1D duration 2.4 ± 1.3 years, A1c 7.9 ± 0.9%, 66% pump-treated. Interview transcripts were coded and evaluated using content analysis to derive central themes.

**Results:** Parents of young children with T1D were constantly aware of their obligation to care for their child's diabetes at home and their responsibility to educate others involved in their child's care. Parents identified 3 major areas in which education would reduce their perceived burdens of care, worry, and stress while increasing their confidence in diabetes management: 1) further knowledge of potential acute and chronic complications of T1D; 2) education from healthcare providers related to the benefits and burdens of advanced diabetes technologies (pump and CGM) specifically in young children; and 3) separate educational courses for other caregivers regarding overall T1D care, insulin administration, and symptom recognition of hypoglycemia and hyperglycemia.

**Conclusions:** Given high parental stress of T1D care in early childhood, tailored education around developmentally relevant issues of T1D care may be particularly appreciated by parents. Parent requests for education should be supported, as education provides parents with tools to reduce worry, increase confidence in their abilities, improve other caregivers' abilities, and provide realistic expectations regarding pros and cons of technology as well as risks for complications. Such educational efforts may reduce parental burden while helping to optimize glycemic control in young children with T1D.

## P054

## Mood and anxiety disorders in adolescents with type 1 diabetes and their parents/caregivers: first results from the baseline assessment of the longitudinal diabetes LEAP study

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**Objectives:** The exact scope of mood and anxiety disorders in adolescents with type 1 diabetes (T1D) is unknown as prior research mainly focused on depression, used questionnaires and overlooked parental emotional problems (EP). This study examines 1) the prevalence of these disorders in adolescents with T1D using a diagnostic interview, 2) the relation between adolescent and parental EP.

**Methods:** Adolescents (aged 12–18) with T1D were recruited in 2015–16 at Dutch paediatric clinics. Mood and anxiety disorders were assessed with the Diagnostic Interview Schedule for Children-IV. In primary caregivers, depressive and anxiety symptoms were assessed with the PHQ-9 and GAD-7 (cut-off ≥10). A Fisher's Exact test was conducted to assess the relation between parental and adolescent EP. Additional clinical data is being collected and will be available to present at the ISPAD conference.

**Results:** The sample consisted of 154 adolescents, of whom 51% were boys ($n = 78$). Mean age was 14.5 years (SD = 1.83). Insulin-therapy was mainly administered through continuous subcutaneous infusion (79%). While 15% of the adolescents ($n = 23$) reported having experienced at least one mood or anxiety disorder in the past year, only 35% of this group had consulted a health-care professional for these problems. Anxiety disorders were more prevalent (14%) than mood disorders (4%). In the primary caregivers, of whom 89% were mothers, with a mean age of 46.2 years (SD = 4.58), clinically relevant depressive symptoms were more prevalent than anxiety symptoms (5% vs. 4%). Parental and adolescent EP were not significantly related ($p > 0.99$).

**Conclusion:** The first results of the Diabetes LEAP study suggest mood and anxiety disorders in adolescents with T1D often go untreated. In adolescents anxiety disorders were more common than mood disorders. Parents, however, more often reported depressive symptoms. Diabetes teams are advised to be aware of parental EP even if the adolescent does not have an emotional disorder.

## P055
## Diabetes-specific emotional distress in parents of teenagers with type 1 diabetes

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Parent involvement in their teen's diabetes regimen is associated with optimal outcomes, but can also lead to increased diabetes-specific emotional distress. Our team created a suite of diabetes distress measures. We report on the psychometric properties of the P-PAID-T, a parent-report measure of their own diabetes distress.We utilized two distinct data sets. One with 256 parents of teens, (M age 15.7, range 14–18, 60% female, 68% Caucasian, M A1c = 9.1) enrolled in a depression-prevention RCT. The other includes parents of 1026 teens, (M age 14.4, range 12–18, 90% Caucasian, M A1c = 8.9) attending one of 42 diabetes camps.Principal component factor analysis with oblique rotation was performed. The RCT data resulted in a 24 item measure, Cronbach's $\alpha$ = .96. The one-factor solution accounted for 53% of the variance. The camp data resulted in a 23 item measure (same 2 items deleted from RCT data plus one more), Cronbach's $\alpha$ = .95. The one-factor solution accounted for 47% of the variance.Scores from the RCT significantly correlated with parent r = .65 and teen r = .40 reports of family conflict; parent r = .56 and teen r = .27 reports of depression; and teen report of emotional distress r = .38 (all p's < .001), evidencing criterion validity. Discriminant validity was shown by negative correlations with diabetes strengths r = −.33 and adherence r = −.30 (p's < .001). A positive correlation with A1c (r = .34, p < .001) suggests better control may occur at the cost of higher parent distress. Scores from the Camp study negatively correlated with parent r = −.50 and teen r = −.28 reports of self-care skills and teen report of strengths r = −.44, (p's < .001), offering more evidence of discriminant validity.This psychometric assessment of the P-PAID-T, with over 1,200 parents of teens, suggests it reliably and validly captures parents' diabetes-specific emotional distress, is associated with key clinical outcomes, and may be useful in routine, clinic-based assessments to guide clinical interventions.

## P056
## Executive problems in adolescents with type 1 diabetes are associated with poor metabolic control and low physical activity

C. Nylander[1], Y. Tindberg[1], J. Haas[2], I. Swenne[1], T. Torbjörnsdotter[2], K. Åkesson[3], E. Örtqvist[2], J. Gustafsson[1], E. Fernell[4]

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Management of diabetes is demanding and requires efficient cognitive skills, especially in the domain of executive functioning. However, the impact of impaired executive functions on diabetes control has only been studied to a limited extent.

**Objective:** To investigate the association between executive dysfunctions and diabetes control in adolescents with type 1 diabetes.

**Methods:** 241/477 (51 %) of 12–18 year-old adolescents, with a diabetes duration of >2 years, in Stockholm. Uppsala and Jönköping, Sweden, participated. Parents and adolescents completed questionnaires, including BRIEF, ADHD Rating Scale (ADHD-RS) and background factors. Diabetes related data was collected from the Swedish Childhood Diabetes Registry, SWEDIABKIDS. Self-rated and parent-rated executive functioning problems were analyzed with regard to gender, HbA1c, frequency of outpatient visits and physical activity, taking background factors into account.

**Results:** Executive functioning problems, according to BRIEF and/or ADHD-RS, respectively, were associated with mean HbA1c > 70 mmol/mol, many outpatient visits and low physical activity for both genders. Self-rated executive problems were more prevalent in girls, while parents reported these problems to a larger extent in boys.

**Conclusion:** Patients with executive functioning problems need to be recognized by the diabetes team. The diabetes care should be especially tailored to provide adequate support to these patients.

# Poster Tour 8: Latebreakers

## P057
## Activity of matrix metalloproteinase in development of experimental diabetes

D. Tursunov

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**Topicality:** Matrix metalloproteinases (MMPs) - group of structurally related zinc dependent endopeptidases involved in the degradation of the basement membrane and extracellular matrix. MMP modulate the degradation of extracellular matrix by binding to specific receptors, the expression of which, in turn, is mediated by levels of several pro-inflammatory cytokines, neuropeptides, integrins, growth factors, and apoptosis inducers (Schnee JM, Hsueh WA, 2000; Murphy-Ullrich JE, 2001; Ross RS, Borg TK, 2001; Wang BW et al., 2008).
**Objective:** To investigate activity of metalloproteinases in the dynamics of the development of alloxan diabetes.
**Material and Methods:** Alloxan diabetes in albino rats receiving administration of alloxan in a dose of 13 mg per 100 g body weight once. 1-, 4-, 7- and 14-day experiment in serum to determine the activity of metalloproteinases-1 and −9 PCR method.
**Results and discussion:** As a result of the experiment it was found that the development of alloxan diabetes first day of experiment significantly increases the activity of the enzymes, especially a sharp increase in MMP-1 and MMP-9 is set to 7 and day 10 of the experiment. Increasing their activity was 2.1 and 2.6 times, respectively, compared with control animals. This is due to the accumulation of blood glycated endoproducts , i.e. complexes of organic substances (mostly proteins) and carbohydrates.
**Conclusion:** Thus, it is proved that the development of alloxan diabetes increases the activity of metalloproteinase-1 and −9. The development of pharmaceuticals that inhibit the work of the enzyme - a promising new way to protect the body´s cells in diabetes.

## P058
## Temporal dynamics of serum let-7 g expression show its involvement in the decline of residual beta cell function

K. Wyka[1], M. Bartlomiejczyk[2], B. Malachowska[2,3], P. Pruszkowska[1], P. Wroblewski[1], A. Szadkowska[1], W. Mlynarski[1], W. Fendler[2]

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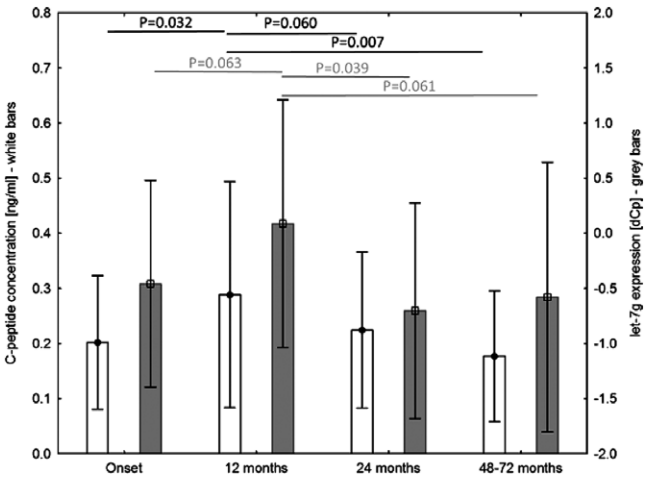
**Objective:** To evaluate whether the serum profile of microRNAs changes is parallel with residual beta cell function or autoantibodies in children with newly onset type 1 diabetes (T1DM).
**Methods:** A group of 30 children with T1DM had serum samples collected at four timepoints: at onset, after 12, 24 and between 48–72 months since onset of T1DM. In all samples levels of four autoantibodies and c-peptide (CP) were evaluated. A panel of six microRNAs (miR-24, miR-21, miR-126, miR-146, miR-375 and let-7 g) selected on the basis of a previous panel profiling experiment and current literature had their expression measured in the serum using a quantitative realtime-PCR (qPCR).
**Results:** Serum levels of ICA, ZnT8A and CP differed significantly throughout the observation period with CP showing a significant increase at the 1-year timepoint followed by a decline thereafter. ZnT8A and ICA declined linearly over time, while GADA and IA2A levels did not change significantly. Expression of beta-cell associated miR-375 was below detection level in qPCR in all samples since the 1-year timepoint. Let-7 g expression pattern mirrored that of C-peptide (fig 1). At the last timepoint, expression of let-7 g correlated with C-peptide levels (r = 0.32; p = 0.07) hinting at let-7 g's association with residual beta cell function.
**Conclusions:** Temporal dynamics of let-7 g showed an association with residual beta cell function and its involvement in the progression of type 1 diabetes.




*[Figure 1]*

## P059
## Identification of a novel INS-gene missense variant p.G71V in three generations with diabetes

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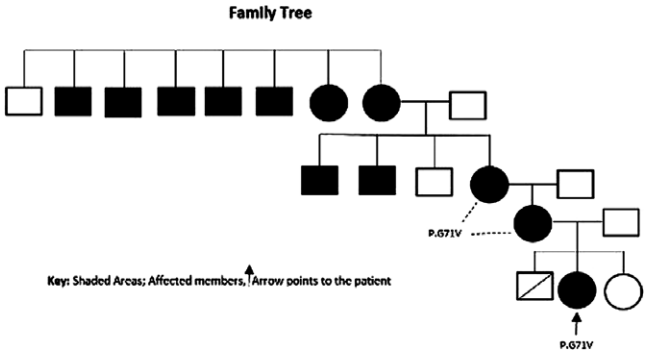
**Case:** A 12 year old non-obese girl was referred to our daibetes clinic as T2 diabetes on Metformin via GP. There was no acanthosis nigricans or DKA on presentation. Several family members had diabetes, they were non-obese, on oral hypoglycaemic agents with addition of Insulin in 40´s. IA2 and GAD antibodies were negative, genetic testing for MODY was performed at Exeter lab.




*[Family tree]*

**Results:** All known MODY genes were screened on the HiSeq 2500 targeted next generation sequencing platform using previously described methods (Ellard 2013, Diabetologia) but no pathogenic mutations were detected. A single heterozygous variant (p.G71V; c.212G > T) was however identified in the INS gene. The glycine residue at codon 71 is moderately conserved across species and is located within the region of the gene encoding c-peptide which is

cleaved during insulin processing. This variant has also been reported previously in control datasets with a minor allele frequency of < 1 in 10,000 (ExAc Browser). Family member testing identified the variant in the probands affected mother and maternal grandmother however testing of the probands maternal aunt and maternal great uncle,who had both been diagnosed with diabetes, did not identify the variant. Whilst the clinicial significance of this variant is currently uncertain, the absence of co-segregation within this family suggests that it may be a rare variant of no clinical significance.

Patient is currently doing well on Metformin with BMI 24.8 and HbA1c 40 mmol/mol.

## P060

## Serum levels of lysophosphatidic acid are strongly elevated in patients with *HNF1B*-MODY

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**Objectives:** Identification of altered serum metabolites among *HNF1B*-MODY patients.

**Methods:** We recruited patients with *HNF1B*-MODY (N = 10), *HNF1A*-MODY (N = 10), polycystic kidney disease: non-dialyzed and dialyzed (N = 8 and N = 13 respectively) and healthy controls (N = 12). Previously unthawed serum samples were fingerprinted by LC/MS. Observed metabolic changes were validated by ELISA performed in a different set of serum samples (*HNF1B*-MODY (n = 9), *HNF1B*-negative patients with diabetes and renal cysts (n = 6), *HNF1A*-MODY (n = 11), *GCK*-MODY (n = 17), healthy controls (n = 17)).

**Results:** In order to obtain metabolites that best differentiate *HNF1B*-MODY patients, we selected metabolic features detected in 80% of samples in each group, with adjusted $p < 0.05$ and with fold change >3 or < 0.33 for comparison of *HNF1B*-MODY patients and non-dialyzed ones. Eight identified metabolites had convergent fold change for comparison of *HNF1B*-MODY versus all other groups. Three of them were lysophosphatidic acid species (LPAs: 18:1, 18:2, 20:4) that proved to be the best biomarkers for *HNF1B*-MODY (Area under ROC curve 1.00 (95%CI 0.91-1.00); 1.00 (95%CI 0.91-1.00); 0.923 (95%CI 0.795-0.983) respectively). On a new set of samples we confirmed elevated levels of LPA among *HNF1B*-MODY patients ($p = 0.0063$). The main enzyme producing serum LPA - autotaxin - was down-regulated in *HNF1A*- vs *HNF1B*-MODY patients ($p = 0.0173$) but did not differ between *HNF1B*-MODY and other groups (all p values >0.84). The downregulation of autotaxin expression was evidenced on cellular level with H*NF1B*-silenced human hepatocytes.

**Conclusions:** An important lipid mediatory compound - LPA was found to be elevated in serum of patients with *HNF1B*-MODY. The main extracellular pathway responsible for LPA production was not up-regulated, indicating that other pathways were responsible for increased serum concentration of LPA.

## P061

## Next-generation sequencing-based screening of monogenic mutations in 43 Japanese children clinically diagnosed with type 1B diabetes

K. Ushijima[1], M. Fukami[1], T. Ayabe[1,2], M. Okuno[1,3], S. Narumi[1], T. Ogata[4], N. Kikuchi[5], T. Kawamura[6], T. Urakami[3], I. Yokota[7], S. Amemiya[8], S. Sugihara[9], The Japanese Study Group of Insulin Therapy for Childhood and Adolescent Diabetes

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**Objectives:** Type 1 diabetes (T1D) lacking diabetes-associated autoantibodies are termed as type 1B (T1BD). Monogenic diabetes such as neonatal diabetes and maturity-onset diabetes of the young is caused by genetic defects in the insulin secretion pathway. Because clinical characteristics of those monogenic forms and T1BD are partially overlapping, children with monogenic diabetes could be clinically diagnosed with T1BD. The objectives of this study was to clarify the prevalence and clinical consequences of monogenic mutations in Japanese children clinically diagnosed with T1BD.

**Methods:** We studied 43 Japanese children from 42 families diagnosed with T1D at age between 0.5 and 16.0 years and had no diabetes-associated autoantibodies. The participants were recruited from 30 hospitals of the Japanese Study Group of Insulin Therapy for Children and Adolescent Diabetes. We performed genetic analysis using the HaloPlex target enrichment system (Agilent) and a next-generation sequencer HiSeq (Illumina) to screen mutations in 30 genes known to cause monogenic diabetes.

**Results:** Four of 43 participants had heterozygous missense mutations in the insulin gene (*INS*). No mutations were observed in the remaining 29 genes. The *INS* mutations (p.G75C, p.C96F and p.V42A) were hitherto unreported. The p.C96F mutation-carrying children were siblings, whose mother was also affected by T1D. No significant differences were observed in body mass index-Z score between the *INS* mutation carriers and non-carriers (−0.4 vs −0.9, $p = 0.26$). Age at diagnosis was significantly younger in the *INS* mutation carriers than that of non-carriers (2.7 vs 9.4 years, $p = 0.025$).

**Conclusions:** The results indicate that small proportion of T1BD children with onset age >0.5 years have monogenic mutations. Mutation screening of those children is helpful not only to understand the molecular pathogenesis but also to provide individualize management, including genetic counseling.

## P062

## Late atypical IPEX syndrome diagnosis in a 26-year male with neonatal diabetes

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*Brazil*, [4]*Clinics Hospital, School of Medicine, University of Sao Paulo (USP), Diabetes Unit, Sao Paulo, Brazil*

**Objective:** Immune dysregulation, Poliendocrinopathy, Enteropahty, X-linked syndrome (IPEX) is a rare and often lethal systemic autoimmunity that usually presents in first year of life. Our aim is to report a 26 year-male patient with late diagnosis of IPEX in which main clinical characteristic was insulin-dependent neonatal diabetes mellitus (NDM).

**Case report:** FHC was in our Monogenic Diabetes Outpatient Clinic for first time at the age of 25 years(y). He had NDM diagnosis at 26 days of life. He presented diarrhea and cachexia for 3 months in his first year and two severe episodes of cutaneous lesions due to skin infections by varicella and herpes in first 2y. Until 10y, he had recurrent acute medium otitis, six episodes of pneumonia, several asthma attacks and oral lichen planus. He had lot of hospitalizations during his six first years and no one thought about IPEX as a diagnostic hypothesis. Nowadays his clinical manifestations were restricted to diabetes. As he came to us in his third decade of life with only diabetes as current clinical manifestation, we hypothesized a mutation in *KCNJ11* and investigated by Sanger sequencing, with negative result. We decided then perform genetic analysis by targeted massively parallel sequencing. We used a customized genomic panel with 26 NDM genes. We identified a disease-causing previously described missense variant in exon 11 of *FOXP3* [c.G1190A/p.R397Q - NM_014009].

**Conclusion:** Mutations in *FOXP3* are responsible for 4% of diagnosis in male patients with permanent NDM. It should be suspected when NDM is related to immune dysregulation and/or in presence of autoantibodies for pancreatic antigens. Our report reinforce the necessity of attention to mild cases, otherwise they will be underdiagnosed. We also present a case with a greater life expectancy comparing to reported cases (mortality of 34% at medium age of 10y, with 3/134 reported cases with more than 20y). Finally, it shows the importance of genetic test for NDM.

# Poster Tour 9: President's Choice

## P065

### Insulin requirements and the factors contributing to insulin dose adjustment during the first year of type 1 diabetes duration in children treated with insulin pump

K. Piechowiak, K. Dżygało, K. Indulska, L. Groele, A. Ramotowska, A. Szypowska

*Medical University of Warsaw, Warsaw, Poland*

**Objectives:** Continuous subcutaneous insulin infusion(CSII) is initiated in many children from type 1 diabetes(T1D) onset. Guidelines on insulin dosage adjustment might help clinicians in therapy of this patients.The aim of the study was to assess the insulin requirement and determine factors contributing to insulin dose adjustment in the first year of T1D duration in children on CSII.
**Methods:** There were included 100 children(49 boys) with newly diagnosed T1D treated with CSII. Mean age at diagnosis was 8.16 ± 3.58(0.7-15.9) years, mean initial HbA1c was 12.04 ± 2.49%; mean initial BMI z-score −0.75 ± 2.20. Following parameters were analysed: c-peptide, HbA1c, total daily insulin dose(TDD; units/kg/day), basal/TDD proportion(basal%) and BMI at onset, 3, 6, 9 and 12 months of follow-up.
**Results:** Daily insulin requirements remained low in the subsequent months(0.37, 0.40, 0.47, 0.5units/kg; $p < 0.0001$). Basal insulin rate was low(16.7, 18.7, 21.4, 23.5%;$p = 0.0003$). Patients had good diabetes control(HbA1c 6.2, 6.4, 6.6, 6.7%). We found correlation between C-peptide level and age($r = 0.42$ 95%CI[0.23-0.57]; $p < 0.0001$). There was no correlation between age and TDD or basal %. Correlations between levels of C-peptide and BMI were observed during the entire period of follow-up($p < 0.05$). At the onset were found significant negative correlation between BMI and TDD($p = 0.0001$) and correlation between HbA1c and TDD($p = 0.0002$), and basal%($p = 0.012$). At diagnosis correlation was found between C-peptide and TDD($p = 0.011$), HbA1c ($p = 0.090$), basal%($p = 0.036$). There was correlation between C-peptide and TDD($p = 0.001$) and HbA1c($p = 0.029$) after 3 months of follow-up.
**Conclusions:** During the insulin pump programming in patients with newly diagnosed diabetes, levels of BMI, HbA1c and C-peptide should be considered. Lower insulin requirement is expected in children with lower initial HbA1c and higher BMI and C-peptide level. In the first year of diabetes duration, basal insulin rate is low(<25% of TDD).

## P066

### BMI change during the course of type 1 diabetes is modified by the level of diabetes control - data from the Swedish national quality register SWEDIABKIDS

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**Objectives:** Female gender, low BMI at onset of diabetes, long diabetes duration, pubertal diabetes onset and intensified insulin therapy were previously associated with increased weight gain during the course of Type 1 diabetes in paediatric patients. We aim at investigating the development of BMI-SDS and associated factors in a nationwide data set from Sweden.
**Methods:** The study population consisted of all patients below 18 years of age with T1D registered in the Swedish national childhood diabetes register SWEDIABKIDS during 2000–2014. The Swedish population-based growth reference was used for calculating BMI standard deviation score (SDS). Mean BMI-SDS and HbA1C was calculated for every patient for every year of diabetes duration, excluding the first 90 days after the diagnosis. Comparisons were made between groups of 0–4, 5–9 and >9 years of diabetes duration and HbA1C < 52; 52–69 and >69 mmol/mol (NGSP < 6,9; 6,9-8,5 and >8,5%).
**Results:** Data were available from 9710 patients (4397 girls). The duration of diabetes ranged from 0 to 17 years. Mean HbA1C increased with increasing diabetes duration: 59,1; 66,7 and 69,0 ($p < 0,001$), this was true for both sexes. For the girls mean BMI-SDS increased with increasing diabetes duration: 0,60; 0,81 and 0.88 ($p < 0,001$). However for the boys mean BMI-SDS decreased with long diabetes duration: 0,56; 0,56 and 0,38 ($p < 0,001$). We analysed the effect of diabetes duration and metabolic control for mean BMI-SDS. For the girls mean BMI-SDS increased with increasing diabetes duration in groups with HbA1C >52 mmol/mol ($p < 0,001$). For the boys mean BMI-SDS decreased with long diabetes duration >9 years within every level of HbA1C ($p < 0,001$).
**Conclusion:** BMI-SDS change with increasing diabetes duration is modified by the level of diabetes control and differs between boys and girls. The positive association of increasing BMI-SDS and diabetes duration is particularly pronounced in girls with less well controlled diabetes.

## P067

### Seasonality of birth and first diagnosis dates of children and adolescents with type 1 diabetes mellitus in a large diabetes center during the last 16 years

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**Objectives:** Previous studies supported seasonality regarding the dates of birth and first diagnosis of children with type 1 diabetes mellitus (T1DM), with most patients being diagnosed in the fall and winter and born during the same seasons. This was confirmed, concerning the date of first diagnosis, with data from our country between 1978 and 2008. Our objective was to test whether such a seasonality is still present in a large cohort of children followed in a single diabetes center in the years 2000–2015 under Mediterranean weather conditions.
**Method:** We retrospectively collected data of 622 children (n = 307 females, mean age 8.17 ± 4 years - median: 8.39 years, range: 0.6-16 years), admitted in our Department with newly diagnosed T1DM between 2000 and 2015. We investigated whether there was a seasonal preponderance according to dates of birth and diagnosis.
**Results:** According to date of diagnosis, significantly more T1DM patients were diagnosed during winter (183 children, 29.4%) and fall (163, 26.2%) compared to summer (127, 20.4%) ($p < 0,05$). According to date of birth significantly more T1DM patients were born in the fall (184 children, 29.6%) compared to spring or summer (143, 22.9% each) ($p < 0.01$).
**Conclusion:** In our cohort of newly diagnosed T1DM children in the last 16 years, there was a statistically significant seasonality according to date of diagnosis with most newly diagnosed T1DM cases being diagnosed in winter, like previously described in our country, being also concordant with current data from west European populations. According to date of birth of newly diagnosed cases, there was a

significant seasonal preponderance with most children born during the fall, contrary to previous data reporting an increased number of children with T1DM born during summer and spring.

## P068

## Ketoacidosis at diabetes onset in the last two decades in Germany and Austria - a multicenter analysis and binational comparison with 35,817 patients

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**Objectives:** Late diagnosis of Type 1 Diabetes with occurrence of diabetic ketoacidosis (DKA) continues to be a problem. An Austrian population-based analysis found that 37.8% of children presented with DKA at diagnosis. A large-scale poster-prevention program was conducted in Austria in 2009 without significant effect on DKA frequency (1). The DKA rate at T1D onset (1995–2007) in the multicenter Diabetes Prospective Follow-up (DPV) registry including Austrian and German pediatric patients was 21.1% (2), suggesting lower DKA rates in Germany compared to neighboring Austria.
**Methods:** DKA occurrence at T1D onset was analyzed with DPV data from 35,817 patients aged 0.5-20 years at diagnosis between 1995 and 2015 (age: 9 ± 4 years, 54% male, 18% migration background). Occurrence of DKA (pH < 7.3)/ severe DKA (pH < 7.1) at T1D onset in Austria and Germany was assessed by log binomial regression adjusting for possible confounders (migration background, gender, age, year of diagnosis). A two-sided p-value < 0.05 was considered significant.
**Results:** Overall, DKA/severe DKA rates did not change significantly over time, with 18.9 ± 0.2% of all patients manifesting T1D with DKA and 5.5 ± 0.1% with severe DKA. In the last decade 18%/6% of German and 23%/6% of Austrian patients presented with DKA/severe DKA at onset. Adjusted for confounders there was no significant difference between rates of DKA or severe DKA at T1D onset between the two countries. Highest rate of DKA/severe DKA occurred in children < 5 years (23%/7%), females (19%/6%) and patients with migration background (23%/7%).
**Conclusion:** DKA rate at T1D onset does not differ significantly between Austria and Germany after adjustment for demographic confounders. Overall, DKA rates did not change significantly over the last two decades. A higher risk for DKA at T1D diagnosis was present in girls, in children < 5 years of age and in patients with migration background.

1) Fritsch M. J Pediatr 2013, 2) Neu A. Diabetes Care 2009.

## P069

## Association between insulin-like growth factor-I (IGF-I) and IGF-binding protein-1(IGFBP-1) axis and glucose intolerance in children

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**Objectives:** Increasing evidence suggests an important role of the IGF-IGFBP axis in the maintenance of normal glucose and lipid metabolism. This study aimed to investigate the association of insulin-like growth factor-I(IGF-I) and IGF-binding protein-1(IGFBP-1) with glucose intolerance in children.
**Methods:** We included 80 children aged 10 to 16 years without known diabetes and other chronic diseases. They were classified into 3 groups according to oral glucose tolerance test(normal glucose tolerance, NGT; impaired glucose tolerance, IGT; diabetes, DM). We performed anthropometric measurement and laboratory tests including serum IGF-I and IGFBP-1.
**Results:**

1. Serum IGF-I levels were significantly higher in IGT group than other 2 groups(P = 0.021), and serum IGFBP-1 levels were not different in 3 groups(P = 0.663). However, serum IGF-I/IGFBP-1 ratio were significantly different with highest level in DM(P = 0.012).
2. Serum IGF-I was correlated with age, c-peptide, HOMA-IR and IGFBP-1 in NGT. But these correlations were disrupted in glucose intolerance group without any correlations(IGT + DM).
3. Serum IGFBP-1 was negatively correlated with age, BMI, serum c-peptide, IGF-I, HOMA-β and HOMA-IR in NGT, and only correlated with age and BMI in glucose intolerance group.
4. Serum IGF-I/IGFBP-1 ratio were significantly related with age, BMI, serum c-peptide, IGF-I, IGFBP-1, HOMA-β and HOMA-IR in NGT. However, in IGT + DM group, they were only correlated with BMI, c-peptide, HOMA-β and IGFBP-1.

**Conclusion:** Serum IGF-I and IGF-I/IGFBP-1 ratio were significantly elevated in children with glucose intolerance, and their relationships with c-peptide, HOMA-β and HOMA-IR were altered to according to glucose tolerance status. These findings suggest that disturbances of IGF-1/IGFBP-1 axis may affect the development of glucose intolerance including diabetes in children.

## P070

## Risk of recurrent severe hypoglycemia or hypoglycemic coma remains associated with a past history of severe hypoglycemia even up to 4 years in a large prospective contemporary pediatric cohort: results from DPV initiative

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**Objectives:** In a contemporary cohort of youth with type 1 diabetes (T1DM), to examine interval between episodes as a risk factor for recurrent severe hypoglycemia (SH) or hypoglycemic coma (HC).
**Methods:** Using the DPV Diabetes Prospective Follow-up in Germany and Austria, frequency and timing of recurrent SH (defined as requiring assistance from another person) and HC (loss of consciousness or seizures) in youth with T1DM aged < 20 yr and at least 5 yr of follow-up were analyzed (n = 14,177). Logistic regression models

adjusting for age (<12, 12- < 18, ≥18 yr), duration (5–10, ≥ 10 yr) and gender were used to examine the relationship between history and timing of previous SH/SHC and risk of SH/HC in the current year of observation (04/2015-03/2016).

**Results:** Subjects were: 51% male, median age at last observation 16.7 [Q1;Q3: 13.8;17.8] yr, duration of T1DM 8.2 [6.3;10.8] yr and A1C 7.9 [7.2;8.8]%. During the 5 years of follow-up, 72% had no SH, 14 % one SH and 14% > 1 SH. The relative risk of SH in the current year was highest with SH in the previous year (odd ratio (OR) 4.7 [CI 4.0-5.5]), but remained elevated even 4 years after an episode (OR 2.0 [CI 1.5-2.7]). A similar pattern was observed when examining the OR for HC. Table 1 presents the proportion of patients with SH/HC in the current year according to time since last previous episode.

| | History of last SH/HC in yr −1 | History of last SH/HC in yr −2 | History of last SH/HC in yr −3 | History of last SH/HC in yr −4 | No past history of SH/HC |
|---|---|---|---|---|---|
| SH in current yr | 23% | 15% | 8% | 9% | 4.6% |
| HC in current yr | 13% | 8% | 5% | 5% | 2% |

*[Table 1]*

**Conclusions:** This is the first prospective pediatric study evaluating the impact and timing of a previous episode on the OR for future severe hypoglycemia. Even 4 years after an episode of SH/HC, children and youth remain with a long term higher risk for SH/HC compared to children who never experienced SH/HC. Therefore, clinicians should continue to regularly track this history at every visit and, whenever possible, adjust therapy in order to avoid recurrences.

## P071
## Influenza A cerebellitis in Wolcott-Rallison syndrome: more than bad luck?

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**Background:** Wolcott-Rallison Syndrome (WRS) is a rare autosomal recessive syndrome caused by mutations in *EIF2AK3* (Eukaryotic Translation Initiation Factor 2-alpha Kinase 3). WRS is characterized by neonatal insulin-dependent diabetes, epiphyseal dysplasia and growth retardation. Mental retardation, hepatic and kidney dysfunction, cardiac defects, exocrine pancreatic dysfunction and neutropenia can be associated. Outcome is poor. Most patients die in childhood of flu-like episodes with fulminant hepatitis sometimes combined with encephalopathy.

**Case presentation:** 8.5 (95% The patient presented at 2,5 months of age with diabetes, liver failure and neutropenia. Initiation of insulin pump therapy induced a good glycemic control and normalization of liver function. Epiphyseal dysplasia and mental impairment were absent. WRS was confirmed by the finding of a homozygous stop mutation in *EIF2AK3* (p.W681X). At 21 months, she was hospitalized with fever, hepatitis, somnolence and hypotonia. Influenza A infection was confirmed. Liver tests normalized after18 days yet she remained hypotonic and developed ataxia. Brain MRI revealed cerebellitis. A repeat MRI after five months showed cerebellar atrophy.

**Discussion:** 8.5 (95% This is the first case of WRS and severe neurological sequellae after proven Influenza A virus cerebellitis. Early neurodegeneration has been described in WRS. Innate immune system pathways and connectome analysis suggest a role for EIF2AK3 in human host defense against viruses such as HSV, EBV and Influenza A. Functional testing is ongoing to confirm this hypothesis.

## P072
## Neonatal diabetes: story of collaboration

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**Background:** Neonatal diabetes is a rare form of monogenic diabetes with onset in the first six months of life occurring in 1/100,000 to 1/400,000 births. Both permanent and transient forms are described.

**Objectives:** We want to bring to focus how collaboration with a center of excellence in Diabetes Genes has been possible through the ISPAD forum.

**Methods:** Four neonates presented to our center with diabetic ketoacidosis between the years 2011 to 2015. Through the ISPAD forum contact with Exeter Monogenic Diabetes team was established and genetic testing was done for all these babies free of charge.

**Results:** Each of these 4 babies was found to have a different mutation. First one had a novel hemizygous missense variant, p.N388S in the FOXP3 gene which causes IPEX syndrome. Second baby was found to be homozygous for *EIF2AK3* nonsense mutation, p.L1030X which confirmed diagnosis of Wolcott Rallison syndrome. Unfortunately both of them succumbed to the associated complications of their syndromes. Third baby was homozygous for an INS promoter mutation, c.-332C > G and had recessively inherited neonatal diabetes due to mutations in the INS gene. He has the TNDM phenotype. After the age of 3 months till now when he is 18 months old he has no insulin requirement. Our fourth patient had his journey to the miracle when he was found to have the KCNJ11 missense mutation, p.R201H. His neonatal diabetes due to a mutation in the Kir6.2 subunit of the K-ATP channel. Transfer to sulphonylurea therapy was initiated and he is now three year old with glibenclimide controlling his diabetes well.

**Conclusion:** Genetic diagnoses and management of these babies with neonatal diabetes is an excellent example of multicenter collaboration between developed and developing countries happening through ISPAD forum.

# Poster Tour 10: Chronic & Acute Complications

## P073

### Only one identified patient with persisting simple retinopathy in childhood T1D - is screening indicated in Denmark from the age of 12 years?

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**Aim:** From 1996 and forward the $HbA_{1c}$ has decreased amongst children and adolescents in Denmark. Therefore this preliminary study aimed to test if screening for retinopathy is indicated in Denmark from the age of 12 years as the current Danish guideline recommends.
**Methods:** Data from the national diabetes register for children and adolescents in Denmark, DanDiabKids was used to identify children and adolescents that had been screened at age 12, 15, and 18 years for retinopathy. Data was collected from 1996 to 2015.
**Results:** 17 out of 1994 patients (0.9%) had retinopathy changes at the age of 12 years. Only 7 of the patients had changes in both eyes. All of them had simple retinopathy changes at this age. By the age of 15 years 2% had retinopathy changes and 2.8% at the age of 18 years. Only one patient born in 1985 had persisting simple retinopathy from age 12 to 18 years. From 2001 and forward the data completion of the screening varies between 60 and 78%. Higher $HbA_{1c}$ was observed among individuals with retinopathy than without.
**Conclusion:** Since the $HbA_{1c}$ has decreased in Denmark from 1996 and only one patient that was born in 1985 has had persistent simple retinopathy, strict adherence to the ISPAD guidelines (screening starting from age 10, or at onset of puberty if this is earlier, with 2–5 years diabetes duration) seems very resourceful with little gain for the individual patient. We suggest that current guidelines should be adjusted nationally and individually according to metabolic control.

## P074

### Skin-advanced glycation end products and arterial stiffness in children with type 1 diabetes

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**Objectives:** Advanced glycation end products (AGEs) are considered to contribute to micro- and macrovascular complications in patients with type 1 diabetes (DM1). The aim of the present study was to investigate if skin AGEs are associated with early signs of atherosclerosis, measured by arterial stiffness and correlate results with inflammatory biomarkers.
**Methods:** In a prospective cohort study, 81 T1D patients (age range, 3–21 years) and 65 control subjects (age range, 4–21 years) participated. Skin autofluorescence (SAF) was measured with an autofluorescence reader. Vascular compliance was measured by using the carotid-to-femoral pulse wave velocity (PWV), in patients and control subjects of eight years and older. Interleukin 6 (IL-6) and high sensitivity C-reactive protein (hsCRP) were evaluated in T1D patients and controls . Data were analyzed statistically by Mann–Whitney U test, Spearman's test and linear and multiple regression.
**Results:** Patients with T1D had an increased value of SAF, PWV and hsCRP compared to control subjects (1.33 vs. 1.17 AU, P = 0.000; 5.54 vs. 5.14 m/s, P = 0.009; 0.46 vs. 0.33 mg/L, P = 0.000 respectively). IL-6 was not significantly different between both groups.

In patients with T1D SAF correlated with age, gender, HbA1c and hsCRP. PWV correlated with age, SAF, diabetes duration, cardiovascular disease and hypercholesterolemia in the family medical history. hsCRP was correlated with age, gender, height SDS, waist SDS, BMI SDS, smoking, SAF, diabetes duration, micro-albuminuria, HbA1c and hypertension. There were no correlations with

IL-6.

**Conclusions:** Children with DM1 have increased skin AGEs that are associated with higher PWV values, and increased hsCRPs compared to controls. Measurement of skin AGEs may contribute to the early identification of children at increased risk for macrovascular complications.

## P075

### Antecedents of diabetic ketoacidosis with new onset type one diabetes from a regional paediatric diabetes centre: Auckland, New Zealand 2010 to 2014

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**Background:** There has been little change in the rates of diabetic ketoacidosis (DKA) in newly diagnosed type 1 diabetes mellitus over recent decades.
**Objectives:** To examine the hypothesis that the risk of diabetic ketoacidosis (DKA) in children aged < 15 years with new onset T1DM was related to delayed diagnosis in primary care.
**Methods:** Retrospective analysis of prospectively collected data from a complete regional cohort for Auckland (New Zealand) from 2010 to 2014.
**Results:** 263 children presented with new onset T1DM, including 141 males, at a mean age of 9.1 ± 0.2 years. 68 (25.8%) presented in DKA. 217 (82%) children were referred from primary care, while 47 (18%) self-presented to local emergency departments. 81 (37.5%) had delayed referral from primary care, often due to obtaining community blood tests. However, delayed referral was associated with a reduced rate of DKA (14.8% vs. 30.4%; p < 0.05). Self-presentation was more likely in children with a family history of T1DM (37.8% vs 6.9%, p < 0.0001) and in children in DKA (40% vs 24.5%, P = 0.043).
**Conclusions:** The great majority of children with new T1DM in the Auckland region were first diagnosed in primary care. Overall, referral from primary care was associated with a lower risk of DKA than with self-presentation. Although delayed referral was common, it was associated with reduced risk of DKA, likely because sicker children were more likely to be referred for urgent assessment. These data suggest that although clear referral guidelines for primary care clinicians may reduce delay in diagnosis of new T1DM, community education is critical to reduce the risk of DKA with new onset T1DM.

## P076

### Managing hypoglycemia during fasting in Ramadan - scoping review of the evidence based perspectives in type 1 diabetics (MYRIAD)

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**Objectives:** People with Type 1 Diabetes Mellitus (T1DM) are generally advised not to fast because of the risks of severe complications, especially hypoglycemia; with enhanced risk for augmented ketogenesis. The novel approaches have been documented to help mitigate the clinical risks of hypoglycemia especially during fasting.
**Methods:** We conducted a step wise literature mapping and a scoping review for the evidence based perspectives for identifying the research question and the relevant studies, across the pubmed and Cochrane library by using specific MeSH, boolean operators Type 1 diabetes AND Ramadan AND Hypoglycemia AND challenges NOT type 2 Diabetes. We undertook interpretive synthesis to identify evolution of approaches that can enable people with T1DM to fast during Ramadan.
**Results:** T1DM fasting increases the risk of hypoglycaemia by 4.7 fold during Ramadan as compared before Ramadan (EPIDIAR). We evaluated a total of four studies across 2005–2016 which evaluated the hypoglycemia risk mitigation modalities. The cumulative no. of patients analysed were 103 (mean 25.75 ± 23.82, min 5, max 60 CI −12.16, 63.66). Two studies each were published from Lebanon and one each from UAE and the recent most (2016) from Egpyt, evaluated the benefits of the low glucose suspend feature of the Medtronic sensor-augmented insulin pump system (MiniMed 530G with Enlite). The modalities to mitigate the risk of hypoglycaemia include, insulin pumps, self-monitoring with regular follow up through a comprehensive care team approach model and modulation of the insulin type and dosage during Suhur and Iftar.
**Conclusions:** The recent evidences demonstrate that an individualised management plan under medical supervision with multi pronged approach can enable people with T1DM to fast safely. We propose a new comprehensive care model (ICT) encompassing judicious approach of Insulin pump, Comprehensive care, Therapeutic modulation as a new paradigm to mitigate the risks of hypoglycemia in T1DM.

## P077
## Can functional and postural alterations affect young subjects with type 1 diabetes mellitus?

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**Objectives:** It is well known that diabetes mellitus can affect the patient's quality of movement. The aim of this study was to evaluate the early occurrence of functional and postural alterations in young subjects with type 1 diabetes mellitus (T1DM).
**Methods:** In 15 patients with diabetes (10/5:M/F), mean age 11.5 ± 1.8 yrs, duration of diabetes 5.6 ± 2.6 yrs, mean HbA1c 7,4 ± 0,8%, body mass index (BMI) 19.5 ± 4,6 kg/m2, and in 37 (23/14:M/F), age-, and BMI-matched healthy controls, were evaluated: muscle strength of lower limb (Vertical Jump, Standing Long Jump), lower back and hamstring flexibility, (Sit and Reach Test), hand's and ankle's joint mobility (prayer sign, inclinometer), posture on the sagittal plane in quiet standing (baropodometric analysis, images).
**Results:** Results of muscle strength and flexibility showed no significant differences between the patients group and controls (VJ: 26.3 ± 9.6 cm vs 27.5 ± 37 cm; SLJ: 141 ± 31 cm vs 146.6 ± 18.1 cm; SRT: −3,7° ± 9.5 vs 0.5° ± 6.9).

On the sagittal plane all the evaluations carried out have shown that the inclination of the axes that originate from the center of the lateral malleolus and passing through the centre of the head of the fibula or the tragus of the ear, were directly correlated (r = 0.34, p < 0.001). The patients group showed a significantly higher inclination of the axis passing through the head of the fibula than that passing through the tragus compared to controls. This result underlines the presence of a posture with a higher flexion of the lower limbs' major joints in the young patients investigated. (−3.7° ± 5.4 vs −0.4 ± 5.1; p < 0.05).
**Conclusions:** The results of this pilot study confirm that young patients with diabetes do not show a significant deficit of strength or flexibility. The increased ankle flexion detected in the patients group could affect the posture and then the quality of gait. This parameter should be further investigated and, if confirmed, it could suggest appropriate interventions.

## P078
## High prevalence of hypertension in children and adolescents with type 1 diabetes identified through the 24 hours ambulatory blood pressure monitoring

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**Objectives:** In children and adolescents with type 1 diabetes (T1DM) the usefulness of 24-hours ambulatory blood pressure monitoring (ABPM) to predict kidney diseases and cardiovascular morbidity is still controversial. Aim of this study was to identify blood pressure abnormalities using both traditional clinic and 24 h-ABPM tools and their relationship with anthropometric, kidney, and metabolic data.
**Methods:** Forty patients (52.5% males) with T1DM (age = 13.6 ± 2.56 yrs; T1DM duration >1 yr) were recruited in the study. Anthropometric, metabolic (HbA1c, lipid profile, renal function parameters), and blood pressure (clinic visit and 24 h-ABPM) data were collected. Hypertension was defined as:

A) systolic blood pressure (SBP) above 95° centile according to age, gender, and height centile, and

B) SBP above 95° centile in more than 25% of 24 h-ABPM.

**Results:** Hypertension was found in 9 out of 40 patients (22.5%) using data by clinic visit while through 24 h-ABPM its prevalence significantly increased to 57.5% ($\chi^2$ = 8.58, p = 0.003). Subjects with hypertension, according to 24 h-ABPM, had a longer duration of T1DM than normotensive ones (8.04 ± 3.22 *vs.* 5.76 ± 1.85 yrs, respectively, p = 0.013). Six out of 40 patients did not present the phenomena of dipping (3/6 classified as hypertensive). Considering the whole population, a significant and positive correlation was demonstrated between 24 h-ABPM SBP and BMI-SDS (r = 0.38, p = 0.020) and clinic visit SBP (r = 0.42, p = 0.007). No other significant data was found.
**Conclusions:** The 24-hours ABPM has allowed us to identify a higher prevalence of hypertension compared to that we found using SBP data from the clinic visit. Despite subjects with hypertension have had T1DM for longer time, our data did not support a relationship between SBP, metabolic control, lipid profile, and renal function. We can considered ABPM a useful tool to precociously identify these patients who may benefit from early therapeutic treatment to prevent disease progression.

## P079
## Severe hypoglycemia rate is not associated with better glycemic control in children with type 1 diabetes- an observational cohort study

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**Objective:** Improvement in glycemic control is supposed to increase the risk of severe hypoglycemia (SH), since the DCCT study. Recently, we observed an increased glycemic control in diabetic children from

our cohort of Rennes University Hospital. The objective of this study was to analyze the occurrence of SH.

**Method:** We included patients with diabetes type 1, aged less then 18 years who were attending at University Hospital of Rennes from January 2010 to December 2015. Data on HbA1c,the frequency of low (<60 mg/dl) glycemia vs. all recorded glycemia on glucometer downloads over 60 days (LGGD)-reflecting the rate of hypoglycemia, sex, age and diabetes duration was collected prospectively every three months. SH was defined as the occurrence of hypoglycemia with seizure and/or coma requiring glucagon or intravenous glucose. Patients were allocated to two groups according to the occurrence or non-occurrence of SH. Data was compared using Chi-square and t-test, level of significance was 5%.

**Results:** Four thousand one hundred and thirteen quarterly observations from 276 patients were analyzed. Mean HbA1c decreased from 7.7% in 2010 to 7.3% in 2015 ($p < 0.0001$) and LGGD passed from 9.7% in 2010 to 5.4% in 2015 ($p < 0.0001$). Fifty-two events of SH were recorded in 36 patients (1 to 4 events each) during this 6-year period. Mean HbA1c level in the group with SH (7.5%) did not differ significantly from the group without SH (7.4 %), ($p > 0.05$). By comparing mean LGGD between the groups, we observed an LGGD-threshold of 9% beyond which the risk of SH seemed to be increased ($p < 0.05$). Sex, age and diabetes duration did not differ between the groups.

**Conclusion:** Our data shows a significant improvement of glycemic control over a 6 year-period in a cohort of children with type 1 diabetes. The occurrence of SH was not associated with a reduced HbA1c level. Besides, we observed a threshold of 9% for LGGD beyond which the risk of severe hypoglycemia could be increased.

## P080

## Audit of pediatric ketoacidosis (DKA) in Sweden: pump use and health contacts before admission

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**Objectives:** In 2015, there were 7209 pediatric patients up to the age of 17.99 years in Sweden. There were 668 cases of new-onset diabetes. The primary objective of this ongoing study is to investigate if the incidence of DKA is higher when the treatment regimen is CSII compared to MDI. The secondary objective is to investigate contacts taken with the health care services up to one month prior to admission for DKA.

**Methods:** A two-year prospective study was designed, running from Feb 2015 to Jan 2017, including all pediatric DKA cases in Sweden. Data is collected through questionnaires filled out by the primary caregivers and the attending physicians regarding pre-admission events and treatments, as well as in-patient parameters. The chi-square test was used for comparison between the CSII and the MDI groups, and the Mann–Whitney U-tests for pH comparisons (SPSS, IBM Corporation).

**Results:** During the first 16 months of the study, 184 episodes of DKA were reported (118 newly diagnosed). In 2015, 57% of all pediatric patients used insulin pumps (SWEDIABKIDS registry data). Among DKA cases with previously known diabetes, 65% were in the CSII group (p = n.s). At admission for DKA, patients in the MDI group had a median pH of 7.17 and the patients in the CSII a median pH of 7.24 ($p < 0.001$). Among patients with new-onset diabetes, 48% had contacted the health care services within 1 month before admission for DKA. The time range from the first contact with a health care provider within one month until admission for DKA was 0–14 days. Of patients who had contacted a health care provider before admission due to clinical symptoms of diabetes, 35% had not been referred to a pediatric center.

**Conclusions:** DKA in pump-treated individuals was associated with a significantly less degree of metabolic disturbance. Among patients with new-onset diabetes, it was common that symptoms that were likely related to diabetes did not bring to immediate referral to a pediatric center.

# Poster Tour 11: Diabetes Care

## P081
## Longitudinal trajectories of metabolic control from childhood to young adulthood in type 1 diabetes from a large German/Austria registry: a group-based approach

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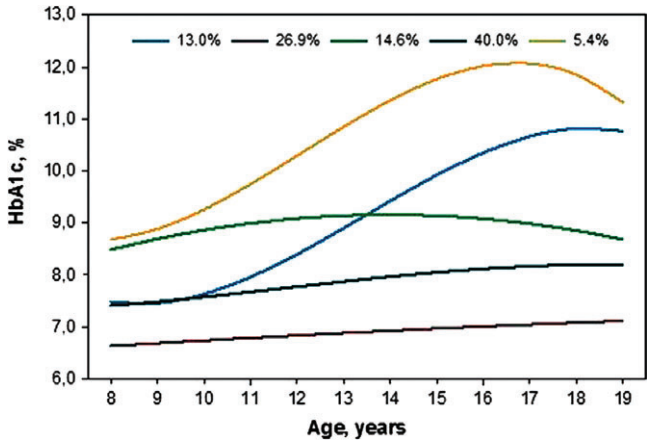
**Objectives:** The aim was to identify distinct pattern of HbA1c over adolescence in young patients with type 1 diabetes (T1D).
**Methods:** 6,433 T1D patients from the observational multicenter DPV database were analyzed (follow up from 8–19 years, baseline diabetes duration ≥2 years, HbA1c aggregated per year of life). To identify distinct subgroups of subjects following a similar HbA1c pattern of change over time, we applied latent class growth modelling (LCGM, SAS 9.4, proc traj) as trajectory approach. We used multinomial logistic regression analysis to assess which determinates are associated with group membership.
**Results:** At baseline, median age was 8.5 [Q1;Q3:8.4;8.6] years with diabetes duration 4.1 [2.8;5.5]years and HbA1c 7.3 [6.7;8.0]%. Using LCGM we observed five distinct HbA1c longitudinal pattern (Fig 1). At age 8, 12 and 16 we observed differences in HbA1c, self-monitoring of blood glucose (SMBG), pump use, daily insulin dose, BMI-SDS, body height-SDS, physical activity and migration across all trajectories (all $p \leq 0.001$), but not in gender. Groups with similar initial HbA1c, but higher HbA1c increase were categorized by lower frequency of SMBG and physical activity and smaller body height-SDS (all $p < 0.01$).
**Conclusion:** Using the trajectory approach, we found five distinct classes with different patterns of metabolic control over puberty. HbA1c increase during puberty might be due to diverse health awareness, psychosocial or genetic factors or treatment differences.




*[Figure 1]*

## P082
## When to start carbohydrate counting? A retrospective case–control study

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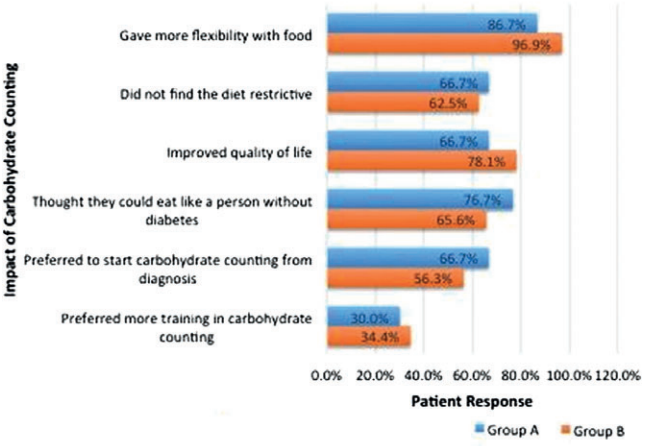
**Objectives:** To evaluate two patient groups with Type 1 Diabetes at a secondary care paediatric diabetic clinic, who started carbohydrate (carb) counting to adjust meal time bolus insulin doses from diagnosis (Group A) or greater than 3 months after diagnosis (Group B). Glycaemic control, impact of carb counting on different aspects of their life and attitudes towards carb counting were assessed.
**Method:** Out of 78 children initially included, 62 had been carb counting for more than a year. Qualitative data was collected in the form of questionnaires given to patients or carers.
**Results:** There were 62 children included in the study: 2 under 5 years old, 31 between 5–11 years old, 22 between 12–16 years old and 7 over the age of 16. 30 children in Group A began carb counting from diagnosis, as recommended by NICE guidelines 2015. On average, HbA1c was 7.15% (55.8 mmol/mol) at 6 months and 7.82% (61.8 mmol/mol) at 1 year. 32 children in patient group B began carb counting after 3 months of diagnosis (6 children before 1 year and 26 after 1 year of diagnosis). On average, HbA1c was 8.85% (73.6 mmol/mol) at 6 months and 9.03% (75.2 mmol/mol) at 1 year. The impact of carb counting is displayed in the graph below.
**Conclusions:** We assessed the glycaemic control of two groups that started carb counting at different time points after diagnosis. Group A had on average a better glucose control and preferred to start at this point compared to those that started carb counting later.




*[Impact of Carbohydrate Counting]*

## P083
## Impact of continuous glucose monitoring systems on metabolic control and glycemic variability in well controlled diabetes

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**Aim:** To assess the impact of long term monthly use of CGM on glycemic control in well controlled children and adolescents.
**Materials and Methods:** 12-month, prospective study conducted among patients with T1DM. Patients aged 2–18 years who had been

followed up for at least for 1 year and with a mean HbA1c < % 7,5 in the prior year were included. The frequency of hypo and hyperglycemia data was collected from patients' continuous glucose monitoring report. iPro®2 Professional CGM was used over a 5-day period in all patients every month for 6 months. In the next six months patients were advised to do at least four finger stick test per day and the SMBG results were reviewed. At the end of the second six months iPro®2 Professional CGM was placed again. The frequency of hypo and hyperglycemia, the duration of hypo and hyperglycemia and AUC for hypo and hyperglycemia were compared.

**Results:** Mean age of the patients was 12 ± 3,14years. 12 of the patients were on insulin pump therapy and 10 were on MDI. Compared with baseline, non-significant but positive differences were observed in HbA1c levels during the study period in pump patients whereas there was no change in MDI patients. Hypo and hyperglycemic excursions and AUC for hypo and hyperglycemia are given in Table 1.

| | Baseline | 3rd month | 6th month | 12th month |
|---|---|---|---|---|
| Mean glucose (mg/dl) | 165 ± 31 | 158 ± 25 | 165 ± 21 | 164 ± 28 |
| no high excursions | 18,4 ± 9,9 | 17 ± 3,1 | 18 ± 3,9 | 16 ± 4,2 |
| No low excursions | 3,9 ± 4,0 | 5,7 ± 4,1 | 5,6 ± 6,0 | 4,4 ± 4,3 |
| AUC hyperglycemia | 40,6 ± 24,9 | 35,9 ± 18,7 | 39,1 ± 17,5 | 40,9 ± 21,8 |
| AUC hypoglycemia | 0,48 ± 0,78 | 0,55 ± 0,69 | 0,67 ± 1,0 | 0,47 ± 0,64 |

*[Hypo and hyperglycemia during the study period]*

No significant differences in hypo and hyperglycemic excursions and AUC were observed between different treatments groups. As a result; continuous glucose monitoring systems did not affect metabolic control or glycemic variability in well controlled diabetes.

## P084
## Sexual lifestyle among young adults with type 1 diabetes

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**Background:** Sexual lifestyles including sexual activity, problems, satisfaction, and the formation and maintenance of relationships, are greatly affected by physical health. Data are limited regarding the sexual lifestyle of adolescents and young adults with type 1 diabetes (T1DM). Fear from hypoglycemic episodes during sexual intercourse and intimacy issues can impact individuals with T1DM. The aim of this study was to assess sexual lifestyles of individuals with T1DM.

**Methods:** 53 T1DM patients, 27(51%) males, mean ± SD age 27·9 ± 8·3 years completed the Hypoglycemia Fear Survey-II (HFS-II) and the Sex Practices and Concerns questionnaire.

**Results:** Thirty-seven (70%) reported they never or almost never had concerns in their sexual lifestyles that were related to their diabetes. None experienced severe hypoglycemia during sex, but 21(40%) reported occasional mild hypoglycemic events. More than two-thirds do not take any measures to prevent hypoglycemia before sex (decreasing insulin dose, snacks, and measuring blood glucose levels). Fear of hypoglycemia during sex was reported by 18(35%); those who reported increased fear experienced mild hypoglycemic events during sex (61·1% vs. 26·5% p = 0·01), were singles (94·4% vs. 64·7% p = 0·02) and had higher scores on the Worries subscale of the HFS-II (42·8 ± 12·8 vs. 34·9 ± 10·5 p = 0·04) compared with those who did not.

**Conclusions:** Among young people with T1DM, most do not have concerns regarding sex that are related to their diabetes, and most do not take specific measures before or after sex. One-third, however, fear from hypoglycemia during sex, mostly singles and those who experienced hypoglycemia in the past. Caregivers should address these concerns.

## P085
## An individual health care plan (IHCP) for a child or young person in an education setting who has diabetes within the children and young people´s North West diabetes network (CYPNWDN) culminating in a national individual health care plan

M. Carson[1], D. Anderson[2], S. Singleton[3]

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**Objectives:** To design an IHCP for roll out to the CYPNWDN in line with the National Paediatric Diabetes Service Improvement Plan.

**Methods:** Subgroup formed of PDSN´s, Dietitians, Schools Nurses and Parent Representatives from CYPNWDN. National and international guidelines used along with essential elements. Two versions designed: Standalone IHCP and an IHCP to work alongside the East of England's Diabetes Guidelines for School, Colleges and Early Year Settings.

**Results:** In August 2013 IHCP was piloted for 6 months in 3 Hospitals followed by a survey to teachers, parents and PDSN's before roll out to the remaining 17 Hospitals within the CYPNWDN. Survey revealed that 100% of the parents using the IHCP found it either easy or very easy. 90% found it easy in comparison to previous IHCP´s. 90% of school staff found it either very easy or easy to use. November 2013 saw the launch of the guidance from the' CYP East of England Diabetes Network' - the IHCP was included with this guideline. The standalone IHCP was presented in December 2013 at the 'National CYP Diabetes Network Meeting' - feedback received and provisionally endorsed as the 'National IHCP' pending comments from each regional network in January 2014 with further review in November 2015 with national roll out of the national IHCP in January 2016. Review took place and regional Network Lead Nurses invited comment following recent changes made to NICE Guidelines (2015) and the 'Supporting Pupils at School with Medical Conditions', Department of Education.

Awards: Quality in Care Commended - October 2014, Winner Excellence in Diabetes Specialist Nursing at Nursing Standard Awards May 2015. The IHCP is supported by JDRF and Diabetes UK via their websites including the Department of Education.

**Conclusion:** A standardised IHCP across England and Wales which will be reviewed every 2 years or when national or international guidelines are updated. To also be translated into other languages for International roll out.

## P086
## Technology downloads: families friend or foe?

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**Objectives:** The ethos of paediatric diabetes care is to reduce the long-term complication risk through optimising glycaemic control, whilst providing family centred care. Although outpatient attendance four times a year is encouraged in the UK, families should also be

empowered to achieve and maintain target HbA1c levels through insulin adjustments based on blood glucose patterns (NICE, 2015). The objective of this small study was to determine the use of technology downloads by families to review glycaemic control.
**Methods:** A short survey of patients (>8 years) and parents attending paediatric diabetes clinic in a small outlier hospital in Yorkshire was conducted over 4 months in 2016. The primary goal was to ascertain how often technology downloads were being reviewed with additional exploration of promoting and hindering factors.
**Results:** 29 responses were obtained (15 patients, 14 parents). 11 responses related to CSII therapy and 18 to MDI regimens. None of the parents or children using MDI therapy downloaded their meter between clinics compared to 6/11 of those using pumps. The most likely factor promoting download consideration was being asked to by the team. 16/29 felt regular downloads would enhance their diabetes control. However, only 9/18 and 7/11 MDI and pump users respectively were confident to make changes based on their downloaded glycaemic patterns. Identified barriers included; finding the download technically challenging, reliance on the diabetes team for interpretation and a further educational need.
**Conclusion:** Regular review of glycaemic control is promoted by diabetes teams and recognised as beneficial by patients and parents. However, this small study highlights dependency on healthcare professionals to facilitate this. Empowering families to make changes independent of, or in collaboration with the diabetes team, could simply result from the expectation to perform technology downloads between clinics and download interpretation education.

## P087
## Effect of basal insulin on glycosylated haemoglobin in children and young people (CYP) with type 1 diabetes mellitus (T1DM)

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**Objective:** To evaluated the relative contribution of basal and bolus insulin in determining HbA1c.
**Methods:** We related HbA1c to the contribution of basal and bolus insulin to the total daily dose of insulin in 227 (110 M) CYP with well controlled T1DM (mean HbA1c 7.3%, range 5.2-8.5) aged 2–19.5 years.
**Results:** Insulin pump settings (total daily dose (TDD), total basal and bolus dose and percentage basal as well as number of basal rates per 24 hours) were obtained and related to age, sex, body mass index (BMI) and HbA1c. There were no differences between the sexes for age, BMI, TDD/kg, basal or bolus measures or HbA1c. HbA1c did not change across the age range and was not influenced by TDD, basal or bolus amount or % basal insulin delivery. The percentage basal insulin increased with age: 0.6% /year (r-0.19; P = 0.01) but this was related to BMI rather than age (P = 0.002). Both BMI and age determined independently total basal and bolus insulin requirements (P < 0.001). Number of basal rates per day were inversely related to HbA1c (r = 0.14; P = 0.04).
**Conclusion:** Glycosylated haemoglobin (HbA1c) is related to episodes of hyperglycaemia which in turn are influenced largely by the bolus insulin component. The role for basal/background insulin in determining HbA1c is less clear. These data suggest that there is an increase in both basal and bolus requirements with age but in this tightly controlled group of patients no clear relationship was established with HbA1c. The relationship with BMI probably reflects insulin sensitivity whereas the age effect may reflect other determinants impacting on insulin action.

## P088
## High remission rate in children with type1 diabetes in Sweden and association with lower HbA1c at diagnosis

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**Objective:** To study remission rate, defined as <0.5 U/kg/BW, in children with Type 1 diabetes (T1D) in relation to clinical parameters at diagnosis and during the first 2.5 years (15 first clinical visits).
**Methods:** Data obtained from 4162 subjects, age 1–18 years at diagnosis, 44.8 % females. These individuals were registered in the Swedish pediatric diabetes quality registry (Swediabkids) and diagnosed between 2007/01-2012/05.
**Results:** As seen in table 1 the HbA1c values were lower in children within remission but they had about the same BMI and duration as children without remission.

*Table 1.*

A logistic regression analysis showed that HbA1c, pH, and p-glucose at onset were related to remission at visit 5, while sex, BMI-SDS and age were not. At visit 10 and 15 HbA1c at onset was still associated with remission. Severe hypoglycemia and ketoacidosis were as common in both groups of subjects. Using insulin pump was related with remission after visit 10 but not before; 40% vs 28%, p < 0.001 and at visit 15 the figures were even more pronounced; 59% vs 39%, p < 0.001. Physical activity had no impact on remission until visit 15.
**Conclusion:** Remission in children with T1D was associated with lower HbA1c and higher pH at onset. During clinical follow-up remission was still associated with lower HbA1c and a higher rate of pump treatment and to physical activity.

# Poster Tour 12: Diabetes Epidemiology

## P089
## Study of type 1 diabetes onsets for the last 4 years in a major hospital

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*[1]Miguel Servet Children's Hospital, Paediatric Diabetes Unit, Zaragoza, Spain, [2]Miguel Servet Children's Hospital, DUE Paediatric Diabetes Unit, Zaragoza, Spain*

**Objectives:** To analyse the relationship of epidemiological, clinical and analytical data of onsets in patients with Type 1 Diabetes (T1D) in our Hospital.
**Methods:** Retrospective analytical study in 0–15 years patients diagnosed of T1D between the years 2012–2015 in a major Hospital.
**Results:** 91 patients, age at onset 9,16 years (0,9-15,5). Three different strata of age at onset: 10–15 yeas old (48,4%), 5–9 (35,2%) and 0–4 (16,5%). 54,9% were male. Winter was the season with more diagnostics (28,6%), followed by summer,spring and autumn. 53,8% were diagnosed in their primary health center. 16,5% presented related antecedents of T1D; 31,9% of T2D and 24,2% other autoimmune pathologies. 91,2% presented polydipsia, 89% polyuria, 65,9% weight loss and 27,5% polyphagia.Symptoms lasted 28,45 days.Average of glycemia was 442 mg/dl.37,3% presented ketoacidosis(DKA). Average age in patients with DKA was 9,39. Average insulina level: 1,02microU/ml, C-peptide: 0,94 ng/ml. HbA1c: 11,73%. 81,3% presented positive GAD antibodies.At diagnosis 10% presented positive celiac markers and 5,5% thyroid antibodies.Insulin dose at discharge was varied(average 0,98U/Kg/d).

C-peptide levels are higher in younger children. DKA is more frequent in girls and it is directly related to finding thyroid antibodies, high glycemia, triglycerides and insulin dose; DKA has a negative correlation with insulin level. HbA1c is lower if there are related antecedents T1D, T2D or autoimmune pathologies. High HbA1c has positive correlation with polyphagia, ketonemia, C-peptide levels, GAD antibodies and needs more of an Insulin dose.
**Conclusions:** The main prevalence is on the oldest group (10–15 y) and in winter. And more DKA in girls.It is important the knowledge and study of characteristics at onset T1D to do an early diagnosis and to decrease DKA incidence. 53,8% were diagnosed in primary Health Center. It is essential to educate other areas do populations more sensitive to earlier diagnosis and to prevent complications at onset.

## P090
## IDF Life for Child six-country epidemiology study - preliminary results from Azerbaijan, Bangladesh, Mali and Pakistan

G.D. Ogle[1,2], G. Ahmadov[3], B. Zabeen[4], S. Besancon[5], A. Fawwad[6], J. Noble[7], F. Kakkat[1], D. Govender[1], M. Silink[1,8], C. Wasserfall[9], K. Azad[4], A.T. Sidibe[5], Y. Ahmedani[6], A.C. Middlehurst[1,2], M. Atkinson[9]

*[1]International Diabetes Federation Life for a Child Program, Sydney, Australia, [2]Diabetes NSW, Sydney, Australia, [3]Endocrine Center, Baku, Azerbaijan, [4]BIRDEM Institute, Dhaka, Bangladesh, [5]Sante Diabete, Bamako, Mali, [6]Baqai Institute of Diabetology and Endocrinology, Baqai Medical University, Karachi, Pakistan, [7]Children's Hospital Oakland Research Institute, Oakland, United States, [8]Children's Hospital Westmead, Sydney, Australia, [9]University of Florida College of Medicine, Gainesville, United States*

**Objectives:** Significant knowledge voids exist in both the epidemiology and disease heterogeneity of youth onset diabetes in most under-resourced countries. The International Diabetes Federation Life for a Child Program and its partner centres addressed this need in six countries, with initial results available for four countries: Azerbaijan, Bangladesh, Mali, and Pakistan.
**Methods:** Consecutive new- or recent-onset cases of diabetes in subjects < 21 years were enrolled, up to a minimum of 100 cases / country. Clinical features, GAD-65 and IA2 autoantibodies, C-Peptide, and *HLA-DRB1* were evaluated. DNA was also collected on 200 control subjects in each country.
**Results:** Results are presented for Azerbaijan, Bangladesh, Mali, and Pakistan in sequence. Patient enrolment was n = 106, 100, 132, 100. Diagnosis of type 1 diabetes (T1D) was 98%, 84%, 98%, 100%.For T1D, male/female ratio 1.17, 0.79, 1.02, 1.38; peak age onset 9–11, 12–13, 15–16, 14–15 years; diabetic ketoacidosis at diagnosis 58%, 10%, 44%, 21%; GAD-65 positivity 62%, 26%, 59%, and (n = 74 analysed) 59%; IA2 positivity 39%, 11%, 22%, and (n = 83) 16%; C-peptide < 1.0 ng/mL 93%, 26%; 14%, (n = 94) 13%. *HLA-DRB1* population frequencies varied significantly among countries as did locus-level *DRB1*-T1D association: Azerbaijan ($p < 10^{-24}$), Bangladesh ($p = 0.03$), Mali ($p = 0.02$), Pakistan ($p < 10^{-14}$). Association strength for individual alleles, especially DRB1*03:01, varied widely among countries. As a side note, access to a home refrigerator for insulin storage was 99%, 57%, 44%, 97%.
**Conclusions:** Marked variation in clinical, biochemical, and *HLA-DRB1* allelic associations were observed among four countries, suggesting that not all patients have classic T1D. Additional analysis and further studies may expand treatment options for some subjects, and reveal novel forms of diabetes. The findings indicate need for stratification of T1D patients for current management and potential future individual immunomodulatory interventions.

## P091
## Do lifestyle habits influence the development of the metabolically healthy obese phenotype in youth?

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**Objective:** It is unclear how lifestyle habits influence metabolically healthy obese (MHO) and metabolically unhealthy obese (MUO) phenotypes in youth. We compared lifestyle habits and insulin dynamics at age 8–10 years in relation to MHO and MUO profiles at age 10–12 years.
**Methods:** The QUALITY cohort comprises Caucasian youth (n = 630) with at least one obese biological parent. We defined MHO as children with a BMI ≥ 97$^{th}$ percentile for age and sex and *none* of the following risk factors: triglycerides > 1.2 mmol/L, fasting glucose > 6.1, HDL-cholesterol < 1.04, or blood pressure > 95$^{th}$ percentile for age, sex, height. MUO were defined as having at least one of these risk factors. Fitness was measured by $VO_{2peak}$. PA and sedentary behavior ($SB_{acc}$) were measured using accelerometry. Hours of sleep and screen time were self-reported. Dietary intake was measured by 24-hour recalls. Insulin sensitivity and secretion were measured with Matsuda-insulin sensitivity index (ISI) and the ratio of the area under the curve of insulin to glucose over the first 30 minutes (AUC I/G 30 min) and 120 minutes (AUC I/G 120 min) of an OGTT, respectively. Lifestyle habits and insulin dynamics at baseline were compared across MHO (n = 58) and MUO (n = 90) using t-tests.
**Results:** MHO children versus those that were MUO had at baseline:
1) lower adiposity (36.1 vs. 39.3% body fat, p = 0.005);
2) higher Matsuda-ISI (7.4 vs. 5.4, p < 0.0001);
3) lower AUC I/G 30 min (38.6 vs. 52.4, p = 0.0006); and
4) lower AUC I/G 120 min (40.5 vs. 55.3, p = 0.002).

MHO also engaged in less screen time (2.7 vs. 3.5 hrs/day, p = 0.019), and consumed less sugar-sweetened beverages (93 vs. 150 mls/day, p = 0.014) compared to MUO youth. There were no differences between the groups in terms of PA, fitness, $SB_{acc}$, or sleep.

**Conclusions:** Specific lifestyle habits, such as screen time and diet, may be important targets to prevent obese children from developing metabolic complications as they enter puberty.

## P092

## Epidemiological characteristics of newly diagnosed children with type 1 diabetes in a single diabetes center during the last 16 years

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**Objectives:** The aim of the present retrospective study was to assess the epidemiological features

(age, gender, incidence) of newly diagnosed children with Type 1 Diabetes (T1D) in a single Diabetes Center during the last 16 years (2000–2015).

**Methods:** The study group consisted of six hundred and eight children diagnosed with T1D during the period 2000–2015. Data of children, regarding gender, dates of birth and dates of first diagnosis were retrieved from patients' files and analyzed. Patients were divided in four groups according to the year's period of T1D diagnosis:

a) diagnosis between 2000–2003 (n = 103),
b) between 2004–2007 (n = 161),
c) between 2008–2011 (n = 177) and
d) between 2012–2015 (n = 167).

According to age of diagnosis, three groups were analyzed: 0–5 years old (n = 144), 5–10 years (n = 226) and ≥ 10 years old (n = 235).

**Results:** Mean age at diagnosis was 8.21 ± 4.01 years. No gender differences in the studied cohort was noticed (females: males = 298:310, p = 0.626). A significant increase (≈60%) in the annual incidence of newly diagnosed T1D patients after the year 2004 was noted, with the annual number of newly diagnosed T1D cases rising between 40 and 50, contrary to the previously (2000–2003) annually diagnosed cases ranging from 19 to 34 (p = 0.001). The majority of children were > 5 years old, and no increase of T1D incidence in younger ages (<5 years) during the four periods was noted (p = 0.749).

**Conclusions:** There was a significant increase in the annual incidence of newly diagnosed T1D pediatric cases after 2004, when the annual incidence stabilized, while no increase of T1D diagnosis in preschool ages was noted in the large cohort studied.

## P093

## Partial remission and predictive factors in a cohort of 117 children and adolescent with T1DM

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Partial remission, in type 1 diabetes, should have beneficial effects on acute and chronic complications.

The aim of the study was to describe partial remission and evaluate its predictive factors in a cohort of children and adolescents with T1DM during the first 15 months of the disease.

Children and adolescents under 15 years, admitted between June 2013 and July 2014, having started insulin treatment within a month before admission were studied.

One hundred and seventeen consecutive cases were analyzed. At admission, sex ratio was 0.86, age was 8.2 ± 4.3 years (27% < 5 years, 36% aged 5–9 and 37% 10–14). Inaugural ketoacidosis was present in 30 children (26%). Partial remission (insulin less than 0.5 UI/Kg/day and HbA1c ≤ 7.5%) was obtained in 21 children (17.95% of cases) with an average duration of 5.2 ± 4.2 months

(min. 3-max. 15). The remission was significantly more frequent in children who had no ketoacidosis at diagnosis (p < 0.01), no siblings with T1DM (p < 0.05) and in girls (p < 0.02). There was no significant correlation with HbA1c levels at admission, level of maternal education or occupation, geographic origin, age groups or insulin regimen used.

Ketoacidosis at diabetes onset is a negative predictor of partial remission. The absence of T1DM in siblings and female gender are predictors of partial remission specific to our work environment.

## P094

## Clinical and epidemiological characteristics of pediatric population diagnosed of type 1 diabetes mellitus. 20 years of evolution in a region of northern Spain

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**Objective:** To characterize the pediatric population of our region diagnosed of DM1.

**Methods:** Retrospective cohort study of all patients < 15 years, diagnosed in our region of northern Spain, between 01/01/1995 and 31/12/2014. Variables: sex, seasonality, background. At debut: age, clinical presentation, analytical results, pancreatic reserve, HLA II, HbA1c, pancreatic β cell antibodies, other autoimmune disease. Calculation of incidences and trends in the period. Comparison between age groups.

**Results:** 207 patients: 51% female. Average age at debut 8.8 ± 3.7 years: 0–4 years 16%, 5–9 years 38%, 10–14 years 4%. Slight predominance in winter 31.9% (p = 0.04). Family history: type 1 diabetes 15.5%, other autoimmune diseases 10.6%. Average hospital stay 8.5 ± 2.9 days. Results at debut: glucose 446.2 ± 161.7 mg/dl; pH 7.3 ± 0.1; bicarbonate 17.4 ± 5.8 mEq/l; Ketonemia 4,1 ± 2,4 mmol/l; HbA1c 11.4 ± 2.3%. Debut's ketoacidosis percentage 42%, increase of 0.5% per year (p > 0.05). Variable global annual incidence, average 14.1 cases/100,000 (6 to 25.8); annual rise of 2.08% (p > 0.05). Average annual incidence by age group: 6.8/100,000 in the group of 0 to 4 years, 16.4/100,000 in the group of 5 to 9 years and 18.6/100,000 in the group of 10 to 14 years. Annual trend increase in the group of 0 to 4 years (annual percentage of change (APC) of 24%), and in 5 to 9 group (APC 1,6%). Slight decrease in 10 to 14 year´s group (APC −1.2%). Incidence by health zones with marked variability; regions above 30/100,000; 4 rural zones with low incidence (<5/100,000).

**Conclusions:** The general characteristics of the population of our region diagnosed of type 1 diabetes do not differ from those described in others of the country and the world. Changes in trends by age group suggest a shift in the age at debut to younger ages in predisposed subjects. The group of children younger than 5 years and those with family history of autoimmune diseases are groups of high risk and should be closely monitored.

## P095

## Diabetes mellitus type 1 in pediatric patients with African background in Germany, Austria and Luxembourg: analysis based on the DPV registry

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**Objectives:** The African continent, where diabetes was previously thought to be rare, has witnessed a surge in the condition, but epidemiological data for diabetes are scare. We aimed to analyze demographic characteristics and medical care of pediatric patients with African background in Germany, Austria and Luxembourg.
**Methods:** We studied 38.820 diabetes patients (<21y) from the multicenter diabetes patient follow-up registry, DPV. Patients born in Africa or with at least one parent born there were classified as African background. We used multivariable regression models adjusted for age, sex, and diabetes duration (SAS 9.4) for group comparison.
**Results:** In total 127 (0.33%) patients had African background (T1DM: n = 115, 0.30%; T2DM n = 4, 0.01%; other n = 8, 0.02%). Group of patients was heterogeneous with most patients from the Northern Africa region (n = 65, 50.78%) and Sub-Saharan Africa (n = 57, 44.53%). Patients with African background and T1DM had higher HbA1c (adjusted mean with SD: 9.18 ± 0.14 vs. 8.16 ± 0.01; $p < 0.001$), diabetes self-monitoring of blood glucose was lower (4.45 ± 0.16 vs. 5.25 ± 0.01; $p < 0.001$) and insulin pump therapy was used less frequently (10.3% vs. 40.0%; $p < 0.001$). Insulin dose per kg body weight/day was not significantly different (0.83 ± 0.02 vs. 0.86 ± 0.002). Rate of severe hypoglycemia with coma per 100 - patient-years (6.0 ± 0.03 vs. 2.8 ± 0.01) and diabetic ketoacidosis (5.5 ± 0.03 vs. 2.5 ± 0.001) were higher, but difference lacked significance due to low numbers. Differences in long-term diabetes complications were significant. Retinopathy (1.3 ± 0.01 vs. 0.2 ± 0.0002) and microalbuminuria (16.5 ± 0.03 vs. 7.1 ± 0.001); both $p < 0.001$.
**Conclusions:** Diabetes control in patients with African background is poor compared to patients without African origin. Treatment of these patients is a challenge for pediatric diabetes teams and there seems to be a need for specific treatment offers that incorporate different health beliefs.

## P096
## Seasonal variation of type 1 diabetes mellitus diagnosis in Polish children - a multicentre study

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**Objectives:** The current concept of damage of beta cells in type 1 diabetes (T1D) includes environmental factors in genetically susceptible individuals. The aim of the study was the evaluation of the seasonal variation of type 1 diabetes mellitus in Polish children < 18 years of age.
**Methods:** The study group consisted of 2174 children (1007 girls) with the mean age 9.3 SD 4.5 years, with newly diagnosed T1D in the years 2010–2014. This cohort study included data of children at the age of 0–17 years with newly recognized T1D correlated with weather conditions such as temperature and hours of sunshine. The data was obtained from east and central Poland. The meteorological data was provided by Institute of Meteorology and Water Management.
**Results:** We noted significant seasonality in the incidence of T1D ($p < 0.001$). The lowest number of children was diagnosed with T1D during May, Jun and July and the highest incidence was observed from September to February with peak in January. 423(19%) children were diagnosed in the warmest months (June to August with the mean temperature 16.8°C) compared to 636(29%) recognised in the coldest months (December to February with the mean temperature −1.6°C), $p < 0.0001$. T1D onset was noted more frequently in Autumn-Winter (September to February) than in Spring-Summer (March to August); 1270 (58%) vs. 904 (42%) cases, $p < 0.0001$. The seasonal variation demonstrated different pattern in the youngest children 0–4 years of age than in older groups. There were no significant differences between boys and girls ($p = 0.142$) with regard to the seasonal variation of diabetes onset.
**Conclusions:** Significant seasonality in T1D onset with peak values during the cold month might support the hypothesis that some environmental factors (eg. infections) may interfere with T1D onset. Different seasonal variation pattern in younger ages suggests that environmental factors may have a different effect in the youngest children compared to older subjects.

# Poster Tour 13: Genetics, Immunology and the Environment

## P097
## Clinical and metabolic characteristics of an Italian cohort of children at risk to develop T1D

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**Objective:** To determine whether a close follow-up of a cohort of children at risk to develop type 1 diabetes (T1D) results in a lower prevalence of ketoacidosis (DKA) compared to T1D children in the Italian population. To evaluate the effect of diagnosis at an early stage of disease in preserving residual ß-cell function.
**Methods:** First degree relatives of T1D patients and subjects with occasional hyperglycemia were recruited (153 subjects, median age 9.2 years) and screened for HLA (DQ2/DQ8) and specific ß cells autoantibodies (IAA, IA2, GAD and ZnT8). Subjects were stratified in medium-high and low risk based on the number of positive autoantibodies and screened periodically for autoantibodies, basal c peptide and glycosylated hemoglobin (HbA1c) to evaluate risk progression over time. Median follow up time was 42 months. Early diagnosed T1D patients were compared with a cohort of onset age-matched patients from the general population through monitoring basal c-peptide, exogenous insulin dose, and HbA1c for 18 months after diagnosis.
**Results:** 102 subjects (82%) were stratified based on the number of positive autoantibodies. During follow-up, 6 of 23 medium-high risk group subjects developed T1D. Diagnosis was performed by a random, postprandial, or fasting glucose in two children, and by a scheduled OGTT in four children. No DKA was found, compared to 67% of T1D patients from the general population ($p = 0.0067$). Early diagnosed T1D patients showed a lower HbA1c ($p$ = n.s.) and insulin requirement ($p < 0.05$) at onset and at 12 and 18 months after diagnosis, compared to other patients. C-peptide levels were higher at onset ($p = 0.01$) and persist higher after 18 months ($p$ = n.s.).
**Conclusion:** Close follow up of at risk children lead to an early diagnosis with a low rate of DKA and symptoms compared to general population. Interestingly, early diagnosis with a prompt start of insulin therapy might preserve residual ß-cell function.

## P098
## Celiac autoimmunity and confirmed celiac disease (CD) before and after the onset of childhood type 1 diabetes (T1D): a prospective cohort study in Skåne, Sweden

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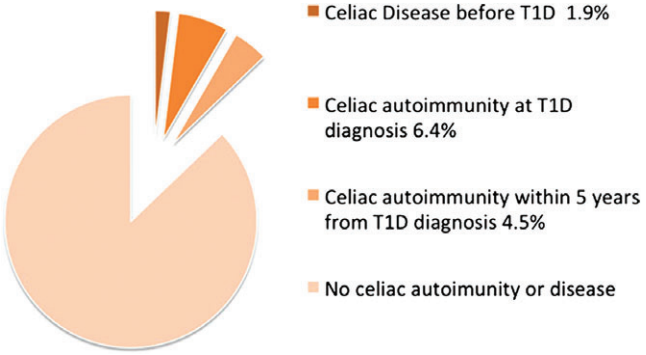
**Objectives:** To investigate the prevalence of celiac autoimmunity and confirmed CD before and after the onset of T1D, and to find predictive factors for the development of celiac autoimmunity after the onset of T1D.
**Methods:** Children who were diagnosed with T1D between May 2005 and December 2010 in Skåne, Sweden, were included in a prospective cohort (n = 513). Data on celiac autoimmunity and confirmed CD, were extracted from the children's journals. Patients who developed celiac autoimmunity after the diagnosis of T1D were compared with children who did not develop celiac autoimmunity within 5 years, according to gender, HLA-type, islet cell autoimmunity, age at onset, body measurements and laboratory analysis.
**Results:** Patients with known CD before T1D were 1.9% (10/513) and patients with celiac autoimmunity at T1D diagnosis were 6.4% (33/513). Of the children with no celiac autoimmunity at the T1D diagnosis, another 4.9% (23/470) developed celiac autoimmunity within 5 years. The age at onset was lower for the children who developed celiac autoimmunity with an age of 5.4 years, compared to 9.7 years in the celiac autoimmunity negative group *($p < 0.001$)*. More patients who developed celiac autoimmunity had the HLA-genotype DQ2/DQ8 and no one in this group had the HLA-genotype DQX/X *($p < 0.001$)*. The celiac autoimmunity patients also had more often IAA *($p = 0.036$)* and less often ZnT8QA *($p = 0.027$)*, were shorter and lighter *($p < 0.001$)* and had a lower BMI *($p = 0.018$)*. No significant differences were found regarding gender, laboratory analysis or the other islet cell autoantibodies.
**Conclusion:** The cumulative prevalence for celiac autoimmunity was 12.9% (66/513), of which 7.4% (38/513) had a confirmed CD, and the majority of these cases was seen either before or at the T1D diagnosis. Predicted factors for developing celiac autoimmunity after the onset of T1D were lower age at T1D onset and the HLA-genotype DQ2/DQ8, which may be useful when repeatedly screening for CD.




*[Pic 1]*

## P099
## Effect of screening for islet autoantibodies on diabetic ketoacidosis at diagnosis of type 1 diabetes in children

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**Objectives:** Diabetic ketoacidosis (DKA) at diagnosis of type 1 diabetes (T1D) is a preventable life-threatening complication with potential long-term sequelae. Decreased DKA prevalence has been reported in children screened for islet autoantibodies and followed with education regarding symptoms of diabetes. The impact of a research screening available in a defined population for 12 years, on DKA at diagnosis, was estimated controlling for demographic factors, health insurance and T1D family history.
**Methods:** The study population included 3439 children for whom DKA status was known, out of the 3544 diagnosed with T1D before age 18, in Colorado, in 1998–2012. Of those, 133 children or 4% had participated in a study that screened for islet autoantibodies: Diabetes Autoimmunity Study in the Young, Type 1 Diabetes TrialNet, or

The Environmental Determinants of Diabetes in the Young. Insurance status at diagnosis was categorized into private, government-provided or none.

**Results:** DKA was present in 1339 of the youth at T1D diagnosis (38.9%; 95% CI 37.3-40.6%). Among those previously screened for islet autoantibodies, only 9 (6.8%) had DKA while 52 would be expected. In multiple logistic regression controlling for age, sex, ethnicity and health insurance, prior participation in a research screening for islet autoantibodies had a powerful protective effect on DKA at diagnosis -OR = 0.2 (95%CI 0.2-0.4), independent of T1D in a 1st-degree (0.4; 0.3-0.5) or 2nd-degree relative (0.6; 0.5-0.8).

**Conclusions:** Participation in research studies that screen children for islet autoantibodies and educate regarding symptoms of diabetes and home glucose monitoring during child's illness can prevent ~80% of DKA. The existing technology is sufficient to consider a widespread screening of all children for islet autoantibodies and intensive follow-up of those positive, as one of the approaches to prevention of DKA.

## P100

## Nucleotide substitutions in *CD101*, the human homolog of diabetes susceptibility gene in non-obese diabetic mouse, in patients with type 1 diabetes mellitus

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**Objectives:** Genome wide association studies have identified more than 50 susceptibility genes for type 1 diabetes mellitus. However, low frequency risk variants could remain unrecognized. The present study aimed to identify novel type 1 diabetes susceptibility genes by newly established methods.

**Methods:** We performed whole-exome sequencing and genome-wide copy-number analysis for a Japanese family consisting of two patients with type 1 diabetes and three unaffected relatives. Further mutation screening was carried out for 127 individuals with sporadic type 1 diabetes. The functional consequences of identified substitutions were evaluated by *in silico* analyses and fluorescence-activated cell sorting of blood samples.

**Results:** Familial molecular analysis revealed co-segregation of the p.V863L substitution in *CD101*, the human homolog of an autoimmune diabetes gene in the non-obese diabetic mouse, with type 1 diabetes. Mutation screening of *CD101* in 127 sporadic cases detected the p.V678L and p.T944R substitutions in two patients. The p.V863L, p.V678L, and p.T944R substitutions were absent or extremely rare in the general population and were assessed as "probably/possibly damaging" by *in silico* analyses. CD101 expression on monocytes, granulocytes, and myeloid dendritic cells of mutation-positive patients was weaker than that of control individuals.

**Conclusions:** These results raise the possibility that *CD101* is a susceptibility gene for type 1 diabetes.

## P101

## Vitamin D status and vitamin D receptor gene polymorphisms and susceptibility to type 1 diabetes in Korean population

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**Objectives:** Type 1 diabetes mellitus (T1DM) is one of the T-cell mediated autoimmune diseases and vitamin D suppresses activation of T-cell and has immunomodulatory effects. The aim of this study was to investigate the association between vitamin D status and Vitamin D receptor (VDR) gene polymorphisms and T1DM.

**Methods:** One hundred and thirteen controls and eighty-one patients with T1DM were enrolled in the study. . TaqI, BsmI, and ApaI polymorphisms were detected using polymerase chain reaction-restriction fragment length polymorphism. Serum 25-hydroxyvitamin D (25(OH)D) was determined using chemiluminescent immunoassay (CLIA).

**Results:** Serum 25(OH)D levels showed a vitamin D deficiency or insufficiency in 72% of the patients. The mean levels of vitamin D were significantly higher in healthy controls as compared to patients with T1DM (P = < 0.05). TaqI and BsmI differences were significant after applying Bonferroni correction (P = < 0.05, respectively). The TT genotype carrier frequency among controls was higher than among the T1DM patients (P = < 0.05; OR, 2.98; 95%CI: 1.19-7.42). T allele frequency was higher among controls than T1DM patients (P = < 0.05; OR, 2.78; 95%CI: 1.15-6.72). The frequency of bb genotype carriers among controls was higher than among T1DM patients (P = < 0.05; OR, 4.13; 95%CI: 1.4-12.10). The frequency of the b allele among controls was higher than that among T1DM patients (P = < 0.05; OR, 3.20; 95%CI: 1.19-8.60).

**Conclusions:** This study indicated that T and b alleles which have high vitamin D level are protective against T1DM in Korean subjects.

## P102

## Diabetic ketoacidosis at onset of type 1 diabetes in children: role of demographic, clinical and biochemical features along with genetic and immunological markers as risk factors. A twenty-year experience in a tertiary Belgian centre

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**Objectives:** Diabetic ketoacidosis (DKA) is the leading cause of morbidity and mortality in children with type 1 diabetes (T1D). Little is known about the association between genetic and immunological markers and the risk of DKA at T1D onset. The aim of this study was to create a multivariable model foreseeing the onset of DKA in newly diagnosed patients in a multi-ethnic environment like Belgium.

**Methods:** This retrospective study included 532 T1D paediatric patients (age < 18 yr at diagnosis) recruited at our hospital from 1995 to 2014. DKA and its severity were defined according to the 2014 criteria of ISPAD. Genetic risk categories for developing T1D were defined according to the results by the Belgian Diabetes Registry. Multivariate statistical analyses were applied to investigate risk factors related to DKA and its severity at diagnosis.

**Results:** The mean age at diagnosis of the total population was 7.8 yr (range 0.2-17.5). Overall 42% of patients presented DKA at diagnosis. This study outlined the major risk of DKA at diagnosis for younger children (<3 yr) and for those belonging to ethnic minorities. Children carrying neutral genotypes had 1.5-fold increased risk of DKA at diagnosis than those with susceptible or protective genotypes (p = 0.047), an observation not previously reported. Neutral genotypes were more frequent in ethnic minorities and these parameters were both independently predictive of DKA at T1D onset. Only solitary positive IA-2A increased the risk of DKA at diagnosis

independently of its severity (p = 0.025). The proposed multivariable model could help to predict the probability of DKA in 70% of newly diagnosed cases.
**Conclusions:** This was the first reported implication of IA-2A positivity and neutral genotypes predisposing to DKA at diagnosis regardless of its severity. Earlier diagnosis through genetic and immunologic screening of high-risk children could decrease DKA incidence at diabetes onset.

## P103
## The prevalence ZnT8 antibodies and clinical features in 1022 Japanese patients with childhood and adolescent onset type 1 diabetes

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**Objectives:** Zinc transporter 8 antibody (ZnT8Abs) is one of autoantibody in type 1 diabetes. The aim of this study was to determine the prevalence and role of antibodies to ZnT8Abs in Japanese childhood and adolescent onset type 1 diabetes.
**Research design and Methods:** The sera of 1022 Japanese patients with childhood and adolescent onset Type 1 diabetes was collected at the registry of a cohort in Japanese Study Group of Insulin Therapy for Childhood and Adolescent Diabetes (JSGIT). ZnT8Abs were measured by a radio-immuno-assay using recombinant ZnT8 COOH-terminal or $NH^2$-terminal proteins. GAD antibodies (GADAbs) and IA-2 antibodies (IA-2Abs) were also measured. HLA-DR typing was performed by PCR-amplified DNA and nonradioactive sequence-specific oligonucleotide probes.
**Results:** ZnT8Abs were detected in 24.0% patients. GADAbs and IA-2Abs were 41.3 and 54.4% respectively. Among the 138 patients who were both negative with GADAbs and IA-2Abs, only 8 patients were ZnT8Abs positive. Among the patients within 1-year after the onset, 49.1% of them had ZnT8Abs. The prevalence of ZnT8Abs was rapidly decreased with the duration of the disease compared with GADAbs and IA-2Abs. ZnT8Abs was higher in the patients with the adolescent-onset than in those with childhood onset. ZnT8Abs were associated with adolescent, a high GADAb titer and female. It was not observed that the relationship between ZnT8Abs and HLA DRB1*09:01, which was already reported to be associated to Japanese childhood-onset type 1 diabetes.
**Conclusions:** The high prevalence rate of ZnT8Abs in child-onset Japanese type 1 diabetes was reported, However, this study has revealed that ZnT8Abs was detected in a higher proportion of patients with adolescent-onset autoimmune type 1 diabetes than in those with childhood onset. They seem to be a valuable marker to differentiate clinical and immunological phenotypes.

## P104
## Analysis of chosen polymorphisms rs2476601 A/G - PTPN22, rs20541 A/G - IL13, rs29941 A/G - KCTD15 in pathogenesis of type 1 diabetes in children

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**Background:** Type 1 Diabetes is multifactorial disease with a genetic susceptibility and environmental factors. The Tyrosine phosphatase non-receptor type 22 (PTPN22) gene polymorphism is known to be associated with T1DM, but it has not been established in a Caucasian children population yet. The interleukin 13 (IL13) and the potassium chanel tetramerization domain containing 15 (KCTD15) gene polymorphisms impact on the development of Type 1 DM in children has not been reported yet.
**Objective and hypotheses:** To estimate the association of polymorphisms of PTPN22, IL13 genes and KCTD15 polymorphisms with the predisposition to T1DM in children.
**Method:** The study was performed in 94 patients with T1DM and 160 healthy volunteers. The three single nucleotide polymorphisms (SNPs): rs2476601 - PTPN22, rs20541- IL13 , rs29941 -KCTD15 were genotyped by TaqMan SNP genotyping assay using the real-time PCR.
**Results:** Rs2476601 A alleles were more frequent in patients with T1DM in comparison to healthy subjects (p = 0.004 with OR = 2). Rs20541 A alleles were more frequent in T1DM patients in comparison to healthy subjects (p = 0.002 with OR = 2). Rs29941 A alleles were more frequent in T1DM patients in comparison to healthy subjects (p = 0.001, OR = 7).
**Conclusion:** Rs2476601 A/G - PTPN22, rs20541 A/G - IL13 , rs29941 A/G - KCTD15 polymorphisms could contribute to development of T1DM in children. The main risk factor for rs2476601, rs20541 and rs29941 is allele A.

# Poster Tour 14: Monogenic Diabetes

## P105
## Onset of type 2 diabetes in a toddler ?

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**Objectives:** To report a case of a normal weight Italian girl who showed temporary diabetes in two occasions, neonatally and at the age of two year, and successive later development of overt diabetes of uncertain classification.
**Case report:** FP is the eldest daughter of a caucasian couple, born at the end of normal pregnancy by natural delivery with a birth weight adequate to gestational age. In the first week of live she showed temporary hyperglycemia, glycosuria and ketonuria. Insulin and C-peptide in serum resulted respectively 0.5 mcU/mL and < 0.3 mcg/ml. Blood glucose (BG) monitoring was started showing mainly normoglycemia with occasional high-borderline BG values with HbA1c in the normal range. KCNJ11 and MODY2 were excluded by genetic test. At 2 years of life hyperglycemia, ketonuria and HbA1 of 6.9% were documented and insulin treatment was started, and discontinued after two weeks, for complete spontaneous remission. T1DM related antibodies (ICA, GADA, IAA, IA2, ZNT8) and HLA D3 and D4 antigens were all negative and an IVGTT showed a FPIR of 47 mcU/mL (1$^{st}$ centile). NGS identified two variant of the HNF1-α gene: 79A > C (pIle27Leu) reported as associated with insulin resistance, and G1720A > G (pSer574Gly) associated with increased risk of type 2 diabetes. At the age of 8 year the girl developed over diabetes (HbA1 of 8.4%, CGM reported a BG value (mean ± SD) of 152 ± 40 mg/dl and a maximun glycemic value of 311 mg/dl). On the basis of the genetic results we started treatment with metformin (initial dose: 250 mg OD, final dose: 500 mg BID) with a progressive reduction of both fasting and postprandial glycemia (mean ± sd BG by CGM 125.5 ± 32.1 mg/dl).
**Conclusions:** The interest of this case arises from the difficulty, even in the presence of overt diabetes, to find a correct diagnostic and therapeutic orientation. The good therapeutic response to metformin and genetic mutations suggest the hypothesis of an exceptionally early onset of type 2 diabetes.

## P107
## The case of lipoatrophic diabetes in eleven year old girl

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Lipodystrophy syndromes are genetically heterogeneous disorders characterized by partial or total loss of adipose tissue in the body and insulin resistance. The clinical signs could manifest at different age and include lipodystrophy, insulin resistance, diabetes mellitus and hypertriglyceridemia, and hepatic steatosis.
**Clinical case:** Patient M., 11 years old, was admitted to Endocrinology unit with hypermasculine lipodystrophy. The girl had accelerated growth, loss of subcutaneous fat. Her height was 158 cm, SDS 1.76. Body weight 35.8 kg, BMI: 14.34 kg/m2, SDS BMI: −1.89. She had grey axillar acanthosis, hypertrichosis of the lower legs, curly hair. Puberty stage was B2P1, she had early puberty since the age of 8. She had muscular hypertrophy and contractures of the interphalangeal wrist joints. Fasting glycaemia was 12.7 mmol/L and HbA1c was 9.7%. Cholesterol was high, 17.97 mmol/l, triglycerides - 90.46 mmol/l, protein-179 g/l, leptin-2 ng/ml, insulin-105.1 mcU/ml. On the background the carbohydrate and animal origin fats free diet during a week, the blood glucose levels decreased to 4.5 - 7.7 mmol/l, cholesterol - to 4.2 mmol/l, HDL - to 0.57 mmol/l, triglycerides - to 10 mg/l, protein was 94 g/l, ALT- 93 E/l, AST- 45 E/l. Proton MR- spectroscopy revealed a predominantly brown fat. Hyperinsulinemic euglycemic test clamp- M-index −2.5, which corresponds to the severe insulin-resistance. Molecular genetic analysis revealed a heterozygous mutation p. D136V in the gene LMNA (MIM #: 150330, reference sequence NM_170707.2). This mutation has never been previously described, its pathogenicity is not clear, her parents ae healthy and don't have the mutation.
**Conclusion:** Taking into consideration that the patient has got not previously described mutations in LMNA, we can assume a new dominant mutation in this gene, which leads to the development of a generalized form of lipodystrophy. About its pathogenicity can be assessed after conducting tests in vivo.

## P108
## Impact of insulin therapy on body mass index and pulmonary function in patients with cystic fibrosis-related diabetes mellitus in a non-Caucasian population

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**Objective:** Cystic fibrosis is the most common autosomal recessive disease among Caucasians and mortality rates are high. Recent therapeutic advances have increased survival rates, resulting in increased risk of comorbidities, such as cystic fibrosis-related diabetes (CFRD). Current guidelines recommend early diagnosis and treatment of CFRD with insulin; however, few studies have evaluated the clinical impact of therapy. Moreover, published studies have focused on Caucasian populations. The objective of this study was to evaluate the effect of insulin on BMI and pulmonary function in a non-Caucasian cohort with CFRD.
**Research design and Methods:** This retrospective study analyzed the medical records of patients reviewed at the Multidisciplinary Center of Cystic Fibrosis of São Paulo School of Medicine, Brazil. BMI and pulmonary function (measured by forced vital capacity [FVC] and forced expiratory volume [FEV] in 1 second) were assessed. The relevant time interval commenced one year before (T-12) and ended one year after (T + 12) the introduction of insulin (T0).
**Results:** The zBMI values were as follows: −0.434 ± 1.3 (T-12), −0.462 ± 1.3 (T-6), −0.547 ± 1.3 (T-3) -0.607 ± 1.3 (T0) - 0.478 ± 1.3 (T + 3), −0.534 ± 1.3 (T + 6), −0.547 ± 1.3 (T + 12). Between T-12 and T0, there was a zBMI reduction of −0172 ($p < 0.05$). Following T0, zBMI increased and then stabilized. FVC and FEV worsened between T-12 and T0 and stabilized after T0.
**Conclusions:** Early insulin therapy has a positive effect on BMI and pulmonary function in non-Caucasian patients with CFRD.

## P109
## The Wolfram-like syndrome: a case report

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**Background:** The Wolfram-like syndrome-WFSL is rare autosomal dominant disease characterised by triad: congenital progressive hearing loss, diabetes mellitus and optic atrophy.
**Case report:** The patient was kept under observation from birth for Peters anomaly type III, congenital glaucoma, megalocornea. At the age of 4 months his hearing was examined and severe hearing impairment to deafness was diagnosed, one-sided deformity of the auricle with atresia of the bony and soft external auditory canal; non-differentiable eardrum; missing os incus. He was under observation from infant age for severe psycho-motor retardation. From the age of 2.5 years treated for hypothyreosis. At the age of 3 1/4 years the patient was examined for growth retardation, failure to thrive. Insulin-treated diabetes mellitus was diagnosed. Molecular-genetic examinations revealed de novo mutation c.2425G > A (p.(Glu809Lys) in WFS1 gene. No mutations were proved in the biological parents.
**Conclusions:** The mutation (p.(Glu809Lys) in WFS1 gene is associated with occurance of the Wolfram-like syndrome-WFSL.

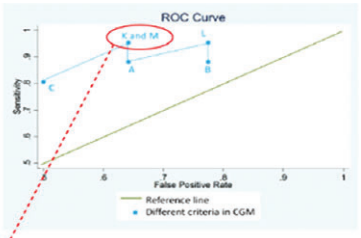


*Fig 1. Determination of optimal glycemic cut-off points to classify CF patients by CGM on ROC curve analysis.* ROC curve is a graph where sensitivity and specificity are crossed. The reference line provides the worst sensitivity and specificity: therefore, the point closest to the top left-hand corner maximizes sensitivity and specificity: it will be the best criterion of continuous glucose monitoring. Letters K and M had the same sensitivity and specificity. We chose the K criterion as is shown below.

| MOST SENSITIVE AND SPECIFIC CRITERIA ON CGM BY ROC CURVE | Fasting blood glucose (FBG) | Postprandial |
|---|---|---|
| Normal Glucose Tolerance (NGT) | < 100 mg/dl<br>100-126 mg/dl (<30% measurements) | < 140 mg/dl or<br>140-199mg/dl (CGM time < 4.5%) |
| Abnormal GlucoseTolerance (AGT) | ≥ 30% measurements between 100-126 mg/dl | 140-199mg/dl (CGM time ≥ 4.5%) or<br>≥ 200 mg/dl (one peak only) |
| CFRD | > 126 mg/dl | ≥ 200mg/dl ( >1peak) |

*[OPTIMAL GLYCEMIC CUT-OFF BY ROC CURVE]*

## P110
## Continuous monitoring system evaluation for the diagnosis of carbohydrate metabolism in cystic fibrosis (CF) patients

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**Objectives:** Oral glucose tolerance test (OGTT) is validated test to diagnose glucose abnormalities in CF patients, however it is not always sufficiently sensitive and specific. Continuous glucose monitoring (CGM) could be an alternative tool.
**Methods:** Prospective study of CF patients aged ≥10years. OGTT and CGM were performed. Patients with exacerbations,steroids,GH, immunosuppressed, insulinised or transplanted were excluded.

Patients were classified in normal glucose tolerance (NGT), abnormal glucose tolerance (AGT) or cystic fibrosis-related diabetes(CFRD) by OGTT. After OGTT CGM(IproTM2 ) was performed.

Changes in BMI and FEV1 in the preceding year were assessed (DSD BMI and Δ%FEV1,respectively (current-one year ago). Different criteria were established and ROC curve was used to determine optimal glycaemic cut-offs to define the classification in NGT, AGT or CFRD by CGM. STATA statistical software.
**Results:** Thirty patients. Mean age: 14.6 ± 2.6 years, 53.3% female. 36.7% homozygous F508del, 40% heterozygous F508del, 23.3% other.

OGTT: 47%NGT,47% AGT and 6% CFRD. CGM revealed glucose peaks >200 mg/dl in 21% of CF patients with normal OGTT (66% ≥2peaks in different days). 21% of AGT patients on OGTT presented fasting blood glucose (FBG) >126 mg/dl during monitoring.

CGM: patients were classified as NGT, AGT or CFRD using different criteria and selecting the most sensitive and specific (Figure) As greater was the loss of BMI and FEV1 more sensitive and specific was CGM to detect glucose tolerance abnormalities (AUC ROC curve 0.75 in ΔBMI < 0 vs 0.64 in ΔBMI > 0; AUC 0.66 in ΔFEV1 < 0 vs 0.62 in FEV1 > 0).
**Conclusions:**

1. Diagnostic criteria of glucose metabolism in CF patients based on CGM results are proposed.
2. Carbohydrate metabolism abnormalities detected by CGM are related to deterioration in lung function and nutricional status in the previous year.
3. CGM reveals early glucose tolerance abnormalities, undiagnosed by OGTT and correlated with clinical outcomes.

## P111
## CFRD clinical care: experience of Diabetology Unit and Tuscany Regional Centre for Cystic Fibrosis of Meyer Children's Hospital

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**Background:** Epidemiological and clinical data on medical care for cystic fibrosis-related diabetes (CFRD) is limited.
**Objectives:** To evaluate the state of clinical care and the adherence to guidelines for CFRD patients followed at Diabetology Unit and Cystic Fibrosis Unit of Meyer children's hospital.
**Methods:** Data were retrieved from the electronic medical files, analyzed and compared to the latest International Society for Pediatric and Adolescent Diabetes (ISPAD) and American Diabetes Association/Cystic Fibrosis Foundation (ADA/CFF) guidelines.
**Results:** 65 out of 305 (21.3%) CF patients were diagnosed with CFRD between 1988 and 2014. Mean age at diagnosis was 25.9 ± 10.9 years. 32.3% of cases were diagnosed in pediatric age. 8 patients (12.3%) died in the last 5 years and 29 (44.6%) underwent lung transplant. Insulin therapy was initiated at diagnosis in 90.7% of cases. 52.6% of subjects were treated with basal-bolus regimen, either with multiple daily injections (MDI) or with continuous subcutaneous insulin infusion (CSII; 5 patients). 14% and 28.1% of patients were treated respectively with long acting or rapid acting insulin analog only. 3 subjects (5.3%) discontinued insulin therapy. Patients attended the CF clinic regularly (mean 6 ± 4 visits yearly), whereas they were seen less often than recommended by the diabetes multidisciplinary team (2 vs 4 times yearly). Self-monitoring blood glucose (SMBG) was performed by 59.6% of patients. HbA1c was measured more than 3 times per year only in 32.7% of patients in the last 2 years. Nevertheless metabolic control was good. Only 12.2% of patients had a HbA1c over the recommended target of 7% (53 mmol/mol). Mean HbA1c during the last two years was 6.1% (43 mmol/mol) in adults (5.2-9.9%) and 6.3% (45 mmol/mol) in children (5.4-8.1%). Only 36.8% of patients performed complete screening for microvascular complications.
**Conclusions:** We found suboptimal adherence and compliance to standards of care among CFRD patients analyzed.

P112

## Dapagliflozin in a girl with Rabson-Mendenhall syndrome, RMS

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**Background:** Donohue- and Rabson-Mendenhall syndrome are rare autosomal recessive disorders caused by mutations in the insulin receptor gene, INSR. Phenotypic features include extreme insulin resistance, linear growth retardation, paucity of fat and muscle, and soft tissue overgrowth. Severe hyperinsulinism with pancreatic β-cell decompensation, hyperandrogenism, hyperglycemia and ultimately ketoacidosis adds to the picture. Early mortality due to advanced complications of diabetes is common. INSR has also been entailed in magnesium homoeostasis and nephrocalcinosis. The diabetes treatment in the cases of DS-RMS is extremely hard since the insulin receptors are not responding to insulin.

**Case description:** A girl born SGA in 2007 and diagnosed with RMS with the genetic deletion p.V66/del.ex18 had a serum insulin level of >9000 and showed obvious signs of achantosis nigricans. Treatment with IGF-1 at the age of 2 y resulted in cardiomyopathy and was withdrawn. She was further on treated with metformin and CHO-reduced diet, got a PEG and trachestomia and substitution was given with potassium and magnesium. Since 3 y back, the plasma glucose values are significantly more stabilized and lowered by adding Dapagliflozin (Forxiga). The HbA1c-value is now around 55 mmol/mol. No adverse effects as UTI or fungal infection have been shown. Mentally this girl developes very nicely and is attending normal school education.

**Conclusion:** Dapagliflozin is a relatively new T2D drug on the market that significantly rise the glucose excretion by the kidneys and thereby lowers the plasma glucose value. It can be a drug to consider in the treatment of RMS.

# Poster Tour 15: Nutrition, Exercise & Epidemiology

## P113
## Assessment of nutritional knowledge of Greek patients with type 1 diabetes and their parents

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**Objectives:** To assess the level of nutritional knowledge of patients with type 1 diabetes and their parents in our center and its associations with glycemic control using a questionnaire that was developed and applied in another center that would allow comparisons between the two centers.
**Methods:** Patients with type 1 diabetes, aged > 12 years and their parents were recruited during their regular visits at the Outpatient Pediatric Diabetes Clinic of our Department. All participants were asked to fill out a translated version of the Nutrition Knowledge Survey (NKS). Caregivers also completed a second questionnaire consisted of demographic information, whereas data regarding disease treatment and control were extracted from patient's medical records.
**Results:** The mean total NKS score of all questionnaires completed was 60.36%. Mothers scored significantly higher (mean NKS score: 64.66% $\pm$ 14.37) compared to fathers (mean NKS score: 58.57% $\pm$ 16.90) and patients (mean NKS score: 52.85% $\pm$ 16.97). A significant inverse correlation was recorded between HbA1c levels and "Carbohydrate counting" domain score (r = −0.275, P = 0.016), whereas "Healthful eating" domain score was linearly correlated with maternal (r = 0.281, P = 0.015) and mid-parental age (r = 0.288, P = 0.017).
**Conclusions:** The application of the NKS questionnaire in our center showed a significant association between carbohydrate counting knowledge and glycemic control, outlined differences in diabetes nutrition knowledge status between the center where NKS was originally developed and our center and highlighted a higher nutritional knowledge level of mothers compared to fathers and children.

## P115
## Influence of physical activity on metabolic control, body composition and cardiovascular system in children and adolescent with T1DM

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**Objectives:** Our study aims to evaluate the effect of physical activity (PA) on body composition, metabolic control, systolic and diastolic blood pressure (SBP and DBP) and heart rate (HR) in young patients with type 1 diabetes mellitus (T1DM).
**Methods:** We performed a cross-sectional study on 81 patients (45 male) with T1DM aged 16.0(5.6) years, with disease duration of 86(62) months and free of coeliac disease and/or thyroiditis. Every patient was asked to report which type of physical activity was used practicing every week and how long. Depending on the type of sport practiced and the time spent in their practice, the total hours of physical activity per week were divided into three categories of exercise: aerobic, anaerobic and mixed. Body composition was assessed through body mass index (BMI), body impedance and skinfolds, and metabolic control was evaluated through mean and SD of HBGM, HBGI, LBGI and HbA1c. For each patient were also taken into account the following parameters: systolic and diastolic pressure, heart rate and insulin need. Data are reported as median (IQR). Simple and multiple regression analysis and Mann–Whitney test were used for statistical analysis.
**Results:** The time spent on PA was inversely correlated with fat mass % (FM%) ($R^2$ = 0,194; p < 0.0002). FM% was directly correlated with SDS-DBP ($R^2$ = 0.082; p < 0.01) while BMI was directly correlated with the SDS-SBP ($R^2$ = 0.066; p = 0.02). Mixed exercise was associated with significant lower FM% then the aerobic and anaerobic one [17.9 (6.4) vs 27.5 (15); p < 0.001]. We did not find correlations between the amount and type of PA and any of the others parameters we collected.
**Conclusions:** Our results seem to highlight a positive effect of exercise, particularly the mixed one, on body composition and that the latter improves DBP. Furthermore, it does not seem that PA has a significative effect on metabolic control.

## P116
## Indian Diabetes Risk Score (IDRS) for type 2 diabetes mellitus screening in young adults: effect of yoga and meditation

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**Background:** India is the country with the top most people with diabetes, and with time life style is changing among pediatric and adolescent populations well as aged peoples. Current research based on the prevalence and management of diabetes in Delhi metro population by Yoga and Meditation. There are several study are going on the patients about their social and mental problem in younger diabetic children as well as their family.
**Methods:** 32 school children (age group 10–20 years) and 35 aged diabetic patients (age 60–70 years) are scored using IDRS which includes age, family history of diabetes, exercise status and Waist circumference. After scoring them they are categorised into mild, moderate and high risk group. All group were treated with Yoga and Meditation for daily one month with balance diet at Shri Mahamaya vaishnav devi mandir research institute, New Delhi, India.
**Results:** We get 8%, 79% and 13% children in high risk, moderate and low risk group respectively for developing type 2 DM. After one month their blood glucose and insulin levels were closer to normal levels with increase in work efficiency in both younger and aged diabetic patients. Present study highlight that the successful treatment of diabetic children and adolescents not only requires anti-diabetic drugs; but also family care, life style education, harmonised mind-body-soul, awareness, psychological support, preventive approach toward activity of daily living.
**Conclusion:** Through counselling with meditation and yoga, we can help people to acknowledge and share the emotional challenges raised by diabetes complications. Therefore preventive diabetes education programme & promotion of Yoga and meditation will be future plan of action which can be suggested in the form of regular exercise and diet planning for the students as part of an integrated approach.

## P117
## An audit of dietary intake of Australian children with diabetes attending the Royal Children´s Hospital, Melbourne

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**Objective:** To understand what children with diabetes at the Royal Children's Hospital are eating compared to their peers and explore dietary intake impact on HbA1c outcome.

**Methods:** An open cross-sectional dietary audit of children and adolescents with diabetes aged 2-17 years was conducted using an age-appropriate validated Food Frequency Questionnaire. Total energy, macronutrient intake and diet quality were calculated and compared to dietary advice provided and national intake data. Body weight, participation in physical activities, and dietary intake influences on glycaemic control were investigated.
**Results:** 785 patients were recruited and clinic data collected, from which 457 dietary surveys were completed. Dietary intakes were overall nutritionally adequate with macronutrient distribution (% total energy intake) being lower carbohydrate (49%), higher fat (33%), higher saturated fat (15%) and higher protein intake (19%) than recommendations, but similar to their peer group. Energy intakes were excessive of requirements in the 4–13 year age groups. Rates of overweight (27%) and obesity (9%) were significantly higher than national data (18% and 7% respectively). Optimal glycaemic control (HbA1c < 58 mmol/mol) was achieved by 43% of cohort, with a greater proportion being females. HbA1c was shown to improve with higher carbohydrate intake and lower fat intake and deteriorate with increased age and those classified as underweight. Mean reported rates of physical activity in the group was 1.3 ± 1.0 hours/day with 60% meeting national recommendations. Rates declined with increased age.
**Conclusions:** This audit has provided a snapshot of our clinic population and identified areas requiring targeted education/support to improve health outcomes which include dietary adherence, rates of overweight/obesity, appropriate energy intakes and optimal glycaemic control targets. Furthermore it provides good baseline data to evaluate the efficacy of future interventions.

## P118
## Eating behaviour patterns in Polish and Italian children with type 1 diabetes mellitus

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**Objectives:** Children with diabetes should follow the same dietary recommendations as a healthy peers. Nonetheless, they have to adjust insulin dosage to food intake. Nutrition education and modelling healthy habits in children with diabetes will help to maintain better diabetes control. We aimed to identify eating behaviour patterns in Polish and Italian children with type 1 diabetes mellitus.
**Methods:** The study is conducting among 50 Polish and 50 Italian children, aged 7–18 years with type 1 diabetes mellitus who follow a routine check-up visit at Diabetes Centre in Poznan (Poland) and in Milan (Italy). A self-administrated Children´s Eating Behaviour Questionnaire is used to assess the frequency and quality of food intake.
**Preliminary Results:** The study cohort has already comprised 43 Italian children (girls:23; boys: 20). In the end of August the study will be finished. The mean age was 13.5 years. 74,4% of children admitted that other's people support is very important in maintaining a healthy diet and 77% had a nutrition consultation. All children had regular meals (67%-5 meals per day; 33%-4 meals per day) and breakfast. Typical breakfast contains milk, biscuits, cornflakes (58%, 72% and 28% respectively). All children had at least one snack per day and they usually ate: fruits, sandwich, crackers, chocolate, ice-cream (60.4%, 53%, 28%, 16.3% and 14% respectively). 37.2 % children added sugar to beverages (87.5% one spoon, 12.5% two spoons). 11.6% of respondents took multivitamins. Majority consumed fruits and vegetables less than three times per day (67.4% and 95.3%, respectively) , 74.4% had fish less than 2–4 per week, 81.4% ate meat once a week or more and 95.3% drank water every day. 56% drank slim milk or low fat milk 2–4 per week or more.
**Conclusions:** Most of children had healthy eating habits. Children need support in maintaining a healthy diet and a nutrition consultation should be a part of diabetes management.

## P119
## High proportion of type 2 diabetes among newly diagnosed children and adolescents in La Reunion Island, a French oversea territory

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**Objectives:** La Reunion Island, a 843 000 inhabitants French oversea territory located in the Indian Ocean, exhibit one of the highest rate nationwide of adult obesity and type 2 diabetes (DT2). Although more than 1/4 of the pediatric population is also overweight or obese; little is known on pediatric onset diabetes. Our goal was to estimate the incidence of Pediatric onset diabetes in La Reunion and to describe diabetes etiologies.
**Methods:** Data on all new cases of diabetes 0–18 years old admitted in any one of the 3 pediatric centers in La Reunion from January 1rst 2010 to December 31st 2014 were collected. Family history, clinical (symptoms, age, gender, BMI), biological (Ketones, pH, HCO3-, HbA1c), and immunological (ICA, IA2, IAA, GAD antibodies) data at diagnosis, along with follow up findings (insulin requirement, associated symptoms, genetic testing) were retrospectively recorded from paper and electronic charts to classify diabetes etiologies.
**Results:** Over the 5-year period 170 children and adolescents were diagnosed with diabetes representing an estimated incidence of 12.5/100,000 per year. Mean aged at diagnosis was 9.4 ± 4.8 yrs old with 23% of the patients younger than 5 years old. Most of them (75%) had a family history of diabetes and 15% were obese at diagnosis. Final diagnosis was type 1 diabetes for more than 80%. T2D represented 9.4% of the patients (n = 16) with a mean aged at diagnosis of 14.9 yrs old [10.8 -17.5], Body Mass index 4.1 ± 2.1 SDS [0.3-8.5], mostly girls (3:1), and all pubertal. Mean HbA1c for DT2 patients was 10.8 ± 3.4% [5.5-16.8]; 2 cases presented with ketosis and 2 in ketoacidosis (25%).
**Conclusions:** Incidence of pediatric onset diabetes in La Réunion appears to be similar to mainland France but with a worrisome proportion of almost 10% of the patients with DT2. Strategy prevention should be implemented in this population to reduce childhood obesity and limit the growing burden of DT2.

## P120
## Type 2 diabetes in Bangladeshi children and adolescents - an emerging problem

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**Introduction:** Type 2 diabetes mellitus is emerging as a new clinical problem within pediatric practice. Recent data shows the prevalence of Type 2 diabetes among children and adolescents is increasing in some ethnic groups around the world.
**Methods:** A total of 1369 children and adolescents with diabetes attended CDiC Clinic in BIRDEM, a tertiary care Hospital in Bangladesh over six years period: January 2010 to December 2015. Among them 144 children were diagnosed as type 2 diabetes who were included. Demographic and clinical data were recorded including age, gender, duration of diabetes, HbA1c, BMI SDS, Waist/height ratio, BP, insulin dose and oral drugs. Urinary Albumin concentration was measured by DCA 2000 analyzer.
**Result:** The number of children with type 2 diabetes increased more than seven fold from 2010 (2%) to 2015 (15%). Median age was 13.0

[11.0-15.0] and ten patients (7%) were below 10 years of age at the onset. Family history was positive in 92% patients and 10% mother had H/O GDM. Mean waist-height ratio was 0.60 ± .07 and more than 90% were obese or overweight. Mean HbA1c was 10.5 ± 2.8 and after 3 months was 8.4 ± 2.2. Fatty liver on USG was found in 27 (19%) patients. Microalbuminuria developed in 10% children and adolescents. Among them 20% were newly diagnosed. Life style modification was advised in most of the patients. Insulin was started initially along with Metformin in thirty-one patients (22%) and could be stopped in thirteen (42%) of them in 3 months period.

**Conclusion:** Though it was uncommon in previous years, the number of type 2 Diabetes increased over the years in our country. Life style modification along with oral drug could be the first choice in most of the children and adolescents with type 2 diabetes.

# Poster Tour 16: Psychosocial Issues

## P121
## Involving parents of young children in designing and delivering a supportive intervention at new diagnosis of type 1 diabetes (T1D)

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**Objective:** Given the unique challenges of managing T1D in young children, new strategies are needed to promote glycemic control and parent quality of life. Other parents with experience parenting young children with T1D may be well-suited to offer support during the especially difficult period after diagnosis. In preparation for a stepped care behavioral intervention trial, parents of children with T1D were involved in designing and delivering peer support over 9 months post-diagnosis.
**Methods:** Before trial start, diabetes providers referred potential parent advisors: parents of children diagnosed ≥1 year ago with T1D under age 7. Study staff screened referred parents and invited those who were interested to join the parent advisory board to give feedback on intervention components. A subset with interest, recognized suitability, and availability to be more involved, were trained as parent coaches, in which they would be paired with parents of newly diagnosed young children to offer supportive contact related to adjusting to diagnosis and parenting a young child with T1D.
**Results:** Of the 35 parents nominated, 30 were eligible to be advisors based on child's current age, age at diagnosis, and English fluency, and 10 (90% female; 80% Caucasian; Child age = 7.7 ± 2.0 years; Age at diagnosis = 3.8 ± 1.0 years) consented to be parent coaches. Training included a 4-hour group session and individual calls focusing on coach roles, reflective listening/communication skills, and research ethics. Parent coach outcomes to be measured include quality of life, parenting stress, mood, and self-efficacy.
**Conclusions:** Trained lay peer coaches are a low-cost, translatable resource that can potentially offer highly relevant support after diagnosis. Peer coach support could be delivered universally, permitting targeted resources to be allocated to parents with higher needs. The ongoing trial will evaluate outcomes of peer coaching in combination with more intensive intervention components.

## P122
## Fear of hypoglycemia in parents of children with type 1 diabetes: results from diabetes MILES - Youth - The Netherlands

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**Objectives:** To identify sociodemographic and clinical correlates of parental fear of hypoglycemia (PFOH) among parents of children (4–18 years) with type 1 diabetes (T1D), and to examine the relationship between PFOH, mindfulness and mindful parenting.
**Methods:** This study is part of Diabetes MILES Youth-The Netherlands, a national cross-sectional study of children with T1D and their parents. For these analyses, data from 421 parents were available. Questionnaires included HFS-P Worry (PFOH), FMI-short (mindfulness) and IM-P (mindful parenting).
**Results:** Hierarchical multiple regression analysis showed that younger age of the parent, lower educational level, non-Dutch nationality and more blood glucose measurements per day were related to higher PFOH. Other parent characteristics (gender, marital status, employment status), child characteristics (age, gender) and other diabetes-related factors ($HbA_{1c}$, diabetes duration, pump therapy, history of severe hypoglycemia, ketoacidosis and diabetes-related hospitalisations) were not associated with PFOH. Moreover, lower mindfulness was related to higher PFOH. However, adding mindful parenting to the model negated the previous contribution of general mindfulness to PFOH. In this model, lower mindful parenting was related to higher PFOH. Regarding the subdomains of mindful parenting, less non-judgmental acceptance of parental functioning and less emotional non-reactivity in parenting were related to more PFOH.
**Conclusion:** With respect to sociodemographic and clinical factors, younger age, non-Dutch nationality, lower parental educational level and more blood glucose measurements per day were associated with higher PFOH. In addition, parents who were less mindful, in general or specifically in terms of their parenting, experienced more PFOH. Hence, training parents of children with T1D who experience PFOH how to become more mindful might help them to cope better with their concerns about their child's risk of hypoglycemia.

## P123
## Longitudinal association between quality of life and HbA1c

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**Objective:** The purpose of the study was to prospectively explore the relationship between chronic-generic and condition-specific quality of life (QoL) and HbA1c using data of a cohort study of young patients with type 1 diabetes (T1D) across Germany.
**Methods:** The baseline survey conducted 2009–2010 included patients aged 11 to 21 years with T1D onset occurring from age 0–4 years. The follow-up survey was conducted in 2012–2013. Additional clinical data of routine care procedures from the German/Austrian DPV Initiative were linked. QoL was assessed by the self-report DISABKIDS chronic generic module (DCGM-12) and diabetes module (DM) with treatment and impact scale. Regression analyses were performed with the baseline DISABKIDS scores and socio-demographic and health-related covariates as predictors, and the outcome follow-up HbA1c.
**Results:** A total of 560 patients with a mean follow-up time of 3.0 years (SD 0.6) were included in the analyses. At baseline, they had a mean age of 15.9 (SD 2.3) years, a diabetes duration of 13.0 (2.0) years and a mean HbA1c of 8.3 (1.3) % (67 (14.2) mmol/mol). Univariate analyses indicated associations between the QoL scores at baseline and HbA1c at follow-up (β[DCGM-12] = −0.017 (standard error 0.004), β[DM treatment] = −0.010 (0.002), β[DM impact] = −0.018 (0.003), $p < 0.001$). The associations remained significant after adjustment for sex, age, socioeconomic status, family composition, hospitalization, insulin pump therapy, diabetes duration, satisfaction with treatment/care, and overweight (β[DCGM-12] = −0.012 (0.004), β[DM treatment] = −0.007 (0.002),

β[DM impact] = −0.014 (0.003), p < =0.003). However, the associations were no longer present when additionally adjusting for baseline HbA1c (p > 0.05).
**Conclusions:** Self-reported QoL was associated with HbA1c after three years in the course of T1D among adolescents and emerging adults with long-duration T1D, but mainly mediated by correlation with HbA1c at baseline.

## P124
## Validation of a diabetes self-care measure for parents of children with type 1 diabetes

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**Objective:** Managing Type 1 diabetes requires daily complex behaviors (insulin administration, diet, activity). Development of these self-care skills becomes increasingly important as children with type 1 diabetes move towards adolescence. We aim to validate a new measure that assesses parent's perceptions of their child's diabetes self-care skills to guide interventions that can enhance adherence and diabetes knowledge.
**Methods:** Participants were from 41 diabetes camps throughout the U.S. Parents (N = 616) completed the Diabetes Skills Checklist to assess the diabetes self-management skills of their children (N = 616; mean age = 10.3, age range = 8-11.99, female = 53%, ethnicity = 91.1% White, 5.6% Latino, 2.4% Black). Parents also completed a measure of their own diabetes-specific distress (P-PAID-C). Principal axis factor analysis (PAFA) was performed to validate the 23-item Parent version of the Diabetes Skills Checklist.
**Results:** Item-to-total correlations < .3 and items with communalities < .3 were deleted when running PAFA with promax rotation, resulting in a 13-item measure, with a Cronbach's alpha of .86. The 4 factor structure (knowledge about diet, diabetes and exercise, insulin adjustment, and knowledge about insulin) accounted for 59.7% of the variance. Total scores were significantly correlated with parent reported distress $r$ (586) = −.27, $p$ < .000 and hemoglobin A1c (HbA1c) $r$(598) = −.13, $p$ < .002.
**Conclusions:** The Diabetes Checklist-Parent Version is a brief measure of parent perceptions of their child's diabetes self-care skills. Parent perceptions of better self care-skills were associated with less distress and lower A1c. Results closely match the factor structure of the Diabetes Checklist for parents of teenagers. This scale also has practical application as a brief screen during clinic visits and for interventions targeting adherence and diabetes knowledge in children.

## P125
## Differences in perception of a child eating behaviours in parents of overweight children with type 1 diabetes - a pilot study

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**Objectives:** The maintenance of HbA1c below 7.5% as recommended by ADA and ISPAD guidance is crucial in treatment of children with type 1 diabetes. The other important parameter is a patient´s weight. The aim of this study was to compare perception of a child eating behaviours and factors affecting choice of food in parents of children with diabetes type 1 considering their weight and metabolic control.
**Methods:** Parents of children with diabetes duration > 1 year filled in the Polish version of the Child Eating Behaviour Questionnaire and the Food Choice Questionnaire. We analysed 165 fully answered questionnaires (parents of 83 girls/82 boys, mean age - 12; mean diabetes duration - 5 years; mean HbA1c - 7.7; mean z-score - 0,45; mean total daily insulin dose - 38.7; mean base - 14.2).
**Results:** 78 (47.3%) children achieved good metabolic control. 32 (19.4%) children were overweight (z-score > 1). We found significant difference between parents of children with (z-score > 1) and children with (z-score ≤ 1) in perception of satiety responsiveness (p = 0.0113) and relationship between z-scores and enjoyment of food (r = 0.201, p = 0.0106), food responsiveness (r = 0.2175, p = 0.0057) and emotional over-eating (r = 0.154, p = 0.05). HbA1c significantly correlated with satiety responsiveness (r = 0.156, p = 0.48) and food responsiveness (r = 0.187, p = 0.0172). There was a significant correlation between children's age and parental choice of food in consideration of weight control (r = 0.1.94, p = 0.137), food price (r = 0.206, p = 0.0087), mood (r = 0.165, p = 0.357) and ethics (r = 0.153, p = 0.05). We found relationship between age and emotional over-eating (r = 0.309, p = 0.0001).
**Conclusions:** 19.4% children had problems with weight. Parents of overweight children had more problems with satiety recognition in their children and emotional meaning of food. Children's age may pose a risk factor for overweight. Interventions targeted weight control should include both children and parents.

## P126
## Implementation of patient reported outcomes through quality improvement methods to enhance pediatric diabetes care

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**Objectives:** 1) Integrate patient reported outcomes (PRO) into routine pediatric diabetes visits in an academic center
2) Use PRO data to support improved outcomes: glycemic control and quality of life.
**Methods:** Quality Improvement (QI) methodology (building a team, setting goals, developing consensus, iterative testing) was used to expand capacity for PROs of interest (quality of life, barriers to adherence, transition readiness) beyond the existing systemic process of depression screening. Evidence review was conducted to select relevant measures; logic was created in the electronic medical record (EMR) to identify eligible populations and frequency of survey administration. Surveys are completed on an EMR-integrated computer tablet, including real-time data access and score interpretation to guide discussion of responses and referrals, as indicated. Diabetes module Quality of Life, (PedsQL 3.2 (Varni et al., 2013) was the initial PRO examined.
**Results:** Since initiation of PedsQL administration in January 2016, completion rates average 74%, 1582 of 2225 eligible patients completing the questionnaire. Subscale analysis of the population at our center compared to national averages of the 3.0 version ((Hilliard et al., 2013). (See Table).
**Conclusions:** Building upon existing infrastructure, PRO measures can be successfully integrated into routine diabetes visits. Subscale scores for PedsQL can inform design of QI-driven interventions tailored to local needs and resources.

| Subscale | CCHMC Data Youth & Parent combined Jan — Mar 2016 (n = 1245) Mean (SD) | PedsQL Diabetes Moduble * YOUTH-report (n = 4571) Mean (SD) | MCID** | PedsQL Diabeters Module* PARENT-report (n = 4440) Mean (SD) | MCID** |
|---|---|---|---|---|---|
| **Barriers** | 76.89 (17.23) | 79.9 (18.1) | 10.86 | 70.4 (19.3) | 10.57 |
| **Adherence** | 84.15 (15.40) | 82.4 (16.0) | 9.99 | 77.2 (6.4) | 9.56 |
| **Worry** | 65.12 (22.26) | 74.4 (22.7) | 12.01 | 72.4 (22.0) | 8.52 |
| **Communication** | 82.01 (19.15) | 79.0 (22.7) | 7.53 | 74.2 (25.0) | 7.91 |

*Peds QL Data Source: Diabetes Care 36:1891–1897, 2013.

**MCID = Minimal Clinically Important Difference.

*[Table 1]*

## P127
## Adapting to type 1 diabetes in very young children: a crowdsourcing method for characterizing parents´ perspectives

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**Objectives:** Parenting very young children with type 1 diabetes (YC-T1D) is immensely challenging and parental coping is associated with child outcomes. This paper reports qualitative work using crowdsourcing methods to design a web-based coping resource created by parents for parents.
**Methods:** A "Crowd" of 170 parents of YC-T1D (onset < 6 years old and now < 10 years old) enrolled after internet recruitment. The researchers sent parents 19 open-ended questions in sets of 3–5 questions weekly over five 1-week periods about parenting YC-T1D. Parents shared written responses with other members via the internet and they were paid modestly. Trained coders identified themes evident in those responses.
**Results:** The Parent Crowd submitted a mean of 115 responses to the 19 questions; 88 parents answered every question and 152 answered at least one. Resulting themes reflected affective, behavioral, cognitive and social challenges of parenting YC-T1D, and also examples of positive effects of T1D.The researchers organized the themes in a social-ecological framework comprising five levels of influence: Child (25 themes), Parents (39 themes), Family (41 themes), Social Circle (21 themes), and Community (21 themes) and validated the taxonomy in a second iteration of parental feedback. The initial sample was not sufficiently diverse and so the researchers recently engaged 13 racial and ethnic minority parents, who supplemented and affirmed the Parent Crowd´s work. Researchers and the Parent and HCP Crowds will use the resulting taxonomy to guide the design of the content, functions and governance of a social media portal. The Parent Crowd will now specify website functions that could enhance coping with identified challenges.
**Conclusions:** This crowdsourcing initiative efficiently yielded rich data to inform planning of a web-based coping resource designed by and for parents of YC-T1D. Parental use of the completed website will then be evaluated in a randomized, controlled trial.

## P128
## Drug use among adolescents with diabetes. A literature search and pilot study

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**Objectives:** Illicit drug use is common among adolescents. Depending on the type of drug, the prevalence is between 0,1 and 8,0%. Little is known about the prevalence among adolescents with diabetes.
**Methods:** A literature search was done. Only 17 articles were usefull. They showed drugs are used by adolescents with diabetes and they can influence blood glucose levels. There is a higher chance of hyperglycaemia, ketoacidosis and metabolic acidosis.

We investigated in a pilot study the prevalence of drug use among adolescents with diabetes in Amsterdam.

An anonymous questionnaire was distributed among adolescents (16–25 years old), treated by Diaboss. The questionnaire included 15 questions about their characteristics, frequency of drug use, type of drug, experiences with drug use, and advice to other adolescents with diabetes and to diabetes specialists.
**Results:** The response rate was 35% (n = 62), mean age 19,4 years. 29% (n = 18) use drugs. Cannabis is used most frequently. 13 adolescents take precautions considering their diabetes. 4 Adolescents report hypoglycaemia, 10 adolescents hyperglycaemia. No adolescent report a hospital admission or visit to the emergency department. 23% of all adolescents were educated by their diabetes specialist; 53% were asked about their drug use. Advice to other adolescents with diabetes is 'use drugs with people you trust' (n = 25) and 'keep your mind clear to be able to think about your diabetes' (n = 19). Advice to diabetes specialists is 'be honest and open' (n = 19) and 'do not say drug use is forbidden when having diabetes' (n = 19).
**Conclusions:** Of literature search and the study: It is not uncommon for adolescents with diabetes to use drugs; the prevalence in this study is even higher than that of the general population. Adolescents require education on the effect of drugs on their diabetesregulation by their diabetes specialists.

Consider illicitit drug use as a possible cause of diabetic ketoacidosis and test urine on drugs.

# Poster Tour 17: Latebreakers

## P129

### Pharmacokinetics (PK), Pharmacodynamics (PD), and safety following single or repeated 3 mg doses of nasal glucagon (NG) in adults with type 1 or type 2 diabetes (T1D or T2D)

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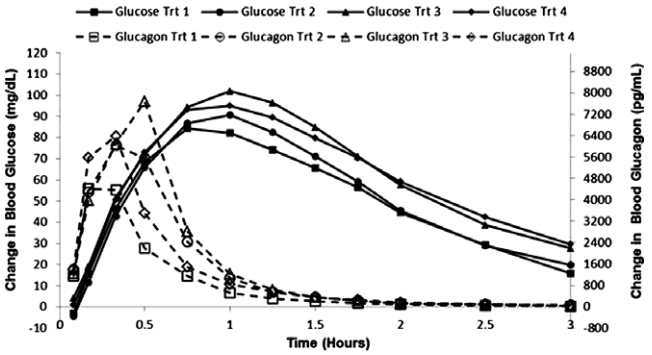
*[1]Locemia Solutions, Montreal, Canada, [2]Altasciences/Algorithme Pharma, Montreal, Canada, [3]Eli Lilly and Company, Indianapolis, United States, [4]Eli Lilly Canada Inc., Toronto, Canada*

**Objectives:** Examine PK, PD and safety of single or repeated 3-mg NG doses given in randomized sequence in a 4-period, cross-over study.
**Methods:** Subjects (insulin-using adults with T1D or T2D, BMI 18.5-35.0 kg/m$^2$) received 4 NG treatments (trts) ≥1 wk apart. Trts were given 4 hrs after a low-carbohydrate breakfast. Trts were: 1) Single 3-mg NG; 2) 3-mg NG plus another 3-mg NG 15 minutes later (same nostril); 3) 3-mg NG plus another 3-mg NG 15 minutes later (opposite nostril); 4) 2 concurrent 3-mg NG doses (both nostrils).
**Results:** 32 subjects were enrolled (T1D: 23, T2D: 9). Numbers of subjects who received trts 1 to 4 were 27, 28, 25 and 29, respectively. Baseline (BL) blood glucose range was 40–181 mg/dL. For Trts 1 to 4, PK parameters of change from BL for glucagon were: mean area under the curve 0-3 hr: 2471, 4097, 4639 and 3611 hr.pg/mL, median $T_{max:}$ 0.17, 0.33, 0.50 and 0.33 hrs; PD parameters of change from BL for glucose were: mean area under the effect concentration 0-3 hr: 157, 168, 190 and 194 hr·mg/dL, median $T_{max}$: 0.75, 1.00, 1.00 and 1.00 hrs. Repeated NG doses resulted in higher glucagon concentrations, but gave glucose responses comparable to single dose (graph). The only serious adverse event (AE; cellulitis) was not drug-related. Most AEs resolved in ≤5 minutes.
**Conclusions:** Although repeat dosing resulted in greater systemic glucagon exposure, it did not result in a meaningful increase in observed glucose response. All NG treatments were well-tolerated.




*[Zhang_NG_ISPAD figure]*

## P130

### Nasal glucagon (NG) for the treatment of moderate to severe hypoglycemia (hypo) episodes in children and adolescents with type 1 diabetes (T1D) in home or school settings

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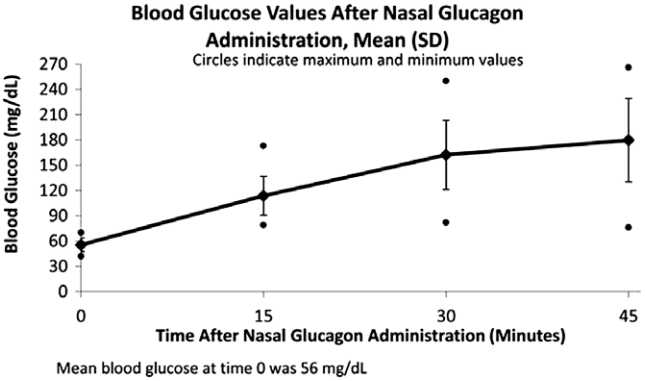
**Objectives:** This multi-center, open-label study evaluated NG for effectiveness and ease of use in treating moderate or severe hypo episodes in patients (pts) with T1D, age 4 to <18 yrs.
**Methods:** Pts and caregivers (CGs) were taught how to use NG. During naturally occurring symptomatic episodes of moderate or severe hypo in real world settings, CGs administered 3 mg NG and measured blood glucose (BG) over time. Adverse events (AEs), recovery of symptoms, and ease of use were solicited by questionnaires.
**Results:** Fourteen pts, who experienced 33 moderate hypo episodes with neuroglycopenic symptoms and a BG ≤70 mg/dL, were included in the efficacy and main safety analyses. Mean number of episodes per pt was 2.4 (range 1 to 4). In all episodes, pts returned to normal status within 30 minutes after NG dose. No calls to 911 (emergency medical services) were needed. Mean baseline BG was 56 (range 42–70) mg/dL. Within 15 minutes after NG dose, mean BG rose to 114 (range 79–173) mg/dL, and continued to rise (figure). No serious AEs occurred. For most episodes (61%), CGs administered NG in < 30 seconds; in all cases administration took < 2 minutes. CGs were satisfied or very satisfied with NG after most episodes (91%).
**Conclusions:** NG raised BG and resolved symptoms in all reported episodes of hypo among children and adolescents with T1D. The majority of CGs were highly satisfied with NG. Data suggest NG is a viable alternative to currently available injectable recombinant glucagons.




*[BG Values After Nasal Glucagon Administration]*

## P131

### Evaluation of the Freestyle Libre Flash glucose monitoring system in children and adolescents with type 1 diabetes

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**Background and aims:** The FreeStyle® Libre Flash Glucose Monitoring System (FSLFGMS, Abbott) measures glucose concentrations in the interstitial fluid for up to 14 days. It has been approved for use in children aged >4 yrs in January 2016. Experience in children is still limited. We evaluated the accuracy and usability of the FSLFGMS in children with type 1 DM.
**Methods:** 24 children with type 1 DM (10 girls), aged 4.7-15.9 yrs were included. Subjects wore a sensor on the back of their upper arm. For the first 14 days they regularly measured capillary blood

glucose (BG) with their usual BG meter (Accu-Chek® Mobile (ACM), Roche (n = 8), Contour® Next Link (CNL), Bayer (n = 9); OneTouch® Verio® IQ (OTV), LifeScan (n = 7)) followed by a sensor glucose scanning. FSLFGMS readings were compared to BG measurements by surveillance error grid analysis; the mean absolute relative difference (MARD) was calculated. After 14 days subjects were asked to fill in a questionnaire on the usability of the FSLFGMS.

**Results:** 938 FSLFGMS readings were paired with BG results. FSLFGMS were higher than BG (170 ± 94 mg/dl vs 156 ± 82 mg/dl; $p < 0.001$). FSLFGMS readings were highly correlated with BG ($r = 0.957$; $p < 0.001$). 74.20% of the data pairs were in the none risk zone; 24.20% in the slight risk zone and 1.60% in the moderate risk zone. The FSLFGMS overestimated BG (hypo deviations > hyper deviations). Overall MARD was 16.5%. MARD varied with BG meter: CNL 16.3%, ACM 21.4%, OTV 10.7% ($p < 0.001$). 14 patients (58%) reported sensor problems, mainly early detachment of the sensor. Nonetheless, the usability questionnaire indicated high levels of satisfaction.

**Conclusion:** Results showed a good agreement between the FSLFGMS readings and capillary BG measurements in children. FSLFGMS overestimated BG creating a higher risk for hypoglycaemia. The wearing of the sensor requires special attention. Further studies in children are imperative in order to optimize the use of the FSLFGMS in the paediatric population.

## P132
## Check it! Positive psychology intervention improve quality of life and adherence in adolescents with type 1 diabetes

S. Jaser[1], R. Whittemore[2], N. Patel[1], L. Choi[3], W. Russell[1]

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**Objectives:** Adolescents with type 1 diabetes (T1D) struggle with adherence to the demanding treatment regimen. Positive psychology interventions have improved adherence in adults with chronic illness (Charlson et al., 2010) but have not been tested in pediatric populations. We conducted a randomized trial to estimate the effects of a positive psychology intervention on adherence, glycemic control and quality of life.

**Methods:** Adolescents with T1D (n = 120, mean age 14.8 ± .4 yrs, 52.5% female, 87.5% White) were randomized to either an education (n = 60) or positive affect (PA) intervention (n = 60). Blood glucose monitoring (BGM) frequency was 3.3 ± 1.8 times/day, and mean A1C was 9.2 ± 0.9%. Adolescents in the PA group received the intervention (gratitude, self-affirmation, parental affirmation, and small gifts) via text messages or phone calls over 8 weeks. Questionnaires and clinical data were collected at baseline 3 and 6 months. Data were analyzed using generalized linear modeling.

**Results:** After adjusting for age, sex, race/ethnicity, income, depressive symptoms, pump use, and baseline measurement for each outcome, adolescents in the PA group demonstrated significant improvement in quality of life at 3 months, compared to the education group (estimated mean difference = 3.9, $P = .020$), but this was not sustained at 6 months (1.3, $P = .569$). The PA group showed a trend toward improvement in parent-reported adherence (estimated mean difference = 1.2, $P = .129$), particularly in the text group (1.5, $P = .136$). There was no significant intervention effect on BGM, but for those in the PA group, the odds of clinically significantly improvement (checking at least one more time/day) were about twice as high as for those in the education group (OR = 1.9, $P = .337$). No significant effects were found for glycemic control.

**Conclusions:** A positive psychology intervention had significant, positive effects on quality of life and promising effects on adherence in adolescents with T1D.

## P133
## Deveopment of the support through art and networking in diabetes (STAND) programme: a psychological intervention for Adolescents with type 1 diabetes

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**Objective:** Adolescents with T1D regularly exhibit inadequate self-care, accompanied by enhanced psychosocial stress, and lower quality of life when compared to adults and children with a diagnosis of T1D (Isabella et al., 2007). Group interventions offer cost effective and psychologically meaningful opportunities to manage distress related to living with a chronic illness (Yalom, 2000). This research aims to outline the conceptualisation, development and implementation of a novel 6 week psychotherapy programme for adolescents with T1D. The research also assessed the inclusion of social media to support psychological well being and medical regime adherence in conjunction with the group.

**Methods:** An audit of 135 adolescents attending clinic revealed that less than 3% had engaged in a meaningful conversation about diabetes with a peer with diabetes. A comprehensive literature review of psychological concepts that influence adolescents relationship with and management of their T1D revealed the following 6 themes as relevant: Loss of Identity (Northam et al., 1996); Illness Perceptions (Murphy et al., 1997); Coping Skills (Boland et al., 1999); Relationship Conflict (Delamater et al., 2007); Eating Disorders (Takki et al., 2003); and Transition to Adult Services (Eiser et al., 1993). A 6 week psychotherapy programme was developed with a target group of 12 adolescents aged between 16–18 years.

**Results:** Qualitative analysis of the participants experience of group through content analysis revealed that group interventions were superior to individual therapy in normalising the young person´s experience of diabetes and social media offered an important adjunct of support to maintain motivation and support outside of group sessions.

**Discussion:** The benefit of the STAND programme in terms of promoting psychological wellbeing and the relevance of including social media to maintain contact and support to adolescents with diabetes outside of clinic is discussed.

# Poster Tour 18: President's Choice

## P137
## Improved diabetes management in Swedish schools: results from two national surveys

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**Objectives:** Support in diabetes self-care management during school day is essential to achieve optimal school performance and metabolic control. Swedish legislation regulating to the support of children with chronic diseases was strengthened 2009. The aim of this study was to evaluate differences between the results of two national surveys conducted 2008 and 2015 measuring parents' and diabetes specialist teams' perception of support during school time.
**Methods:** All pediatric diabetes centers in Sweden were invited to the study. In each center 10% of the families with a child treated for T1DM and attending preschool class or compulsory school were invited to participate. Parents' and the diabetes teams' opinions of the support provided in school were collected in two separate questionnaires.
**Results:** Forty-one out of 42 eligible diabetes centers participated. In total, 568 parents answered the parental questionnaire. Metabolic control among participating subjects was improved between the two surveys (61.8 ± 12.4 mmol/mol compared to 55.2 ± 10.6 mmol/mol in 2015). The proportion of children with a principal responsible staff member increased from 43% to 59%, $p < 0.01$. An action plan to treat hypoglycemia was present for 65% of the children in 2015 compared to 55% in 2008 ($p < 0.01$). More parents were satisfied with the support in 2015 (65% compared to 55%, $p < 0.01$).
**Conclusions:** This study shows that the personnel support has increased and that more parents are satisfied with the support of self-care in school in 2015 compared to 2008. Even more efforts are needed to implement the nation legislation to achieve equal support in all Swedish schools.

## P138
## Puberty in boys with type 1 diabetes mellitus (T1D) has an earlier onset compared to a simultaneously recruited control group

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**Background:** Recent studies have suggested some advancement in the age of onset of puberty in healthy boys. However, no study has compared the age of pubertal development in boys with T1D compared with a simultaneously recruited group of healthy children.
**Objective:** To evaluate the age of pubertal events in boys with TD1 and determine whether the duration of diabetes, metabolic control or insulin dose are associated with age of puberty in T1D boys.
**Methods:** Boys aged 8–18 with T1D (n:130, age 13.4 ± 2.7 years) and healthy boys recruited from schools (C; n: 389, age 12.8 ± 2.2 years) were studied. A pediatric endocrinologist evaluated pubertal development. Genital development was assessed through inspection (Tanner stage) and by evaluation of testicular volume. Age of pubertal events was determined by probit analysis.
**Results:** T1D boys had an earlier age of genital Tanner stage 2 and 5 compared to C boys (Table). The onset of testicular growth occurred five months earlier and reached a testicular volume ≥20 ml half a year earlier in T1D than in C boys (not significant). Both groups of boys had a similar age of pubic hair development. Duration of diabetes was positively associated with older age of onset and of final stages of puberty. No association of metabolic control or insulin dose with pubertal timing was observed.

| | TD1 (years) | Control (years) | P |
|---|---|---|---|
| Genital Tanner stage 2 | 10.3 ± 1.0 | 11.1 ± 1.0 | 0.003 |
| Genital Tanner stage 5 | 15.6 ± 1.1 | 16.8 ± 1.2 | 0.002 |
| Testicular volume 4–9 ml | 9.6 ± 0.9 | 10.1 ± 1.0 | 0.1 |
| Testicular volume ≥20 ml | 14.0 ± 1.1 | 14.7 ± 1.2 | 0.056 |

*[Age of Genital Tanner Stage and Testicular Growth]*

**Conclusions:** Boys with T1D treated with modern insulin therapy appear to have an earlier age of onset and of final events of pubertal development compared to a simultaneously studied group of healthy children. These data suggest that pubertal delay is not a frequent problem nowadays for T1D boys.

## P139
## Clinical characteristics and metabolic control of type 1 diabetes in youth with autism spectrum disorder: a DPV analysis based on 57074 patients < 21 years of age

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**Objective:** To compare clinical characteristics, diabetes management, and metabolic control in youth with type 1 diabetes (T1DM) and Autism Spectrum Disorder (T1DM-ASD) to those without ASD (T1DM-nonASD).
**Methods:** Patients with T1DM (<21 yr of age) from the German/Austrian diabetes patient follow-up registry (DPV) were analyzed. Time frame was defined as last year of observation for each patient between January 2005 and March 2016. ASD diagnosis was reported based on ICD-10 /DSM-IV/DSM-5 codes. Linear, logistic or negative binomial regression models adjusted for age, sex, diabetes duration and year of observation were utilized to compare clinical characteristics and metabolic control of T1DM-ASD to T1DM-nonASD patients (SAS 9.4).
**Results:** A total of 57074 patients were analyzed (111 (0.19%) T1DM-ASD; 56963 T1DM-nonASD). Groups were similar for mean age at diabetes onset and duration of diabetes but not for gender (male T1DM-ASD: 85.6% vs. non-ASD: 52.8%; p-value < 0.001). Difference was found in HbA1c when adjusted for age, gender, duration of diabetes, and year of observation (7.9% ± 0.2% T1DM-ASD vs. -T1DM-nonASD 8.2% ± 0.01%; p-value = 0.04). Number of SMBG tests /day was more frequent in the T1DM-ASD (5.6/day ± 0.2) vs. -T1DM-nonASD (5.2/day ± 0.01; p-value =0.03). T1DM-ASD patients

were more often treated with psycho-stimulants (17.1% vs. 2.1%; p value < 0.001) and anti-depressive medications (3.6% vs. 0.7%; p value < 0.001). Unadjusted comparisons showed no difference for severe hypoglycemia events, diabetes ketoacidosis episodes, insulin dose unit/kg/day, rate of insulin pump therapy, number of diabetes education session received/year and BMI-SDS.
**Conclusions:** Despite their ASD, metabolic control was better in T1DM-ASD group possibly due to their adherence to routines and daily schedules. However, awareness of ASD remains important in the treatment of T1DM, as these two conditions require long-term multi-disciplinary medical follow-up for optimal outcome.

## P140
## Assessment of solar irradiation as a protective factor towards T1D risk in Sardinia

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**Objectives:** A North–south gradient in risk of T1D has been found in Europe and a potential protective effect of solar irradiation has been suggested. We performed an ecological analysis to assess whereas a correlation between incidence of T1D and solar irradiation could be documented within the high risk Sardinia island.
**Methods:** The percentage of direct solar irradiation of exposed territory was determined for each of the 377 municipal areas of the island of Sardinia, through a DTM processing (Digital Terrain Model) with a definition of 250 meters/pixel. Incidence data were available through the Sardinian Diabetes Registry. A correlation analysis was performed using the two sets of data, environmental and epidemiological, to assess the ecological relationship between solar radiation and geographical distribution of T1D risk within Sardinia.
**Results:** A mild negative correlation (r = −0.14; p = 0.006) was found between sun direct radiation and the geographical disease distribution of T1D risk.
**Conclusions:** The correlation between latitude and T1D risk is well-known and the underlying hypothesis might a role of Vitamin D deficiency in the pathogenesis of the disease. Indeed, previous studies have hypothesized a role of vitamin D deficiency in T1D risk. Our results, which are based on ecological analysis performed within the high risk Sardinia island, are suggestive and consistent with a protective role of sun exposure. Finally, the study confirms that ecological analysis of simple correlation is a suitable statistical method to suggest hypotheses and conduct research.

## P141
## TRACCing teens on their journey to adult care

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**Objectives:** The Paediatric Diabetes group at Children's Hospital / London Health Sciences Centre identified a gap in transitioning adolescents and in their education about complications. The Transition Readiness Adolescent Complications Clinic (TRACC) was developed in July 2015. Clinical data and patient feedback on the 1st yr assessment of TRACC are described.
**Method:** Patients with type 1 diabetes (T1D) aged 17–18 years were scheduled for TRACC clinic which involves an interdisciplinary team: dietitian, social worker, transition coordinator and endocrinologist. Clinic began with a group session for participants and parents explaining the aims of the program. Adolescents were seen individually to review complications screening results (foot exam, lipid profile, nephropathy screening). Transition topics were discussed according to patient's request. Eleven adolescents completed a satisfaction questionnaire at the end of the clinic.
**Results:** Twenty-six adolescents (20 males) were seen at TRACC between Jul 2015 and May 2016. Median age was 17.6 yrs. (IQR 17.4-17.8); T1D duration was 7.6 yrs. (IQR 4.4-11.6). Median A1C% was 8.5 (IQR 6.9 - 10.6). 46% (12/26) of patients were managed on insulin pump. Abnormal albumin-creatinine-ratio (ACR) was found in 20% (5/25); median ACR mg/mmol was 0.7 (IQR 0–1.75). Nine patients (35%) were overweight/obese. Median BMI was 23.2 (IQR 20–26.7). Based on Canadian Diabetes Association guidelines, 80% of patients had dyslipidemia. All patients had normal foot screening. The most requested transition topics were driving, adult diabetes care process and complications information.
**Conclusions:** This program facilitates the transition process by providing T1D adolescents with further education on prevention of long-term complications and discussion on transition topics. Our preliminary findings emphasize the need to ensure that this population receives ongoing follow up care with an adult team.

## P142
## Participation of children and adolescents with type 1 diabetes mellitus in summer camp leads to a reduction of hypoglycemic episodes. Results from a 2 year study

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**Objectives:** Aim of the study was to evaluate the influence of participation in a summer camp with increased physical activity (PA) and a Mediterranean Diet (MD) model, on the glycemic control of children and adolescents with type 1diabetes mellitus (TD1).
**Methods:** The study took place during 2014–2015 in a summer camp in Northern Greece. Children and adolescents with TD1 participated for ten days each year in a program along with other children and adolescents without any health problems. 30 patients (21 female, 9 male) aged 12,7 ± 2,8 yrs old participated in the study during the first year and 40 (24 female, 16 male) aged 11,8 ± 2,6 yrs old during the second year. They were supported by a full medical diabetes team. Camp schedule consisted of an increased daily PA and a MD nutrition model. Glycemic control parameters (measurements of blood glucose, hypoglycemic episodes) were recorded for a 30 days period before and after the camp. HbA1c was measured 1 month prior to and after the camp as well.
**Results:** Paired sample t-test and Wilcoxon statistical analysis showed a reduction at blood glucose (BG) levels (p > 0,05) and incidence of hypoglycemia for both years (p < 0,001, p = 0,012) after vs before the camp period. HbA1c levels reduced at the first year (p > 0,05) and remained the same at the second year (p > 0,05)(Table 1).

| | BGmax(mg/dl) | BGmin(mg/dl) | BGmean(mg/dl) | HbA1c(%) | Episodes of Hypoglycemia |
|---|---|---|---|---|---|
| | | Before vs After | | | |
| 1rst Year | 373(±65)vs 348(±72) | 51(±10)vs 52(±8) | 212(±33)vs 200(±35) | 7,8(±1,3)vs 7,3(±1,1) | 18(±11)vs11(±8) (p < 0,001) |
| 2nd Year | 352(±85)vs 333(±72) | 52(±9)vs 52(±6) | 204(±39)vs 193(±35) | 7,2(±1,2)vs 7,3(±0,7) | 15(±11)vs10(±5) (p = 0,012) |

*[Glycemic control before vs after the camp]*

**Conclusions:** Participation of children and adolescents with TD1 in the summer camp beneficially affected their glycemic control by a reduction of BG levels and episodes of hypoglycemia. It is a way of educating patients with TD1, impacting positively on socialization, acceptance and self-management of diabetes.

## P143
## Improving the transition from pediatric to adult diabetes care: towards a smoother multidisciplinary educational transition program

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**Objectives:** In youth with diabetes, transitioning from pediatric to adult care is a crucial period at risk of loss of follow up, metabolic deterioration, and diabetes-related complications. To better address those issues, we implemented in 2012 an educational diabetes transition program.
**Methods:** A 2-year organized multidisciplinary educational program (pediatric endocrinologists, diabetologists, nurses, dieticians, psychologists, youth health worker) was proposed to all youth with diabetes after the age of 16 yrs old. Individual and/or collective sessions to enhance patients' knowledge and self-management skills, and to sustain social, leisure, and recreational networks were performed. A Transition Health Passport (THP), including a medical summary, is filed by the patient in collaboration with the transition coordinator nurse.
**Results:** Over a 3-year period, 28 adolescents (15 boys, 13 girls), mean age 17,5 $\pm$ 0,8 yrs, mean diabetes duration 8.5 $\pm$ 4.5 yrs, mean HbA1c 9,5 $\pm$ 2.3%, have been included in the program. All participants completed the THP (4 individual sessions) and most of them (86%) also attended collective sessions. Evaluation of the program showed a high satisfaction of the participants and most of the patients (80%, (20/25)) had at least one appointment with and adult diabetologist within 12 months after the end of the program. Among the 8 others patients, 5 were followed by their general practitioner, 3 were lost for follow up, and 1 had a ketoacidosis episode. Meeting the adult's staff and using ludic educational tools during sessions for training in self-management was most appreciated.
**Conclusions:** Our program, using multidisciplinary teams both from pediatric and adult care, allows, for most of these adolescents with poor glycemic control, a safe transition to adult care. However, better strategies should be developed to also improve glycemic control though the transition process.

## P144
## Frequency of parietal cell antibodies in children and adolescents with type 1 diabetes in Austria

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**Objectives:** Parietal cell antibodies (PCA) are markers of autoimmune gastritis (AG). AG can lead to hypergastrinemia and iron deficiency anemia (IDA). Adults with type 1 diabetes (T1D) show a higher prevalence of PCA compared to healthy controls (up to 20% vs. 1%). The aim of this study was to evaluate the frequency of PCA in children and adolescents with T1D in Austria and to evaluate risk factors for the development of PCA.
**Methods:** Within the DPV database (Diabetes Prospective Follow-up) a standardized, prospective, computer-based documentation program, 698 patients with T1D aged < 20 years (52% male, mean age 16.2 $\pm$ 4.1 years, mean diabetes duration of 8.5 $\pm$ 4.0 years and mean age at diabetes onset of 7.6 $\pm$ 4.1 years) were screened for PCA in Austria using one assay and one laboratory.
**Results:** The frequency of PCA in T1D patients was 8.0%. PCA were more common in females ($p = 0.001$) and were strongly correlated to thyroid antibodies ($p = 0.001$). Comparing PCA positive patients to PCA negative patients, we found lower MCV values of the red blood cell count in PCA positive patients ($p = 0.015$). We found no differences in age, age at diabetes onset, diabetes duration nor in anthropometric parameters between the both groups.
**Conclusions:** Children and adolescents with T1D have a lower frequency of PCA, than reported for adults. Females and particular female patients positive for thyroid antibodies seem to be at increased risk for developing PCA.

# Poster Tour 19: Diabetes Care

## P145

### Evaluation of a novel method to detect residual ß-cell function by dried blood spots in children and adolescents with a recent diagnosis of type 1 diabetes

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**Background:** The majority of drug developments in type 1 diabetes (T1D) are aimed at preventing decline of beta cell function (BCF). Traditionally, BCF is evaluated by the C-peptide response to the labour-intensive mixed-meal-tolerance-test (MMTT), but there's a need for a more practical alternative. We developed a new method to measure C-peptide in ´dried blood spots' (DBS).
**Objective:** To explore the use of a novel method to detect residual BCF in children recently diagnosed with T1D
**Method:** 26 T1D-subjects aged 6.9-16.5 yrs (10 M;16 F) had a MMTT within 6 months of diagnosis and 12 months after diagnosis with paired sampling of venous and DBS C-peptide at 0 and 90 minutes, and a urine sample for C-peptide/creatinine-ratio. In between MMTT's, weekly DBS C-peptide measurements before and after a standard breakfast were collected at home.
**Results:** DBS and plasma C-peptide levels correlated well (n = 85 paired measurements; r = 0.95; p < 0.001). All but 2 subjects had detectable fasting and postprandial DBS C-peptide throughout the study. Median fasting DBS C-peptide levels (range) at 6, 9 and 12 mo from diagnosis were 308 (<50-834), 210 (<50-1299) and 272 (<50-967) pmol/l, respectively. In multiple regression models with duration of diabetes and glucose as covariates of 21 cases with a median (range) of 24(8–29) home DBS measurements, fasting and post-prandial DBS C-peptide were negatively affected by diabetes duration in 67 and 71%, and positively affected by glucose levels in 67 and 43%, respectively. A significant interaction between fasting or post-prandial glucose and diabetes duration was identified in 19 and 5% of cases, respectively, indicating that glucose responsiveness decreased over time. The decline in fasting DBS C-peptide correlated well with that identified by the MMTT (r = 0.80;p = 0.002) and the urine C-peptide/creatinine ratio (r = 0.77;p = 0.004).
**Conclusion:** DBS C-peptide measurement can be a useful tool in evaluating BCF in T1D intervention studies.

## P146

### The flexible lifestyle 3mpowering change (FL3X) clinical trial: recruitment and retention strategies

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**Objectives:** FL3X is an 18-month RCT to test the efficacy of an adaptive behavioral intervention to improve A1c in adolescents with type 1 diabetes (T1D). We describe how our innovative recruitment process resulted in high retention.
**Methods:** FL3X participants (age 13–16 yrs, A1c 8-13%, T1D duration >1 yr) were asked to complete 5 measurement visits (baseline, 3, 6, 12 and 18 months) and those randomized to intervention had additional diabetes coach visits every 4–6 weeks throughout the study. FL3X used a 2-step recruitment process to ensure the teen and parent made a well thought out decision to participate. After initial contact (in-person contact and/or a mailing to explain the study, step 1), a follow-up phone call was completed with both parent and teen to address barriers/issues to participation (step 2) before the baseline visit was scheduled. These conversations incorporated motivational interviewing strategies to allow the parent and teen to identify, express, and discuss concerns about participation.
**Results:** Of 848 teens (mean age 14.9 yrs., 52% male, 81% white, 50% A1c > 9%) invited to participate, 249 teens (mean age 14.7 yrs., 50% male, 86% white) completed a baseline visit following the 2-step recruitment process. Of those who agreed to participate after recruitment step 2, 95% were consented/randomized. Participation rates were similar for those with higher A1c (>9%, n = 134). FL3X has >90% completion of the 5 study visits within window (target date ±3 weeks): 94% completion of 3-month (n = 208), 95% of 6-month (n = 177), 96% of 12-month (n = 120) and 91% of 18-month (n = 51) visits to date (visits ongoing).
**Conclusion:** Using a 2-step recruitment process, FL3X successfully enrolled 249 teens and parents, with a retention rate >90%. This recruitment process demonstrates the benefits of thoughtfully helping participants understand study requirements and encouraging open communication about potential concerns and barriers to participation prior to study enrollment.

## P147

### Pooled analysis of four randomized studies with insulin glargine 100 U/mL vs NPH insulin in adults with T1DM using a basal plus meal-time insulin regimen

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**Objectives:** To examine the efficacy and safety outcomes in people with T1DM treated with insulin glargine 100 units/ml (Gla-100) or NPH insulin in a basal plus meal-time regimen.
**Methods:** Standardized patient-level data were pooled from four RCTs of 28 weeks duration comparing once-daily Gla-100 at bedtime and NPH insulin (55% QD at bedtime, 45% BID), in combination with either human insulin (HI) or insulin lispro (lispro) at meal-times. HbA1c, fasting plasma glucose (FPG), weight, insulin dose and confirmed hypoglycemia were analyzed from baseline to week 28 by meal insulin type and overall.
**Results:** Of 1526 participants, 756 used Gla-100 (694 HI, 62 lispro) and 770 NPH insulin (707 HI, 63 lispro). Baseline characteristics and week 28 outcomes are shown (Table). HbA1c reductions were comparable between Gla-100 and NPH insulin overall, but greater with Gla-100 and meal-time lispro. FPG decrement was significantly

| | Overall | | | Meal-time Insulin $$$lispro | | | Meal-time human insulin | | |
|---|---|---|---|---|---|---|---|---|---|
| | Gla-100 (n = 756) | NPH (n = 770) | *P* | Gla-100 (n = 62) | NPH (n = 63) | *P* | Gla-100 (n = 694) | NPH (n = 707) | *P* |
| Age (years) | 38.6 (17.7, 76.8) | 38.4 (17.2, 77.1) | NS | 42.2 (19.5, 76.8) | 39.3 (18.3, 67.1) | NS | 38.5 (17.7, 73.9) | 38.4 (17.2, 77.1) | NS |
| Diabetes duration (years) | 14.1 (0.7, 61.0) | 14.0 (0.2, 50.0) | NS | 18.5 (2.2, 55.0) | 16.00 (1.5, 50.0) | NS | 14.0 (0.7, 61.0) | 14.0 (0.2, 50.0) | NS |
| HbA1c, baseline (%) | 7.91 (1.19) | 8.00 (1.24) | NS | 9.18 (1.05) | 9.72 (1.30) | 0.012 | 7.80 (1.14) | 7.85 (1.11) | NS |
| HbA1c, 28 weeks (%) | 7.80 (0.03) | 7.82 (0.03) | NS | 8.47 (0.13) | 8.93 (0.13) | 0.018 | 7.78 (0.03) | 7.77 (0.03) | NS |
| HbA1c change (%) | −0.16 (0.03) | −0.14 (0.03) | NS | −1.01(0.13) | −0.55 (0.13) | 0.018 | −0.04 (0.03) | −0.05 (0.03) | NS |
| FPG, baseline (mg/dL) | 215 (91) | 211 (94) | NS | 243 (92) | 223 (110) 191 | NS | 213 (90) | 210 (93) | NS |
| FPG, 28 weeks (mg/dL) | 177 (3) | 192 (3) | 0.0003 | 159 (11) | (11) | 0.048 | 186 (3) | 199 (3) | 0.002 |
| FPG change (mg/dL) | −36 (3) | −21 (3) | 0.0003 | −72 (11) | −40 (11) | 0.048 | −26 (3) | −12 (3) | 0.002 |
| Confirmed hypoglycemia (PG <70 mg/dL): | | | | | | | | | |
| Total (events/person-year) | 37.3 (1.7) | 38.6 (1.8) | NS | 59.4 (6.2) | 60.3 (6.6) | NS | 31.2 (1.5) | 32.0 (1.5) | NS |
| Nocturnal (events/person-year) | 6.5 (0.4) | 8.0 (0.5) | 0.006 | 10.7 (1.7) | 11.5 (1.8) | NS | 5.5 (0.4) | 6.8 (0.4) | 0.01 |
| Total severe (events/person-year) | 0.7 (0.1) | 0.9 (0.2) | NS | 2.2 (0.6) | 2.7 (0.8) | NS | 0.5 (0.1) | 0.6 (0.1) | NS |
| Nocturnal severe (events/person-year) | 0.19 (0.04) | 0.33 (0.06) | 0.048 | 0.38 (0.16) | 1.12 (0.33) | 0.03 | 0.14 (0.04) | 0.21 (0.05) | NS |
| Body weight, week 28 (kg) | 72.3 (0.1) | 72.3 (0.1) | NS | 77.9 (0.4) | 78.1 (0.4) | NS | 71.5 (0.1) | 71.5 (0.1) | NS |
| Body weight change (kg) | 0.8 (0.1) | 0.8 (0.1) | NS | 2.1 (0.4) | 2.3 (0.4) | NS | 0.4 (0.1) | 0.4 (0.1) | NS |
| Basal insulin dose (U/kg) at week 28 | 0.31 (0.0) | 0.35 (0.0) | <0.0001 | 0.44 (0.02) | 0.44 (0.02) | NS | 0.28 (0.0) | 0.32 (0.0) | <0.0001 |
| Meal-time insulin dose (U/kg) at week 28 | 0.39 (0.0) | 0.39 (0.0) | NS | 0.41 (0.02) | 0.47 (0.02) | 0.053 | 0.39 (0.0) | 0.38 (0.0) | NS |
| Median (Min, Max) for age and diabetes duration, Mean (SD) for baseline characteristics, and adjusted mean (SE) for week 28 outcomes. Change is from baseline to week 28 | | | | | | | | | |

greater with Gla-100 vs NPH insulin (P = 0.0003) with a significantly lower basal insulin dose at week 28 for Gla-100 overall (*P* < 0.0001). Event rates of confirmed nocturnal and severe nocturnal hypoglycemia were significantly lower with Gla-100 vs NPH insulin; rate ratios 0.80 and 0.57.

**Conclusions:** In this pooled analysis of adults with T1DM, FPG, insulin dose and nocturnal hypoglycemia rates were lower with Gla-100 than NPH insulin therapy. When Gla-100 was combined with meal-time insulin lispro, HbA1c and FPG appeared lower vs those on NPH insulin.

## P148

## How do young people with type 1 diabetes experience transition from pediatric to adult health care? A sub study of the Norwegian Childhood Diabetes Registry (NCDR)

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**Objectives:** To explore the experiences of young people with Type 1 diabetes (T1D) on transition from pediatric to adult health services . A national, population-based cohort study as part of a quality improvement project on transition in Norway.

**Methods:** A questionnaire based on a mixed-method model was developed and sent by post to 784 adolescents/young adults with T1D who were registered in the NCDR and transferred to adult health services within the last 2–4 years. 8 were ineligible. Two reminders were sent. Psychometric evaluation included explorative factor analysis, tests of intern reliability and test-retest reliability. The questionnaire addressed experiences with health personnel, content of consultations, organization of services and preparedness for transfer. Most of the items had a five point scale .WSR test is used comparing patient experiences in pediatric vs. adult health care.

Demographic data, questions on treatment regimens and comorbidity are included. Characteristics of respondents vs. non-respondents are assessed using ChiSquare test and Independent Samples t-test. HbA1c is from the NCDR at time of transfer.

**Results:** 321 (41.4%) answered the questionnaire. 57.6% of the respondents and 36.0% of the non-respondents were female. Mean $HbA_1C$ at time of transfer was 8.8% in respondents, 9.1% in non-respondents. Significant differences in patient experiences of pediatric and adult health care were found for continuity in services ($p < 0,001$), interval between consultations ($p < 0,001$), confidence in caretakers ($p < 0,001$) and all-in-all satisfaction ($p < 0,001$). Data from medical journals will be collected and analyzed as part of this project.

**Conclusions:** This survey points at significant differences in experienced satisfaction between pediatric and adult health care in Norway. Results should be taken into consideration when discussing quality improvement in health services to adolescents and young adults with lifelong chronic conditions.

## P149

## High hereditary risk for CVD among children with type 1 diabetes mellitus (T1D ) according to BDD, a Swedish prospective cohort study

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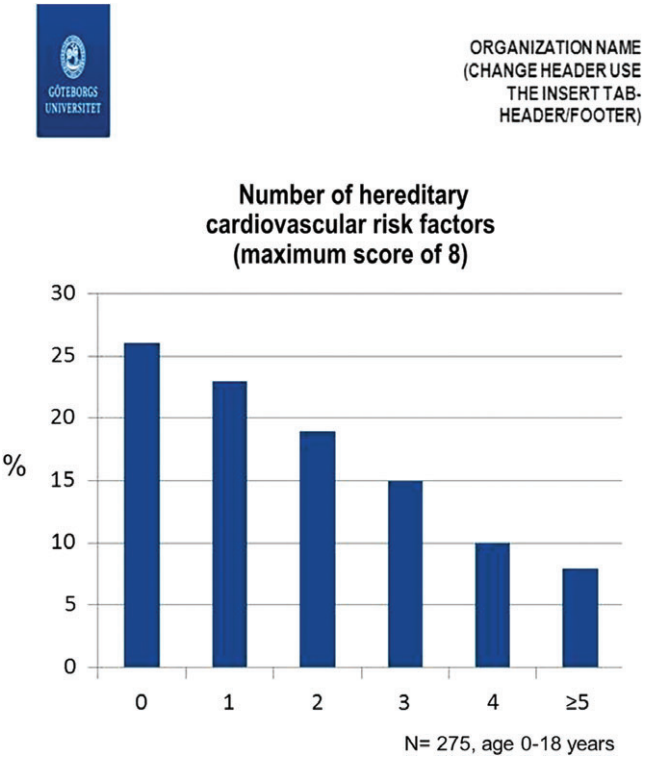
**Objectives:** To evaluate the hereditary risk for CVD in children with T1D.

**Method:** Better Diabetes Diagnosis (BDD) study is a nationwide Swedish prospective cohort study that since 2005 recruits all new-onset T1D children and adolescents who are less than 18 years old. HLA genotyping, islet autoantibody assays (IAA, GADA, IA-2, Zn.T8.2) for each child including their family's cardiovascular health is recorded. This study includes data on children who were recruited at the Queen Silvia's Children's Hospital during 2010–2014. Questions regarding maternal and paternal high blood pressure, stroke, myocardial infarction (before the age of 55 years), and hyperlipidemia were included in the analysis. A risk score of 0–8 was calculated (0 = no, 8 = all four risk factors from both of the parents were present). Data from Swediabkids, the Pediatric National Diabetes Registry, on metabolic parameters and frequency of screening for blood lipids and vascular complications and blood lipids in the study population was recruited.

**Results:** A total of 275 children aged 0 to 18 years were diagnosed with T1D during this four year period. All but one child participated in BDD. Figure 1 presents the number of hereditary cardiovascular risk factors. 17% of the participants had four or more risk factors. The average HbA1c value for the study population was 56 mmol/mol, during the year 2014, compared to the national average of 57.5 mmol/mol. The frequency of screening according to ISPAD was equivalent to guidelines.

**Conclusion:** Every second child with T1D had at least two hereditary risk factors. Screening efficacy for micro- and macrovascular complications as well as for blood lipids is important. Treatment with ACE-inhibitors and/or statines should be prescribed when needed.




*[CV hereditary risk factors]*

## P150

## High A1c clinic - early review to support compliance and improve glycaemic care

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**Aim:** High A1C clinic was introduced on a Friday every month to offer early support, review and help improve glucose control. The multidisciplinary clinic has a paediatrician and nurse specialist who offer a joint plan. HighA1C leaflets are given and a management plan is made which is reviewed monthly with a virtual access in between. We review and present our results of this new service.

**Methods:** We evaluated our service from the data in our prospective database from Jan 15 to April 16. Patients with A1C of more than 75 mmol/mol were reviewed monthly by the multidisciplinary team to support diabetes management and discharged to regular diabetes follow up once control was better. A1c results were reviewed and analyzed.

**Results:** 47 children out 165 patients over 16 months attended the High A1C clinic. Majority were adolescents except 3 young children. 2 children were moved to adult services and 2 new referrals are excluded from the study as they entered last month). There was no sex variation.

17 patients were seen by the service and once the control was better with one sequence of clinic visits (9 needed one visit, 5 needed

two visits and 2 three visits and 1 four visits) they were discharged to standard diabetes follow up.

10 needed the service on more than 2 sequence of visits of which 2 accessed twice, 3 accessed thrice, 3 accessed four times, 2 accessed 5 times. 5 out of the 10 were discharged once control was better.

16 young adults are in the service with ongoing MDT involvement and have been seen between 2–10 times. All are young adults with difficulties in compliance.

**Conclusion:** Majority of patients were back on target on their glucose control with the high A1c service with the others showing improvement. This led to overall improvement in the HbA1c values. Early review and support is crucial; the national diabetic tariff has helped introduce a new service to tackle the poor compliance, high A1c and achieve better control.

## P151
## 'I hate waiting around!' - How long do young people really wait to be seen in their diabetes transition clinics?

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**Objectives:** Keeping young people engaged with their diabetes care and specialist team are components vital for education to empower self-management skills and to facilitate timely, supported transition to adult diabetes services. Service users cite waiting around and clinics running late as the worst aspect of their clinic experience. Transition service providers hope to identify problems with appointment timing and process and to determine the extent of the issue adversely affecting teenagers' experiences.

**Methods:** Simple audit slips attached to individual patient notes and completed by attending staff facilitated data collection at both clinic venues over approximately 4 months. The Lead Specialist Nurse directed, collated and analysed data, presenting actual (duration of wait after scheduled appointment time) and perceived waiting times (time of arrival to time seen).

**Results:** A mean wait of 22 minutes (perceived) was determined, 80% of which waited less than 30 minutes. 55% arrived more than 10 minutes ahead of their appointment time, thus increasing the amount of time young people felt they were waiting.

83% of the cohort were seen late, 14% early and 3% on time, supporting patients' expressed views.

Actual mean waiting time was 16 minutes and at neither venue was the actual, perceived or corrected mean or median wait longer than 28 minutes.

Significant difference was found between the two venues for mean wait from arrival to first being seen by the clinic preparation nurse; 3 minutes versus 11 minutes. Interestingly, little difference (2 minutes) was consequently found in the waiting time to be seen by the specialist team, suggesting preparation inefficiency.

**Conclusions:** Waiting more than 15 minutes adversely affects teenagers' clinic experience. Improvement actions include suggesting young people arrive no more than 10 minutes before their appointment and professionals being informed and guided in strategies to address preparation efficiency.

## P152
## Putting theory into practice: Implementation of a transition program into routine diabetes care

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**Objectives:** Transfer of pediatric to adult diabetes care has great impact, leading to high numbers lost to follow-up. The importance of transition care has been stressed troughout the literature. However, implementing and sustaining transition care seems to be difficult. We present a working model that aims to integrate transition care into routine practice and to decrease dropout rates.

**Methods:** Our center has ±130 pediatric type 1 diabetes (T1D) patients. Before 2011, patients started adult care with a written transferal at age18. Dropout rates were relatively high. From 2011 on, transition care was implemented:

Pediatric T1D patients are assigned to age groups. Regular medical checkups are scheduled at the same day for each age group. Quality of Life is screened yearly (MY-Q, PedsQl) using a web-based environment, where children aged 12+ years and their parents also complete an Individual Transition Profile (ITP). Results are discussed at the next visit. When indicated, additional care or education is arranged. One yearly visit consists of a peer group meeting with workshops. Parents attend a parallel group consult with the pediatric psychologists to offer peer support and psycho education on child development, parenting skills and transition. The year before transfer, patients are seen twice by the pediatric and adult diabetes teams combined. In the year after transfer, patients see the same nurse and physician every visit.

We will compare dropout rates in the years 2006–2010 to 2011–2016 to examine if our transition program is successful.

**Results:** Preliminary results show a low dropout rate since 2011: 63 adolescents transferred to the adult diabetes team. One patient was lost to follow up. Dropout rates before 2011 are being investigated and will be presented.

**Conclusions:** Dropout seemed to decrease after implementation of transition care into routine practice. Further analysis is needed to see to which extent, and which factors contributed to this decrease.

# Poster Tour 20: Epidemiology

## P153
## Distinct clinical characteristics of pediatric patients diagnosed with type 1 and type 2 diabetes in a contemporary population-based cohort in Western Australia (1999–2015)

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**Objectives:** To compare clinical characteristics in children diagnosed with type 1 (T1D) and type 2 (T2D) diabetes aged 10- < 17 years, in Western Australia (WA) from 1999 to 2015.
**Methods:** Children aged 10- < 17 years, newly diagnosed with diabetes in WA between 1999 and 2015, were identified from the Western Australian Children's Diabetes Database, a population-based, prospective, longitudinal diabetes registry. Data available included diagnosis type, date, age and postcode at diagnosis, Indigenous status, $HbA_{1c}$, BMI, blood pressure, ACR/AER and lipids.
**Results:** Of 746 eligible cases identified, 674(90.2%) had T1D and 72(9.8%) T2D. The mean age at diagnosis was 11.9(±1.5) years in cases with T1D and 12.6(±1.5) in those with T2D ($p$ = 0.02). Demographic differences included a higher proportion of cases with T2D who were female(61% vs 45% vs. of T1D, $p$ = 0.01), of Indigenous descent(56% vs 3% of T1D, $p$ < 0.001),in the quintile of most socio-economic disadvantage(35% vs 3% of T1D, $p$ < 0.001).At diagnosis, cases with T2D had significantly higher systolic and diastolic blood pressure Z-scores, and lower median $HbA_{1c}$ (Table). 3 years post-diagnosis, a greater proportion of children with T2D had microalbuminuria, and higher mean cholesterol and triglycerides levels (Table).

| AT DIAGNOSIS | Type 1 diabetes (N = 674) | Type 2 diabetes (N = 72) | p-value |
|---|---|---|---|
| Median HbA1c at diagnosis % [mmol/mol] | 12.2 [110] | 9.6 [81] | <0.001 |
| Mean SBP-Zscore ± SD | −0.29 ± 0.91 | 0.49 ± 0.94 | <0.001 |
| Mean DBP-Zscore ± SD | −0.78 ± 0.75 | 0.48 ± 0.90 | <0.001 |
| Mean BMI Z-scores (3 months post diagnosis) ± SD | 0.4 ± 1.2 | 3.2 ± 1.6 | <0.001 |
| 3 YEARS POST-DIAGNOSIS | | | |
| Mean HbA1c(95%CI) %;[mmol/mol] | 7.9(7.8 - 7.9); [63(62–63)] | 8.8(8.2 - 9.4); [73(66–79)] | <0.001 |
| Microalbuminuria | 16 (4%) | 8 (13%) | 0.002 |
| Mean total cholesterol (95%CI) (mmol/L) | 4.30 (4.22 - 4.37) | 4.77 (4.49 - 5.06) | <0.001 |
| Mean triglycerides (95%CI) (mmol/L) | 1.12 (1.05 - 1.18) | 2.11 (1.77 - 2.44) | <0.001 |

*[Significant differences by diagnosis]*
**Conclusions:** Differences in clinical characteristics are still observed in pediatric patients with T1D and T2D in WA, with a high prevalence of cardiovascular risk factors detected at diagnosis in those with T2D.

## P154
## Incidence trends of type 1 and type 2 diabetes in Austrian children < 15 years (1999–2015)

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**Objectives:** To analyze recent time trends of the national prospective population-based incidence study of all newly diagnosed patients with type 1 (T1D) and type 2 (T2D) diabetes < 15 years in Austria.
**Methods:** All newly diagnosed cases of diabetes from 0 to < 15 years of age are registered prospectively. The diabetes type was classified on the basis of clinical and laboratory findings according to ADA criteria. Time trends were estimated by linear regression models. Case-ascertainment: 97%
**Results:** During the observation period (1999–2015) 3789 cases (94.2%) were initially diagnosed with T1D (45.8% female), 65 cases (1.6%) with T2D (61,5% female) and 170 cases (4.2%) as other forms of diabetes (e.g. MODY, CFRDM).

From 1999 to 2007, a significant and constant increase of 0.81/100 000 cases per year (APC 5.7 % per year) was observed in the incidence rate of T1D (p < 0,0001), leading to an increase in incidence from 12,2/100.000/yr. in 1999 to 18.9/100.000/yr. in 2007 (J Pediatr 2009;155:190–3). From 2008–2015 the increase was lower with a rise of 0.43/100.000/yr. cases per year (APC = 2.2% per year), changing the incidence rate from 17,7/100.000/yr. (2008) to 19,2/100.000/yr. (2015), with a peak incidence in 2012 (22,8/100.000/yr.). In the very young age group (0–4 years) the increase in incidence from 1999–2007 could not be observed in the later years (13,1 (2008) to 12,3/100.000/yr. (2015), although a peak incidence of 18,3/100.000/yr. in 2012 was seen.

The incidence rate of T2D did not change during the observational period in this age group and remained very low (range 0,14-0,51/100.000/yr.) (p =0,706 (1999–2007) and p = 0,275 (2008–2015).
**Conclusions:** The incidence of T1D-incidence in Austria < 15 yrs. is still increasing, but seems to have reached a plateau, similar to other European regions. In comparison the T2D diabetes in Austrian children showed no increase and remained low during the 17 years of observation, which is in contrast to most regions worldwide.

## P155
## Islet cell antibodies among children and adolescents with type 1 diabetes mellitus in South Africa

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**Background:** There is a paucity of information on the prevalence of pancreatic antibodies in children of African descent with type 1 diabetes. Published information suggests lower prevalence of antibodies in African children. This study was undertaken to determine the prevalence of GAD and IA2 antibodies in a group of South African children with T1DM and to determine whether there are differences in prevalence between ethnic groups
**Methods:** A review of patients presenting to a single practice was undertaken. The study population was limited to subjects that were

less than 18 years at diagnosis, had onset if diabetes on/after 1 January 2002 and not later than 31 December 2014 with a clinical diagnosis of type 1 diabetes. GAD and IA2 antibodies were performed by commercial laboratories. Ethnicity was determined by the families and the investigator.
**Results:** Of 392 subjects with a diagnosis of diabetes mellitus, 364 fulfilled entry criteria. The age at diagnosis ranged from 0.6 to 17 years (median = 8.2 years). Of these, 91 (25%) were black African, 100 (27.5%) Asian, 162 (44.5%) white and 11 (3.0%) of mixed ethnicity (coloured). There was no data of Ab status in 68 of these subjects. Of the remainder, 33 (11.1%) were negative for both antibodies, 134 were positive for 1 Ab and 129 (43.6%) were positive for both antibodies. Thus, 263/296 (88.9%) had antibodies to 1 or both antibodies. There was no significant differences in prevalence of 1 or both antibodies among the different ethnic groups; 87.2% among black African children, 89.6% among Asian children, 89.4% among white children and 88.9% among coloured children. There was no difference when stratified by age at diagnosis or year of diagnosis.
**Conclusion:** The prevalence of antibodies in children and adolescents with type 1 diabetes is similar to that described from developed countries. There was no difference in prevalence between difference ethnic groups, age at diagnosis or year of diagnosis.

## P156
## Epidemiological trends of pediatric type 1 diabetes in British Columbia, Canada

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**Objective:** To describe the trends in incidence and prevalence of childhood type 1 diabetes (T1D) in British Columbia (BC), Canada.
**Methods:** Children < 20 years of age living in BC between April 1st, 2002 to March 31st, 2013 were identified within linked administrative health data (physician billing claims, hospitalization discharge codes, and prescription dispensations). A validated diabetes case-finding definition and algorithm differentiating T1D and T2D were applied to the linked data. Using the BC population of the corresponding year as the standard population, annual age-standardized incidence [IR] and prevalence rates [PR] were calculated overall, and by sex. Linear regression was used to test for temporal trends.
**Results:** In 2002/03, 225 (49% female [F]) new cases of T1D were identified in individuals < 20 years, increasing to 247 (45.3% F) cases in 2012/13. The age-standardized IR [95% CI] increased from 23.26 (20.31-26.56) in 2002/03 to 27.03 (23.76-30.64)/100,000 population in 2012/13 while in females and males IRs increased from 23.65 (19.42-28.58) to 25.53 (21.02-30.75), and from 22.90 (18.89-27.56) to 28.44 (23.83-33.70), respectively. The prevalence of T1D increased from 1790 cases (47% F) in 2002/03 to 2264 (47% F) in 2012/13, while corresponding age-adjusted PR (%) increased from 0.18 (0.17-0.18) to 0.23 (0.22-0.24) increasing the overall prevalence by 33% over the 10-year period. Males had consistently higher prevalence of T1D than females.
**Conclusions:** The incidence of T1D in BC has been stable over 10 years, with differences in males and females evident after 2010. Our data differs from increasing T1D incidence reported in the United States and Europe. Continued surveillance and research will document future trends and provide insight into regional differences in T1D incidence.

## P157
## Prevalence of type 1 diabetes in children of central and east regions of Poland-multicenter study

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Incidence rate of T1D still increases but in Poland is unknown because of lack whole country registry. The aim of the study was accounting the prevalence, and it changes in time.
**Material and Methods:** Study cohort consist of children below 18 years of age with newly recognized T1D from east and central Poland (regions of: Podkarpackie, Warmińsko-Mazurskie, Lubelskie, Świętokrzyskie, Podlaskie and Mazowieckie), between January 2010 and December 2014. After exclusion of children with the other types of diabetes or diagnosed in the other regions 2164 children (96%) with type 1 diabetes was taken to analysis. To estimate the overall population size we used the data from the Central Statistical Office for the population of regions. Statistical analysis with Statistica 6.0, and statistical package R were performed, with $p < 0.05$ as significant.
**Results:** For whole group of children (0–17) the IR was 1,5 fold in the period of 5 years of observation (12,73% per year). The smallest increase of IR was in group 15–18 of age (7,1% per year), the highest in group of 10–14 years old was observed (17.8% per year). In the group of the prepubertal children we observed increase of IR approximately 10% per year (group 0–4 years-9.84% per year, group 5–9 years old - 10,7% per year). The population of urban children (0–18 years) have significantly higher incidence rate than rural ones ($p < 0.02$).
**Conclusions:** The incidence rate of T1D in Polish children living in the east and central Polish regions increased 1.5 fold in the period of 5 years of observation with the highest rise in subjects aged 10–14. Incidence rates of urban children is higher than rural ones. Further monitoring of changes in childhood T1D trends in different Polish regions and influence of potential environmental risk factors is required to better understand causes of childhood diabetes.

## P158
## Epidemiology and characterization of type 1 diabetes in children in Gran Canaria

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Previous studies suggest that the childhood incidence of type 1 diabetes (T1D) in the Canary Islands may be the highest described to date in Spain. In order to assess the incidence in Gran Canaria, we decided to study the incidence of T1D in children < 14 years during the 2006–2015 period, as well as to describe their clinical and analytical characteristics at onset.
**Methods:** Ours is the only pediatric endocrine unit in the island of Gran Canaria. We calculated the annual and overall incidence for the period using the internal registry of the unit as the primary source and data from the local diabetes association and from the hospital´s

pharmacy as secondary sources. To describe the characteristics of our patients at onset, we took a cross-sectional sample of patients followed in the unit from June 2013 to June 2014, and retrospectively analyzed their characteristics at onset.
**Results:** We achieved a degree of ascertainment of 100%. The incidence of T1D for the study period is 29.79 / 100,000, with no differences by gender or age groups. No temporary or seasonal trends were seen in the appearance of cases. 34.2% of patients presented with diabetic ketoacidosis, with an increased frequency in the under 5 years age group. Regarding the genetic characterization, HLA DRB1*03 and *04 were the most common among the DRB1* genes, and DQB1*02 and *03 the most frequent among DQB1*. 86.8% of our patients had at least 1 positive antipancreatic antibody (antiGAD, anti-IA2 or anti-insulin). Associated autoimmune diseases (AAD) were present in 7.9% of our patients after a mean follow up of 4.6 years. The most frequently found was celiac disease, followed by thyroid dysfunction.
**Conclusions:** Our findings support previous results placing the Canary Islands as the region with the highest incidence of T1D in Spain and one of the highest in Europe. No temporal nor seasonal trend was observed in our patients. The prevalence of AADs is low, with a predominance of celiac disease.

## P159
## National prevalence of type 1 diabetes in children aged under 5 years in Ireland - identifying this vulnerable population

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**Objective:** Epidemiological monitoring with accurate definition of disease frequency is key to inform effective and efficient healthcare planning, resource deployment, utilization and support audit. These data are critical for effective Type 1 diabetes (T1D) management, particularly in health systems, such as Ireland, where care may be delivered at multiple sites, with limited integration of data management systems and in the absence of a unique patient identifier. The ability to define and target sub groups of patients with T1D is important, particularly young children under 5 years who present significant management challenges and are especially vulnerable to the damaging effects of hypoglycaemia etc. Reliable prevalence data has been limited to date in Ireland. The aim of this study is to provide robust baseline national prevalence and key demographic data regarding T1D in children aged under 5 years to inform their care provision.
**Methods:** Prevalent cases of Type 1 diabetes in children aged under 5 years were identified from the prospective Irish Childhood Diabetes National Register (ICDNR*) in 2012 and 2013 and survey of the 20 national centres caring for children with T1D. All cases were verified and capture-recapture methodology applied to estimate ascertainment.
**Results:** There were 114 cases (59 male) and 123 cases (64 male) with T1D aged under 5 years at 31st December identified in 2012 and 2013 respectively. Two cases in 2012 and 1 case in 2013 were not registered with the ICDNR. One case of non-Type 1 diabetes was excluded. No deaths were recorded. The point prevalence for T1D in those aged under 5 years was calculated (Table 1).
**Conclusions:** The prevalence of T1D for children under 5 years was 0.31/1,000 and 0.34/1,000 in 2012 and 2013 respectively. Additional demographic data to support care provision and targeted interventions to this vulnerable group is provided. Monitoring of prevalence will continue.

## P160
## Relationships between the North Rhine-Westphalian Index of Multiple Deprivation and the spatial distribution of the incidence of type 1 diabetes in children and adolescents in North Rhine-Westphalia, Germany

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**Objectives:** To analyze the relationships between the North Rhine-Westphalian Index of Multiple Deprivation for 2010 (NRWIMD) and the incidence of type 1 diabetes (T1D) in children and adolescents < 20 years between 2007 and 2014 on municipality level in North Rhine-Westphalia (NRW), the most populous federal state of Germany.
**Methods:** Diabetes data were provided by the NRW Diabetes Incidence Register and municipality-level socio-economic data of 2010 by official statistics. The NRWIMD, a region-specific version of the German IMD, was derived as weighted average of 7 domains of deprivation. Higher NRWIMD scores represent higher deprivation. For analysis, the NRWIMD scores were categorized into deprivation quintiles. Incidence and confidence interval (95%-CI) were calculated per 100.000 person-years. Descriptive statistics were calculated to characterize the regional distributions of T1D and the NRWIMD over 396 communities. Associations between the incidence rate and NRWIMD quintiles were assessed by Poisson regression adjusting for age and sex.
**Results:** Between 2007 and 2014, 6143 cases aged 0–19 years (53% boys, mean age (SD) 8.7 (4.5) years) with incident T1D were registered in NRW. The overall incidence rate was estimated at 22.3 (21.7; 22.8) and ranged between 0 and 55.7 in the municipalities. The NRWIMD ranged between 2.2 and 70.5. The relative risk in communities decreased with increasing NRWIMD quintile, the relative risks of T1D in communities in the NRWIMD quintile Q2, Q3, Q4 and Q5 (most deprived) versus NRWIMD quintile Q1 (least deprived) were 0.98 (0.89; 1.08), p = 0.64; 0.93 (0.85; 1.03), p = 0.15; 0.92 (0.84; 1.00), p = 0.05; and 0.92 (0.85; 1.00); p = 0.06), respectively. The trend test across NRWIMD quintiles was significant (p = 0.03), the average relative risks per increase in NRWIMD quintile was 0.98 (0.96; 0.998)).
**Conclusions:** The results suggest that the risk of T1D in Germany in recent years is somewhat lower in children living in deprived areas.

# Poster Tour 21: Education and Psychological Issues

## P161

### Early Detection of type 1 Diabetes in Youth: the EDDY feasibility study to design, develop and deliver a complex intervention to parents and primary care to raise awareness of the symptoms of type 1 diabetes in childhood, to prevent diabetic ketoacidosis (DKA) at diagnosis

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**Objectives:** To design, develop and test feasibility of delivering a complex intervention to parents of children < 18 yrs and Primary Care staff in 3 adjoining areas in South Wales, to increase awareness of symptoms of diabetes to prevent DKA at onset.
**Methods:** The intervention was designed and developed using a co-production model with public and General Practitioner (GP) advisory groups. It was delivered through schools, nurseries and GP surgeries in Cardiff, Vale of Glamorgan and Bridgend. Feasibility and impact of the intervention for key stakeholders was evaluated using qualitative methods.
**Results:** The parent component of the intervention comprised a re-useable shopping bag and information leaflet, with the hard-hitting message 'untreated type 1 diabetes can kill' and symbols depicting four main symptoms. This was delivered to 323/329 (96%) schools, approximately 101,371/105199 (96%) children. The GP component of the intervention comprised a glucose/ketone meter with disposable lancets, posters and 'Unwell child? Think Diabetes' aide memoire stickers. Educational training days and visits were provided by Community Diabetes Liaison Nurses to 225/329 (68%) schools and 73/84 (87%) GP practices. All GP surgeries received the materials; 47 received 62 glucose/ketone meters and 25 reported already having one. Thematic analyses demonstrated the intervention was acceptable to stakeholders. Potential impact was highlighted by a parent of a newly diagnosed child who stated that receipt of the bag motivated her to seek medical help and by a GP who was prompted to use the meter following a nurse visit, to diagnose a child.
**Conclusions:** The intervention was feasible to deliver and acceptable to key stakeholders. This study was not designed to evaluate effectiveness but results suggest impact on parents and in primary care. We propose minimal refinement of the intervention and full evaluation in a randomised controlled trial.

## P162

### Pediatric diabetes centres rated parental responsibility and family support as most important determinants of HbA1c using a 17-item questionnaire: a pilot study

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**Objectives:** HbA1c is determined by factors related to treatment, patient and environment. To compare HbA1c between centres, risk-adjustment should account for biological, sociodemographic and psychosocial factors beyond control of care providers. We investigated which factors pediatric diabetes centres (PDC) rated as contributing most to excellent (EA1c) and poor HbA1c (PA1c).
**Methods:** A 17-item questionnaire was developed including potential sociodemographic (e.g. ethnic minority parents), interpersonal (e.g. family cohesion) and intrapersonal (e.g. self-efficacy) reasons for EA1c (<6.5%) and PA1c (≥9.5%). These HbA1c cut-offs aimed to yield 200 patients/group. Belgian PDCs (N = 15) were invited to rate the importance of these items on a scale of 1 (none) to 5 (high) for patients with diabetes duration ≥1 year.
**Results:** Out of 215 and 198 eligible patients, 12 PDCs returned valid questionnaires for 120 EA1c and 106 PA1c patients respectively. Compared to non-participants, participants performed more self-measurements/day, more often had basal-bolus insulin, and less frequently had ethnic minority parents. PDCs rated higher parental responsibility (PR), family support (FS) and conscientiousness as most important determinants of EA1c. PR and FS were rated highly (top 2) in all patients except those with ethnic minority parents. Adolescence and lower PR and FS were rated as most important determinants of PA1c. FS was rated highly (top 2), regardless of pubertal status, sex and parents' ethnicity.
**Conclusions:** PDCs rated PR and FS as most important determinants of both EA1c and PA1c. To improve acceptability of between-centre comparisons, risk-adjustment for these factors should be considered. This study suggests that lower PR and FS are important challenges for PDCs. Policy measures should aim at increasing psychosocial support for at-risk patients and families. Questionnaire changes may alleviate the participation and representativeness issues of this pilot study.

## P163

### Benefit finding in adolescents with type 1 diabetes: prospective associations with treatment adherence and metabolic control

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**Objectives:** Although benefit finding has been associated with better psychosocial well-being in numerous chronic illness populations, few studies have examined benefit finding in the context of type 1 diabetes. In addition, little research has focused on children and adolescents. Adolescence is a difficult time for managing diabetes as evidenced by deteriorating metabolic control, poorer adherence, and heightened emotional distress. Understanding factors that predict adolescents' treatment adherence is important as self-management behaviors established during adolescence may carry well into adulthood. In the present study, we investigated longitudinal interrelations among benefit finding, treatment adherence, and metabolic control in adolescents with type 1 diabetes.
**Methods:** Adolescents with type 1 diabetes aged 10 to 14 ($M_{age}$ = 12.49 years, 54% girls) participated in a four-wave longitudinal study spanning approximately 1.5 years ($N$ = 252 at Time 1). At each wave, adolescents filled out questionnaires on benefit finding and treatment adherence. $HbA_{1c}$ values were obtained from treating clinicians. Cross-lagged path analysis was used to examine longitudinal interrelations among the study variables.
**Results:** Higher levels of benefit finding were found to predict relative increases in treatment adherence over time, after controlling for the effects of sex, age, illness duration and treatment type (pump vs. injections). No significant cross-lagged associations emerged between benefit finding and $HbA_{1c}$.

**Conclusions:** Our findings suggest that benefit finding may serve as a protective factor for adolescents with type 1 diabetes and may motivate these adolescents to more closely follow their treatment regimen. The period of adolescence might be particularly suitable for interventions promoting patients' benefit finding given the emergence of future-oriented thoughts and concerns, the increasing responsibility for diabetes management, and the development of coping skills.

## P164
## School-age intelligence and psychosocial wellbeing of the children with early-onset type 1 diabetes with good or poor early glycemic control

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**Objectives:** Good glycemic control from the early stage of type 1 diabetes (T1D) is beneficial on the child's future physical health. However, less is known about its effects on cognitive or psychosocial development. This study examined whether glycemic control one year after diagnosis is associated with intelligence and psychosocial wellbeing at school-age in children with early-onset T1D.
**Methods:** The study included 62 children with T1D diagnosed below five years of age. The children were nine to ten years of age at the time of the study. The children's intelligence (IQ) was assessed with the Wechsler Intelligence Scale for Children, and psychosocial wellbeing (internalizing and externalizing symptoms) was evaluated by their mothers with the Behavior Assessment Scale for Children. Glycemic control was measured by the HbA1c level one year after diagnosis and at the time of the study. Children were divided into three groups with good (HbA1c < 7.6%, n = 20), non-optimal (HbA1c = 7.6% - 8.4%, n = 28) and poor (HbA1c > 8.4%, n = 14) glycemic control one year after diagnosis. Multivariate GLM with post hoc analyses was used to analyze group differences in IQ and internalizing and externalizing symptoms, when current glycemic control was controlled for.
**Results:** Early glycemic control was associated with IQ and psychosocial wellbeing (p = 0.027). The children with poor early glycemic control had lower IQ (p = 0.023) and more internalizing symptoms (p = 0.049) at school-age than the children with good early glycemic control, when current glycemic control was controlled for.
**Conclusions:** Early poorly controlled diabetes may have long-lasting effects on the child's cognitive and emotional development.

## P165
## Level of Internet use among Greek adolescents with type 1 diabetes

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**Objectives:** To investigate the reasons for Greek adolescents and their families to use the Internet and additionally to investigate the level of Internet use and its associations to demographic, socioeconomic parameters and glycemic control.
**Methods:** Patients with type 1 diabetes, aged > 12 years and their parents were recruited during their regular visits at the Pediatric Diabetes Clinic. A similar group of healthy children, age- and sex-matched served as control group. All participants were asked to fill out the Greek translated version of the Internet Addiction Test (IAT). Caregivers of patients with type 1 diabetes were asked to complete a second questionnaire consisted of questions regarding demographic and socio-economic data of the family and data concerning disease management.
**Results:** Thirty-five patients with a mean decimal age of 14.95 ± 1.90 years and their families participated in the study. Mean total score of the patients' IAT questionnaires was significantly lower compared to the controls (26.26 ± 12.67 versus 39.91 ± 18.55, P = 0.003). Controls were categorized as exhibiting mild addictive behavior at a significant higher percentage that controls (31.43% versus 2.86%, P = 0.002). All patients on insulin pump demonstrated normal Internet Use. Mild addictive behavior was associated with a lower parental educational level. Finally, IAT scores and HbA1c values were linearly correlated with an association that was approaching significance (r = 0.315, P = 0.065).
**Conclusions:** Adolescents with Type 1 diabetes and especially those on insulin pump exhibit normal Internet use compared to their healthy peers. Time spend on Internet correlates reversibly with glycemic control.

## P166
## A triadic approach towards illness perceptions in youth with type 1 diabetes and their parents: associations with patient and parent functioning

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**Objectives:** Type 1 diabetes constitutes a challenging illness for both the patient and its immediate context. Especially parents play a crucial role in illness adaptation and management of adolescent and emerging adult patients. The present study addressed the combined role of patient and parental illness perceptions to understand how type 1 diabetes impacts both patient and parental functioning. Previous research focused mainly on the role of illness perceptions and patient self-regulation, but a triadic approach investigating how patient and parental illness perceptions interact in predicting functioning remains forthcoming.
**Methods:** Selected from the Belgian Diabetes Registry, a total of 330 patients-mothers-fathers triads participated. Mean age of patients (52% female) was 18.25 (*SD* = 2.98). Patients and both their parents completed questionnaires on their own illness perceptions (Brief IPQ) and functioning (depressive symptoms, life satisfaction). Additionally, patients reported on their treatment adherence. HbA1c values were obtained from patients' medical records.
**Results:** A series of regression analyses indicated that, although a person's own illness perceptions predicted his or her functioning, illness perceptions of other close relatives were also predictive. Further, significant two- and three-way interaction terms indicated that illness perceptions of different members of the triad interacted in predicting patient and parental functioning. For instance, with respect to the illness perception of personal control, treatment adherence was highest when both patients and mothers scored high on perceived personal control. Likewise, fathers' life satisfaction was highest when both fathers and patients scored high on perceived personal control.
**Conclusions:** The present study encourages researchers to take the family as a system into account when examining individual functioning, both of patients with type 1 diabetes and their parents.

## P167
## Parenting and treatment adherence in type 1 diabetes throughout adolescence and emerging adulthood

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**Objective:** The importance of parenting towards treatment adherence in type 1 diabetes (T1D) has previously been studied, but this research mainly focused on young patients and on parenting styles.

Our study examines associations between different parenting dimensions as the building blocks of parenting styles (diabetes monitoring, responsiveness, psychological control) and treatment adherence throughout adolescence and emerging adulthood. In contrast to previous research, that focused mainly on mother reports, this study is multi-informant, including adolescent and emerging adults with T1D as well as both their mothers and fathers.

**Methods:** 521 patients (aged 14–25 years) with T1D, 407 mothers, and 345 fathers were included. Analyses within and across informants examined the associations between parenting dimensions and treatment adherence (and potential moderation effects in these associations).

**Results:** Treatment adherence was consistently and negatively predicted by psychological control (i.e., negative and pressuring parenting) and positively by responsiveness (i.e., supportive and warm parenting). Diabetes monitoring (i.e., consistent rule setting) was not uniquely linked to treatment adherence, except when combined with high levels of responsiveness. Some effects of psychological control and responsiveness were more pronounced in the older age group.

**Conclusions:** Researchers and clinicians should remain attentive towards the potential role of parenting for treatment adherence, even in emerging adult patients. As similar effects emerge for fathers as well as for mothers, it is important to involve both in the comprehensive treatment of T1D.

## P168
## care of children with type 1 diabetes mellitus at school: a review of attitude of parents in a developing country

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**Background:** Optimal glycaemic control is essential in preventing diabetes related complications in children with diabetes. The school is an important component of care and support to achieve good outcome as children spend a considerable time in school.

**Aim and objective:** The aim of this study was to review the attitudes of parents towards care of their children with Type 1 Diabetes Mellitus (DM) at School in a developing country.

**Methods:** Parents of all children with Type 1 DM seen at the endocrine unit of the University of Port Harcourt Teaching Hospital were invited to participate. Data were collected using a questionnaire. Information on biodata, Details of care in school and challenges experienced were documented and HBAic was done for all children.

**Results:** The Parents of eighteen children and adolescents with Type 1 DM participated in the study. The age range of the children was between 5 and 17 years, mean age of 12.18 $\pm$ 1.7years. Mean duration of DM 3.12 $\pm$ 2.4years and mean HBAic was 9.49%

Two parents (11.1%) did not inform the school of child's condition. No parent gave a written plan of diabetes care/treatment of hypoglycaemia in school and 4 parents (22.2%) did not make contact with school when child was in school. No child had a glucometer or took insulin to school. Five parents (27.8%) adjusted or omitted morning insulin dose to prevent hypoglycaemias in school. Fifteen (83.3%) of children were on twice daily insulin injections. Six children(33.3%) are from high socioeconomic class.

**Conclusion:** This study demonstrates poor attitude and deficiencies in care of children with Type 1 DM in school in our region. There is need for training of parents and presentation of written plans for care of every child with Type 1 DM in school.

# Poster Tour 22: Epidemiology, Acute and Chronic Complications & Associated Diseases

## P169

### Hypertonic saline or mannitol in management of cerebral oedema due to diabetic ketoacidosis in children? A review of current advise by paediatric intensivists of North-West England and North Wales (NWTS)

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**Objectives:** Cerebral oedema due to DKA has mortality rate of 24%. Early recognition and effective intervention can prevent neurological complication and mortality. ISPAD (International Society for Pediatric and Adolescent Diabetes) and BSPED (British Society for Paediatric Endocrinology and Diabetes) guidelines suggest to use either hypertonic saline or mannitol to treat cerebral oedema in children with diabetic ketoacidosis (DKA). In this study we intend to evaluate preference by the intensivists in management of suspected cerebral oedema in children admitted with Diabetic Ketoacidosis (DKA) in North-West England.
**Methods:** A retrospective study was carried out to analyse the management and outcome of patients with Diabetic Ketoacidosis referred to North West and North Wales Transport Service (NWTS) between July 2012 and April 2015.
**Results:** 66 patients (32 boys/34 girls) were included with a median age of 10.5 years. Most common (53%) reason for referral was neurological symptoms suggestive of possible cerebral oedema (35/66). 10/35 (28%) had CT scan brain but none showed any radiological evidence of raised intracranial pressure. Average initial venous blood pH was 6.99 and electrolyte imbalance was noted in 31/66 (46%) patients. Out of 14 patients who received osmotherapy 12children (85.7%) received 2.7% saline and only 2 children were given mannitol. Out of 14 children 7 (50%) were transferred to high dependency unit (HDU) and 7 (50%) were admitted to intensive care unit (ICU). All 7 children in ICU were ventilated as they had low Glasgow Coma Scale (GCS). 1 child died before osmotherapy was commenced.
**Conclusion:** Early CT brain is not sensitive enough to inform initiation of osmotherapy in children with suspected cerebral oedema. Our study showed that hypertonic saline is more frequently recommended by intensivists in North West England and North Wales compared to mannitol in management of cerebral oedema. Further study is needed to establish this trend.

## P170

### Insulin edema related insulin pump initiation: case report

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**Introduction:** Insulin edema rarely occurs in patients with Type 1 Diabetes Mellitus (T1D), after the introduction or intensification of treatment. In the majority of cases, this phenomenon is transient. Our objective was to report a case of a patient with insulin edema after the initiation of Continuous Subcutaneous Insulin Infusion System (CSII), in two different moments.
**Case report:** A 24 year old woman, with T1D since 11 years of age, was under regular use of Insulin Glargine and Lispro. She was presenting important glucose instability and variability, with episodes of hypoglycemia unawareness and severe hypoglycemia, even with a high mean glucose exposure. Those were the indications for a test with CSII. Last HbA1c was 13.5% (estimated average glucose: 340 mg/dL), and total daily dose(TDD) was 52,8 Units/day. The pump set up followed general rules. We noticed a better glycemic control after the initiation of the pump, as compared with the previous ones. On the first week of pump use, the mean glucose went down to 185 mg/dL, but she presented significant weight gain, 6 kg/4 days, together with peri-orbital, feet and ankle edema. Laboratory tests were normal. Patient was treated with spironolactone 50 mg /day for 10 days, when edema was resolved. Insulin pump was changed back to multiple doses with insulin analogs for three months, when insulin pump was re-initiated. Again, patient presented a very similar edema, only this time furosemide had to be added to spironolactone for two weeks.
**Discussion:** Generalized edema after CSII system initiation is rare. Some pathophysiologic explanations have been proposed, like insulin increase of capillary permeability, anti-natriuretic effect, due to increase in sodium tubular reabsorption, or increase in counter-regulation hormones in response to hypoglycemia. As insulin pump prescriptions are growing fast, it is important for the pediatric endocrinologists to be aware of this risk and know how to act promptly to resolve it.

## P171

### Strategy to reduce delay in referral of children with new onset diabetes mellitus to specialist paediatric diabetes teams

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**Introduction:** Our local 10 year audit (1st Jan 2005 - 31st Dec 2014) showed that 38.5% (37/96) of children and young people (CYP) presented in DKA at onset of Diabetes Mellitus. There was delayed referral in 36.5% (35/96). 54.2% (19/35) of children CYP in whom referral to secondary care was delayed presented in DKA. The commonest reason in our cohort for delay in referral was due to the GP carrying out further investigations e.g. fasting blood glucose in order to confirm the diagnosis prior to referral.
**Objective:** To reduce delay in referral by General Practitioners (GPs), of children with new onset Diabetes Mellitus, to specialist Paediatric diabetes teams (PDT).
**Method:** We introduced an electronic 'popup' alert (EPA) that reminds GPs of the national guideline, which recommends same day referral of all children suspected of having DM to PDT, every time they want to place an electronic order for blood glucose (BG)on any child aged less than 18 years. We analysed the number of BG requests by GPs, and DKA rates, 3 months before (sept -dec 2015) and 3 months (Jan-mar 2016) after the introduction EPA . We analysed categorical data using Fisher Exact Test.
**Results:** There has been 19% reduction in requests for BG by GPs in CYP aged less than 18 years (772 vs 626). Total no. of CYP presenting with DM (various sources of referral) before introduction of EPA was 11. 5 of these presented in DKA (2 of whom were associated with delayed referral due to GP undertaking further tests). Total no. of CYP presenting with DM (various sources of referral) after introduction of EPA was 15. 5 of these presented in DKA. None of whom were associated with delayed referral.
**Conclusion:** There has been a significant reduction (p = 0.02) in the number of children presenting in DKA associated with GP delaying

referral by carrying out tests to confirm diagnosis prior to referral. Longer term evaluation will be required to confirm the usefulness of the EPA though these results are promising.

## P172
## Prognostic factors and patterns of c-peptide level for 3 years in type 1 DM children

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**Objectives:** C-peptide is the best measurement of endogenous insulin secretion in patients with diabetes. This study investigated the relationship between C-peptide and clinical/laboratory parameters, measured at 6 month intervals for 3 years after diagnosis.
**Methods:** We retrospectively reviewed the data of 34 children (n = 19 girls, 15 boys) aged 1 to 19 years (Mean age 9.68 ± 4.56 yrs) with Type 1 DM. The initial course of Type 1 DM was studied in 2 groups of 27 patients of abrupt progression group with c-peptide less than 0.6 ng/mL at 36 months (Group A) and 7 patients of slow progression group with c-peptide equal to or greater than 0.6 ng/mL at 36 months (Group B). Symptoms were subdivided into 3 groups, glucosuria only (5.9%), polydipsia, polyuria with weight loss (67.6%), and DKA (26.5%).
**Results:** 1) In abrupt progression group (Group A), mean age at diagnosis was younger (A : 8.67 ± 4.28 yrs, B : 13.57 ± 3.55 yrs, p = 0.009), has lower BMI (A : 16.25 ± 2.48 kg/m$^2$, B: 18.65 ± 3.32 kg/m$^2$, p = 0.041) and severe symptoms (p = 0.013) compared to slow progression group (Group B). Group A also showed significant difference in initial pH (A: 7.31 ± 0.15, B: 7.40 ± 0.03, p = 0.014) and initial c-peptide level (A: 0.64 ± 0.46 ng/mL, B: 0.87 ± 1.08 ng/mL, p = 0.022).

2) There was no significant correlation between sex, family history of Type 2 DM, HbA1c, pancreatic autoantibodies, thyroid antibodies and serum insulin at onset between two groups.

3) Simple correlation analyses showed that in group A, 36 month c-peptide level is not significantly correlated with the initial c-peptide level ($\gamma$ = 0.376, p = 0.053).
**Conclusion:** Patients with younger age, lesser BMI, significant symptoms and low initial c-peptide level need an early intensive insulin therapy for preservation of beta-cell function.

## P173
## Asymmetric dimethylarginine in children and adolescents with type 1 diabetes; association with metabolic control and endothelial dysfunction

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**Aim:** We aimed to determine changes of Asymmetric dimethylarginine (ADMA) levels in regarding with diabetes duration and relation with lipid profile, metabolic control and endothelial dysfunction in children and adolescents with Type 1 Diabetes Mellitus (DM).
**Participants and Methods:** Eighty eight diabetic children aged 7–25 years were included in this cross-sectional study. In the sera of all patients, ADMA levels, HbA1c, and lipid profile were assessed. Carotid Intima Media Thickness (IMT) was measured as an indicator of subclinical atherosclerosis. The patients were divided into three groups according to the duration of diabetes as 1 to 5 years (group1), >5 to 10 years (group 2), and >10 years (group 3).
**Results:** The mean age of each group showed statistically significant difference (p < 0.001). ADMA levels were significantly higher in group 1 compared to groups 2 and 3 (P < 0.05). There was no significant difference in ADMA levels between group 2 and 3 (P > 0.05). Significant differences were found regarding carotid IMT between group1 and 3, and group 2 and 3 (p < 0.05). Triglyceride (TG) and Low Density Lipoprotein Cholesterol (LDL-C) levels were significantly lower in group 1, compared to group 2 and 3 (p < 0.05). No differences were found between group 2 and 3 (p < 0.05). ADMA levels showed significant inverse association with age (r = −0.507, P < 0.001), diabetes duration (r = −0.282, p = 0.008), and LDL-C (r = −0.283, p = 0.008).
**Conclusion:** ADMA concentrations decreased with age as well as duration of diabetes. Patients with diabetes duration of less than 5 years had significantly higher ADMA level. In patients with longer 5 years' duration, ADMA levels did not show any change with the increase of duration. There is no association between ADMA and Carotid IMT as an indicator of subclinical atherosclerosis. Further studies are needed to clarify the potential association of ADMA with subclinical atherosclerosis in children and adolescents with Type 1 DM.

## P174
## Raising the cut-off value for anti-tissue transglutaminase antibodies decreased the number of unnecessary biopsies in children with type 1 diabetes

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**Objectives:** The aim of our study was to investigate whether the anti-tissue transglutaminase type 2 IgA antibody serum (TG2A) cut-off value for performing a biopsy to investigate celiac disease (CD) in children with type 1 diabetes mellitus (T1DM) can be raised. Reason for this was to overcome unnecessary biopsies, without losing too much sensitivity.
**Methods:** Children with T1DM who had both elevated TG2A titers during regular screening and a duodenal biopsy during the course of their diabetes were included. The optimal TG2A cut-off value was determined using receiver operating characteristics (ROC) curve analysis; and compared with the cut-off value used in the ESPGHAN guidelines in terms of sensitivity, specificity, positive and negative predictive value. TG2A titers were expressed as the ratio between the value obtained and the upper limit of normal (ULN). Anti-endomysial antibodies (EMA) were used as a confirmatory test.
**Results:** A total of 63 children were included. The optimal cut-off value for performing a biopsy proved 11xULN. Raising the cut-off value from 3xULN to 11xULN changed the sensitivity from 96% to 87%; increased the specificity from 36% to 73%, the positive predictive value from 88% to 94% and the negative predictive value from 67% to 53%. The number of negative biopsies was reduced from 12% to 6%.
**Conclusion:** Raising the TG2A cut-off value for performing a biopsy in children with T1DM to 11.5xULN reduces the number of unnecessary biopsies. The subsequent slight loss in sensitivity is in our opinion acceptable.
**Disclosure of interest:** None Declared.

## P175
## Current status of incidence and prevalence of type 1 diabetes among children aged less than 15 years in Japan

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**Objective:** A rapid increase in incidence of type 1 diabetes (T1D), especially among young children, has been reported in Europe. We evaluated the epidemiology of T1D in Japan to know whether such a phenomenon is observed in a country with a low risk of T1D.
**Methods:** A majority of children with T1D are registered with the government-subsidized Specified Pediatric Chronic Diseases Treatment Research Projects (SPCDTRP). In this study, the incidence and prevalence of childhood (<15 years old)-onset T1D were estimated by drawing on the SPCDTRP data. Inclusion criteria for T1D were as follows:

1) diagnosis of T1D by a physician, but also
2) receiving insulin therapy, and/or
3) GAD antibody positivity.

The data available for 2005 to 2012 from the SPCDTRP were used to estimate the incidence rate for 2005 to 2010, adjusted to cover those registered within 3 years of onset, and stratified by sex, age at onset, and month of onset.
**Results:** The incidence was 2.3/100,000 person-years (95%CI, 2.2-2.4) (boys/girls, 1.9[1.8-2.0]/2.5[2.3-2.7]) with that for the age brackets 0–4, 5–9, and 10–14 years being 1.5(1.3-1.7), 2.3(2.1-2.5), and 3.0(2.7-3.3), respectively. The onset of disease was shown to peak at 13 years at 3.2(2.9-3.5), with the peak months of disease onset being April/May and December. The number of patients with T1D aged < 15 years was estimated to be 2326(2202–2450) with the prevalence estimated as 13.5/100,000 persons (12.6-14.4).
**Conclusions:** Available data demonstrated a very low incidence, with the onset of disease shown to peak in early adolescence with a female predominance. These findings were consistent with epidemiological data reported earlier in Japan and showed no increase in incidence, unlike those recently reported in Western and some other Asian countries. In addition, the incidence of childhood-onset diabetes exhibited an annual bimodal pattern in this study. Further research is required to determine the case ascertainment rate for the SPCDTRP cohort.

P176

## Falling all-cause mortality from the Yorkshire register of type 1 diabetes in children and young adults

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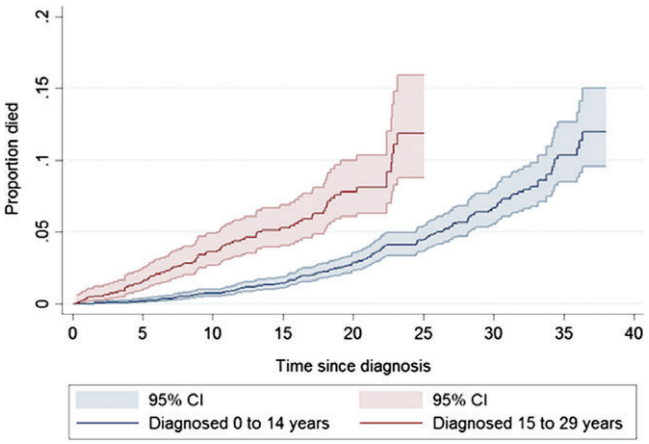
**Objectives:** The Yorkshire Register of Diabetes in Children and Young Adults (YRDCYA) previously found excess mortality in individuals with type 1 diabetes (T1D). Updated data examined mortality risk factors and mortality over time.
**Methods:** The YRDCYA includes under 15 s (early onset) diagnosed with T1D in Yorkshire from 1978 and 15 to 29 year olds (late onset) diagnosed in West Yorkshire from 1991. The YRDCYA was linked to death certification data from the Office for National Statistics (ONS). Standardised mortality ratios (SMRs) and survival curves were produced by demographics. SMRs used England and Wales population death rates by 5-year age group and sex from 1978 to 2014.
**Results:** There were 233 deaths from 6,209 individuals with 107,492 person-years of follow-up. Overall SMR was 4.3 (95% CI 3.8 - 4.9). The late onset group had a significant increased rate of death for time since diagnosis.




*[Cumulative proportion of deaths]*

SMR for those diagnosed before 1980 with 20 years or more follow-up time (3.1 (95% CI 1.9 - 5.1)) was significantly higher than those diagnosed between 1990 to 1994 (0.7 (95% CI 0.3 - 1.4).
**Conclusions:** Early onset T1D is a significant mortality risk factor. However, age at death seems more important than diabetes duration, suggesting that factors associated with later life are the key determinants for risk of death. Decreasing trend in SMRs with later years of diagnosis provides some evidence that mortality has decreased over time.

# Poster Tour 23: Monogenic Diabetes

## P177
## Clinical peculiarities in a large pediatric population with Wolfram syndrome

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Wolfram syndrome (WFS) is a rare, autosomal recessive, neurodegenerative and progressive disease. Early onset diabetes mellitus and bilateral progressive optic atrophy are sensitive and specific criteria for clinical diagnosis. The leading cause of death is the central respiratory failure resulting from brainstem atrophy.
**Methods:** We describe clinical features of 14 patients from 6 different families followed in our Center.
**Results:** Median age of WFS onset was 11.6 years. In each one diabetes mellitus was the first clinical manifestation. Sensorineural hearing impairment was present in 85% patients (median age of onset 13.2 years). Central diabetes insipidus occurred in 92% patients with a median age of onset of 13.7 years. Other endocrine findings were hypogonadotrophic hypogonadism (7%) and Hashimoto's thyroiditis (14.2%). Abnormalities of urogenital tract were present in 35.7% of cases, including dilated renal outflow tracts, urinary incontinence and bladder atony (median age of onset 18 years). Heart diseases were detected in 14.2% patients with a median age of onset of 13.5 years, including ventricular septal disease and secundum atrial septal defect with concomitant valvulopathy. Four of WFS patients (28.5%) deceased at the median age of 27.4 years, in three patients the cause of death was central respiratory failure and in one patient was end-stage renal failure.
**Conclusions:** Our data are superimposable with those reported in the literature in terms of average age of onset, clinical course of the disease and causes of death. The frequency of deafness and diabetes insipidus was more elevated in our patients, the incidence of urogenital diseases was lower although in one case led to death one patient. Moreover, in the present case population we highlight the relative high frequency of heart disease. On the basis of the paucity of data reported in the literature, we suggest to consider also the cardiological aspects as expression of WFS according to our data.

## P178
## SGLT-2 Inhibitor use in an adolescent girl with a pronounced insulin resistance due to a new compound heterozygous mutation of the gene encoding for the insulin receptor

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**Background:** Mutations of the gene encoding for the insulin receptor are rare. Due to the receptor´s limited function it results in a diabetic metabolism with marked insulin resistance. A therapy with insulin is not successful.
**Case report:** We describe a case of a girl presenting to us at the age of 14 years with a BMI-SDS of −1.28, multiple daily insulin injection therapy for 1.5 years, no diabetic associated antibodies, hirsutism, acanthosis nigricans and secondary amenorrhea, high needs of insulin (>10units/kg/day) and high glucose values (150-250 mg/dl), HbA1c 9.4%.
**Methods:** Excess of Insulin (>286.6µU/ml) and androgens, normal cortisol; ultrasound, MRI and laboratory findings without signs for any abdominal, adrenal or genital tumor. Molecular genetic analysis of the gene encoding for the insulin receptor (INSR) through amplification of the exons 1–22 with PCR and consecutive sequencing showed two not described compound heterozygous mutations. The unaffected, not consanguine parents were heterozygous for one of the mutations: father: c.513C > G (p.Tyr171*), mother c.2767G > A (p.Val923Met), retrospectively.
**Results:** Insulin treatment was stopped, therapy with metformin was initiated and the intake of carbs was restricted. Metabolic control improved for a while, but worsened after 6 months. BMI significantly increased (BMI-SDS 0.74) with a massive increase of the subcutaneous fat. We initiated the off-label use with an SGLT-2-inhibitor to reduce glucose levels and consecutively insulin levels: HbA1c 8.5%, no ketonaemia, weight decrease (BMI-SDS 0.45). Androgen excess is successfully treated with cyproteronacetat, acanthosis and hirsutism improved and menstruation restored.
**Conclusion:** An insulin resistance in young slim diabetic patients should lead to the examination for a defect in the insulin receptor. Off-label use of SGLT-2 inhibitors could be a successful treatment option for patients with a defect in the insulin receptor.

## P179
## Greater glucose variability during OGTT is associated with worse clinical markers in cystic fibrosis

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**Objectives:** To demonstrate the incidence of rebound hypoglycaemia (RH) in those with normal glucose tolerance (GT) in cystic fibrosis (CF) and determine whether oscillations in blood glucose (BG) are related to reduced clinical markers.
**Methods:** Data from OGTT screening tests was collected from one paediatric centre over 18 months. 1.75 g/kg glucose (max 75 g) was administered and glucose concentrations measured at 0, 60, 120 and 180 mins. Results were classified according to WHO diagnostic criteria. In addition, a BG < 4 mmol/l at 180mins was classified as RH. The difference in peak and trough BG for each test was calculated. Data on BMI and FEV1 was collected at the same time as the OGTT.
**Results:** 35 tests were performed. 22 females, age range 3.9 - 16.4 years (mean 10.8)

| | Normal | Indeterminate | Impaired Glucose Tolerance | CFRD |
|---|---|---|---|---|
| OGTT (n = 35) | 15 | 8 | 9 | 3 |
| RH (n = 20) | 11 (73%) | 6 (75%) | 2 (22%) | 1 (33%) |
| Age (years)* | 10.1 | 11.1 | 11.5 | 12.1 |
| FEV1 (% predicted)* | 79.4 | 74.5 | 77.1 | 86 |
| BMI (sds)* | −0.26 | −0.76 | −0.35 | 0.16 |
| Difference in peak and trough (mmol/L)* | 5.3 | 9.2 | 6.1 | 7.1 |

*[Summary of results *given as mean]*

RH is more common in those with normal OGTT or those with indeterminate GT. As GT deteriorates, there is less RH. Glucose variability, as determined by the mean difference between peak and trough glucose measurements, was highest in the indeterminate GT group. This group also had the lowest BMI standard deviation scores and lowest FEV1 (%predicted).
**Conclusion:** There is a high incidence of RH associated with normal and indeterminate GT in CF. Clinical markers of CF health were

worse in the group with greatest glucose variability during the OGTT. Glucose oscillation has been proposed as a marker of oxidative stress and early interventions to prevent fluctuating glucose concentrations may be beneficial before the onset of CFRD as determined by OGTT. Continuous glucose monitoring in this group would therefore be a potentially useful adjunct to screening.

## P180
## Are cystic fibrosis trust guidelines robust enough for early identification of CFRD compared to CFF/ISPAD guidelines?

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**Introduction:** Nutrition plays a pivotal role in long-term survival of Cystic Fibrosis (CF) patients and worsening catabolic state affects the respiratory reserve and premature death. Management of glucose intolerance with early insulin treatment promotes anabolism and improves lung function. There is a wide variation in CFRD screening procedure across continents. The recommended age at start of diabetes screening is 12 years as per CF trust (UK) and 10 years as per CFF&ISPAD.

**Aim:** To assess if early screening of glycaemic status helps in early identification of glucose intolerance in patients with CF and to evaluate the correlation between OGTT and HbA1c.

**Methodology:** Retrospective data on OGTT, HbA1c, and patient demographics were collected on all CF patients in a tertiary paediatric hospital in UK(n = 84, 35 M). Patients were categorised into 3 age groups [<10, 10 to < 12 & ≥12 years].

**Results:** [Table 1]

35 CF patients underwent a total of 127 complete OGTT with median age 13 years (range 3–17.3), median follow up of 4 years (range 0.8 -11.1).

**OGTT:** Eleven patients(13%) were diagnosed with CFRD requiring various forms of insulin therapy including insulin pump therapy. This includes 3 patients diagnosed with CFRD as a result of the early OGTT screening between the age of 10 and 12 years(27%). OGTT was undertaken in children less than 10 years of age if they were symptomatic and this has identified one CFRD patient at the age of 9.4 years. Five eligible patients(≥10 years of age) did not undergo OGTT.

**HbA1c:** Total of 89 HbA1c analyses was undertaken along with simultaneous OGTT

**Conclusions:**

1. Application of CFF/ISPAD guideline promotes early diagnosis of CFRD.
2. OGTT may not be routinely needed in children less than 10 years of age unless clinical indicated.
3. No correlation between HbA1c and OGTT, thus unreliable for diagnosis of CFRD.
4. A revised national consensus guideline on CFRD screening in UK would be very useful for early diagnosis of CFRD.

## P181
## Role of mutations causing neonatal diabetes in congenital hyperinsulinism (CHI) in infancy

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CHI refers to a group of inherited disorders caused by inappropriate high insulin secretion to blood glucose levels, resulting in recurrent episodes of hypoglycemia. Worldwide, CHI estimate incidence ranges from 1/35000-40000 to 1/2500 live births, mainly in regions with high rates of consanguinity.In the pancreatic β-cells the ATP-sensitive potassium (K + ATP) regulates glucose-stimulated insulin secretion. K + ATP is composed by 4 ion channels (Kir6.2) and 4 regulatory sulfonylurea receptors (SUR1). The K + ATP channels are also present in the brain and in other neuroendocrine tissues. Inactivating mutations in the ABCC8 and KCNJ11 encoding respectively SUR1 and Kir6.2 subunits of the β-cell ATP-sensitive potassium channels (K + ATP) are the most common causes. Herein we report the case of a 19-month-old male with CHI carrying two different mutations: c.916 C > T; p.Arg306Cys and c.4433 G > A; p.Gly1478Arg located in exons 6 and 37 of ABCC8 respectively. Despite the neonatal onset of CHI, with episodes of recurrent hypoglycemia since the first days of life, the baby didn´t need later a pharmacological treatment to maintain blood glucose levels within the normal range. Otherwise only dietary measures (enteral feeding of milk enriched with glucose polymers) were prescribed. Since the paternally-inherited mutation may be linked to neonatal diabetes mellitus and maternally-inherited mutation has been reported in cases with mild forms of hyperinsulinism, we might hypothesize a balance protecting from inappropriate insulin secretion and subsequent severe hypoglycemic episodes. Moreover, we recommend long term follow-up and periodic oral glucose tolerance test for early detection of insulin dysregulation, considering the established glucose impairment reported on the father side.

## P182
## Insulin receptor gene mutations as a cause of fasting hypoglycemia in children

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**Objective:** Rabson Mendehall syndrome (RMS) represents an intermediate form among syndromes related to mutations in the insulin receptor (INSR) gene. It is characterized by dental anomalies, hyperpigmented skin, hirsutism, macrogenitossomia and severe insulin resistance (IR). Our objective is to report the clinical and laboratorial characteristics of two patients with suspected RMS.

**Methods:**

**Case 1.** A 6-year-old boy born to unrelated parents, developed hyperpigmentation in areas of skinfolds in his first year of life; one first cousin had similar physical features. Physical examination showed cervical, axillary, inguinal and peri-umbilical acanthosis *nigricans*; hypertrichosis; dental abnormalities and macropenis.

**Case 2.** A 2-month- old girl born to unrelated parents, presenting dysmorphic features, hypotonicity, hypertrichosis, cervical, axillary and inguinal acanthosis *nigricans*, developed hypoglycemia since her fist day of life.

**Results:** Case 1 presented prolonged fasting hypoglycemia (minimum 43 mg/dL), few episodes of postprandial hyperglycemia (220–234 mg/dL); HbA1c was 5.8%; fasting glucose and insulin collected at the same time were 70 mg/dL and 178.6 mcU/mL, respectively. OGTT showed a peak insulin level of 2287.2 mcU/mL and glucose of 138 mg/dL. Molecular investigation demonstrated a homozygous missense mutation in exon 19 of INSR gene, at codon 1135, GCG (alanine) to GTG (valine).

Case 2 presented neonatal hyperinsulinemic hypoglycemia showing fasting glucose and insulin levels of 41 mg/dL and 186 mcU/mL, respectively; during a hypoglycemic episode a glucagon test was performed with a peak insulin of 258 mcU/mL and glucose of 20 mg/dL; HbA1c was 5.2%. Even though there was no response to diazoxide treatment, the hypoglycemia crisis could be controlled with dietary management.

**Conclusion:** Despite being a rare genetic disorder, insulin receptor mutations should be included in differential diagnosis of fasting hypoglycemia in children.

## P183
## A novel mutation in a male infant with immune dysregulation, polyendocrinopathy, enteropathy, X-linked (IPEX) syndrome

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**Background:** Immune dysregulation, polyendocrinopathy, enteropathy, X-linked (IPEX) syndrome is an early onset systemic autoimmune genetic disorder caused by mutation of the forkhead box protein 3 - (FOXP3) gene (Xp11.23), a key regulator of immune tolerance. We report the case of a male infant with IPEX syndrome.
**Case report:** A 5-month-old male infant was referred to our clinic for hyperglycemia. He was born at 40 weeks of an uneventful pregnancy. He is the second child of nonconsanguineous healthy parents. His elder brother was diagnosed as immune deficiency with hyper- immunoglobulin E and membranoproliferative glomerulonephritis. He was admitted to our institute for pneumonia at three months. His serum glucose level was elevated to 340 mg/dl during infection necessitating an insulin drip and the patient was fully recovered in 2 weeks with HbA1c was 4.8%. His medical history was otherwise unremarkable. On examination; his weight was 7.3 kg (50. p), height 66.5 cm (50.p), and no dehydration. He had cutaneous lesions compatible with atopic dermatitis. On laboratory; serum glucose was 400 mg/dL with normal blood gas, HbA1c 6.6 %, glucosuria, hemoglobin 8.5 gr/dL, eosinophilia, and elevated immunoglobulin-E. Screening for other endocrine dysfunctions was negative. He was diagnosed as neonatal diabetes and treated with insülin. IPEX syndrome was considered with all findings of the patient and his brother's medical history. Sequencing of the FOXP3 gene revealed a novel mutation in the patient, his brother and his mother.
**Conclusions:** Our patient had not a severe enteropathy and recurrent infections as the features of the classic phenotype of IPEX. It is important to remember that a significant proportion of IPEX patients have FOXP3 mutations that lead to less severe disease. We recommend that a clinical suspicion for IPEX be raised in any male patient with diabetes, particularly if they exhibit signs of immune dysregulation and skin findings.

## P184
## Missense mutation of GLIS3 gene resulting in neonatal diabetes and congenital hypothyroidism

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**Background:** Neonatal diabetes is transient and usually resolves between 6 and 18 months of life. In the remainder of cases, the diabetes is permanent.Mutations in the GLI-similar 3 (GLIS3) gene encoding the transcription factor GLIS3 are a rare cause of permanent neonatal diabetes and congenital hypothyroidism with eight affected cases reported to date.We are reporting first missense mutation in GLIS3 resulting in neonatal diabetes and congenital hypothyroidism.
**Objective and hypotheses:** To evaluate & present non classical situation for a case of neonatal diabetes. As well as sequence correlation between neonatal diabetes and hypothyroidism in missens mutation in genetic studies.
**Method:** One infant Libyan female 6 weeks old, she was presented with hypovolemic shock in ketotic state and markedly raised her blood sugar 1020 mg /dl. Evaluations the patient clinically and genetic studies was done were found first missens mutation resulting in her condition.
**Results:** The homozygous mutation c.1924A > T (p.Ser642Cys), was identified when the patient was tested for a monogenic etiology by sequencing a panel of 13 genes associated with neonatal diabetes.

Patient now is at eight months of age with normal developmental milestones, as well as physical development and requires 0.1-0.2 units/kg/day of basal insulin with HbA1c 6.3%.
**Conclusion:** This case extends the clinical spectrum associated with mutations in GLIS3. We are describingthe first case of GLIS3 gene missense mutation c.1924A > T (p.Ser642Cys) resulted in neonatal diabetes and congenital hypothyroidism. Mutations in GLIS3 should be considered in all children with neonatal diabetes without an established cause, irrespective of reported parental relatedness or insulin requirements.

# Poster Tour 24: New Insulins and Pharmacologic Agents

## P185

### A comparative, systematic, meta-analysis of the safety and efficacy of insulin degludec (IDeg). Does IDeg confer any advantage over other long-acting analogues in young patients with type 1 diabetes?

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**Objective:** Insulin degludec (IDeg) is an insulin analogue with pharmacokinetic / pharmacodynamic properties that enable once daily dosing anytime of the day. Several clinical trials have been reported and IDeg has recently been approved for use in youth with Type 1 - diabetes(T1D). However the utility of IDeg in T1D remains unclear. This study sought to synthesise data from clinical trials to compare the efficacy and safety of IDeg against other licensed long-acting insulin analogues.

**Methods:** A systematic review (May 2016) using OVID, Medline, EMBASE, CINAHL and SCOPUS databases. Data from randomised, controlled trials in T1D were subjected to meta-analysis(Review Manager v5.3).Primary outcomes analysed: HbA1c, fasting plasma glucose (FPG), adverse events (AE), hypoglycaemia rates and insulin dosing requirements.

**Results:** Seven trials were identified (1 paediatric (age 1-18 yrs)vs. detemir; 6 adult(median age 43,range 18-75 yrs)vs. 4 Glargine/2 Detemir). Compared to other long-acting analogues, IDeg showed non-inferiority for HbA1c reduction(mean difference (MD)0.05% [95% CI-0.02,0.12]p = NS)but superiority for reductions in FPG(MD:-0.82 mmol/L [−1.42,-0.21]p0.008). There were no differences in combined(RR:0.87 [0.62,1.20]) or severe hypoglycaemia rate(RR:-0.87 [−0.53,-1.44])(p = NS), whereas IDeg was associated with greater reductions in nocturnal hypos(RR: −0.61[−0.47,-0.80]p = 0.0003), basal insulin(MD:-0.06U/kg[−0.06, −0.05]p < 0.0001) and bolus insulin dose (MD:-0.01U/kg[−0.01,-0.00]p < 0.0001). There were no differences in AEs (total RR:0.95[0.86,1.06];Severe RR:1.28 [0.96,1.70]p = NS).

**Conclusion:** Compared to other long acting insulin analogues IDeg is non-inferior for HbA1c reduction, but superior for lower FPG. IDeg is associated with lower insulin dosing, reduced nocturnal hypo rate and has a similar adverse events profile. Further data regarding youth with T1D is needed but given IDeg's pharmacological properties results from adults studies are generalisable to children.

## P186

### Efficacy and safety of insulin degludec in children and adolescents with type 1 diabetes

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**Objectives:** Degludec (IDeg; Tresiba®) is a novel basal insulin with an ultra-long, flat and stable action profile. In adults, it was demonstrated to provide more glucose-lowering effects and lower rates of hypoglycemia respect to glargine (IGlar). To date studies on childhoods´ IDeg use are scarce. Aim of this study was to assess the efficacy and the safety of IDeg in children and adolescents with type 1 diabetes (T1DM) previously treated with IGlar.

**Methods:** Twenty children and adolescents with T1DM (15.1 ± 4.0 yrs; 9 males; 7 prepubertal; T1DM duration 7.2 ± 3.7 yrs; IGlar treatment at least 1 year) were recruited in the study and shifted to IDeg once daily. Anthropometric (BMI-SDS), metabolic [HbA1c, FPG, and severe hypoglycaemia rates], and insulin dose [IGlar or IDeg plus short-acting or regular] were collected at baseline (T0, during IGlar treatment), 3 months (T1), and 6 months (T2) after IDeg was started. Data were analysed according to pubertal status.

**Results:** BMI-SDS did not change on IDeg both in prepubertal and in pubertal patients. Despite HbA1c values were not significantly improved during IDeg treatment (ΔHbA1c T0-T1 -0.3%, p = 0.1; T0-T2 -0.1%, p = 0.6), FPG was significantly decreased at T1 (−18.6 ± 34.1 mg/dl, p = 0.05). No episode of severe hypoglycaemia was reported on IDeg. We found a significant reduction in doses of both basal insulin (IGlar vs. IDeg: 21.8 ± 8.9 vs. 19.4 ± 7.8 IU/day, p = 0.003) and short-acting or regular mealtime insulin (T0 vs. T2 0.56 ± 0.13 vs. 0.50 ± 0.15 IU/kg/day, p = 0.02).

**Conclusions:** In our patients, IDeg seems effective to improve the glycemic control reducing FPG even at lower basal insulin doses compared to IGlar. Moreover, it allowed the reduction of the dose of mealtime insulin. No episode of acute complication was reported suggesting how IDeg may be consider safe also in childhood.

## P187

### Comparison of daily insulin dose in continuous subcutaneous insulin infusion and multiple daily injection therapies for children with type 1 diabetes mellitus depending on severity of metabolic disorder at disease onset

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**Objective:** To analyze advantages of continuous subcutaneous insulin infusion (CSII) over the multiple daily injection (MDI) by giving children with type 1 diabetes mellitus multiple injections at disease onset.

**Methods:** Participants of the study were 93 children with type 1 diabetes mellitus at disease onset and disease duration of 14–21 days since the date of initial diagnosis. Glycated hemoglobin ($HbA_1c$) and acid–base balance were measured in all patients, glycemic control was carried out 9 times per day. A non-parametric Mann–Whitney test criterion was used for statistics processing.

**Results:** The patients were divided in two groups in accordance with the generally accepted standards of ketosis and diabetic ketoacidosis diagnostics: group 1 (n = 57, average age 9,7 ± 3,4, average $HbA_1c$ level of 9,5 ± 1,5%) - ketosis, group 2 (n = 36, average age 9,16 ± 4,1, average $HbA_1c$ level of 11,57 ± 1,62%) - ketoacidosis.

The study has shown that the average daily dose of insulin in the first group amounted to 0,37 ± 0,19 U/kg, in the second group to 0,51 ± 0,21 U/kg (p = 0,003).

In the first group 19 children have received CSII at an average daily dose of 0,39 ± 0,18 U/kg and 38 patients were treated with MDI with an average daily dose of 0,36 ± 0,2 U/kg (p = 0,57).

In the second group 12 patients have received CSII at an average daily dose of 0,45 ± 0,13 U/kg and 24 patients were treated with MDI with an average daily dose of 0,54 ± 0,23 U/kg (p = 0,29).

**Conclusion:** The daily dose of insulin for children with type 1 diabetes mellitus at disease onset depends on the severity of the metabolic disorder at the beginning of the therapy. CSII may be more effective in cases of more significant metabolic disorders.

## P188

## Dapagliflozin, an SGLT2 Inhibitor, induces a transient decrease on BMI and insulin dose in female adolescents with Type 1 Diabetes and clinical hyperandrogenism

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Dapagliflozin, an insulin-independent sodium-glucose cotransporter 2 inhibitor (SGLT2-I), increases glucosuria and reduces hyperglycemia in subjects with T2D. The objective was to assess the effect of Dapagliflozin on body weight in 3 overweight female adolescents with T1D, acne, hypertrichosis and normal androgen levels. Dapagliflozin (10 mg per day) was prescribed during 12 months and the insulin dose was adjusted. Patients were 15 ± 2 years old, 3 ± 1 years post menarche and had attained near final height.

| Time (month) | Weight (kg) | BMI (kg/m2) | BMI (SDS) | HbA1c (%) | Insulin (U/day) | Glucose (mg/Dl) | Glucose (SD) |
|---|---|---|---|---|---|---|---|
| 0 | 66,7 | 25,2 | 1,42 | 8,1 | 58 | 191 | 92 |
| 6 | 60,4 | 22,7 | 0,75 | 8,1 | 36 | 175 | 85 |
| 12 | 64,2 | 24,2 | 0,9 | 8,1 | 51 | 177 | 74 |

*[Results shown as mean]*

Capillary Beta-hydroxybutyrate was low or undetectable (range 0.0- 0.5) and none of the patients showed electrolyte disturbances or urinary tract infections. Polydipsia, polyuria and dry mouth were reported. One patient exhibited hand tremor but refused to discontinue the SGLT2-I. After 11,6 months on Dapaglifozin, one girl who had showed a progressive reduction of Hba1c (8.3% to 7.5%) and IMC SDS (0,85 to −0,05) developed an euglycemic diabetic ketoacidosis and treatment was stopped. After 6 months, all subjects reduce their body weight (3.9; 6.7 and 8 kg respectively) and 2 girls exhibited a reduction in body acne. After 12 months, two subjects exhibited a partial rebound on IMC SDS. Interestingly blood glucose levels and fluctuation were reduced but HbA1c did not improved in 2 out of 3 subjects. Insulin dose and body weight were reduced after 6 months on Dapagliflozin without metabolic deterioration in 3 adolescents with T1D; whereas a partial rebound on both parameters was seen after 12 months on treatment. Adverse drug side effects as euglycemic ketoacidosis and hand tremor may appear. Randomized controlled trials are needed. Our findings provide hope that SGLT2 inhibition might be an effective adjuvant to insulin treatment in overweight adolescents with T1D.

## P189

## The incidence of hyperglycemia and ketosis with insulin degludec-based treatment compared with insulin detemir in pediatric patients with type 1 diabetes: an analysis of data from two randomized trials

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**Objectives:** To assess the incidence of hyperglycemia and episodes of ketosis in two phase 3b trials investigating insulin degludec (IDeg; NN1250-3561 [Study 1]) and insulin degludec/insulin aspart (IDegAsp; NN5401-3816 [Study 2]), which both have a long duration of action due to the IDeg component, versus insulin detemir (IDet) in pediatric patients with type 1 diabetes.

**Methods:** Patients aged 1–18 years were randomized to IDeg OD or IDet OD or BID for 26 weeks in Study 1 and IDegAsp OD or IDet OD or BID for 16 weeks in Study 2. All treatment arms received IAsp as mealtime insulin. In Study 1, hyperglycemia was recorded if plasma glucose (PG) was >11.1 mmol/L (200 mg/dL); in Study 2, hyperglycemia was recorded if PG was >14.0 mmol/L (250 mg/dL) where patient looked/felt ill. In both trials, capillary blood ketones were to be measured if PG was >14.0 mmol/L.

**Results:** Due to the different criteria for recording hyperglycemia, there was a difference in the rate of hyperglycemic episodes between the trials (Table 1). Lower rates of ketosis (self-measured ketones >1.5 mmol/L) were observed with IDeg than IDet, reaching statistical significance in Study 1 (Table 1). In both studies, lower rates of ketosis per patient year of exposure (PYE) were observed with IDeg than IDet for ketone levels of >0.6, >1.5 and >3.0 mmol/L (Table 1).

| | Trial arm (n) | Number of episodes per PYE | | | |
|---|---|---|---|---|---|
| | | Hyperglycemia† | Episodes of ketones >0.6 mmol/L | Episodes of ketones >1.5 mmol/L | Episodes of ketones >3.0 mmol/L |
| Study 1 | IDeg + IAsp (n = 174) | 364.3 | 3.46 | 0.51 | 0.02 |
| (26 weeks) | IDet + IAsp (n = 175) | 368.3 | 6.90 | 1.02 | 0.19 |
| Rate ratio (95% CI) for IDeg vs IDet (FAS) | | 0.99 (0.84; 1.15) | NA | 0.36 (0.17; 0.76)* | NA |
| Study 2 | IDegAsp + IAsp (n = 181) | 10.94 | 0.37 | 0.11 | 0.04 |
| (16 weeks) | IDet + IAsp (n = 179) | 8.33 | 0.76 | 0.24 | 0.07 |
| Rate ratio (95% CI) for IDegAsp vs IDet (FAS) | | 1.08 (0.64; 1.81) | NA | 0.44 (0.11; 1.74) | NA |

*$p < 0.05$. †Hyperglycemia: espisodes with PG >11.1 mmol/L (200 mg/dL) (study 1); PG >14.0 mmol/L (250 mg/dL) where patient looked/felt ill (Study 2). FAS, full analysis set; IDeg, insulin degludec; IDgeAsp, insulin degludec/insulin aspart; IDet, insulin detemir; NA, not available; PG, plasma glucose; PYE, patient years of exposure.

**Conclusions:** These data demonstrate the potential of IDeg in preventing hyperglycemia and ketosis in children and adolescents with type 1 diabetes.

*[Table]*

## P190
## Ultra long-acting degludec versus long-acting insulin glargine in children and teenagers with type 1 diabetes

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**Objectives:** Unstable metabolic control and frequent hypoglycemic events are the main indications of switching from long-acting insulin glargine to ultra long-acting insulin degludec. The aim of the present study is to evaluate the efficacy of such a switch in children and adolescents.

**Methods:** We enrolled retrospectively 58 children and adolescents with type 1 diabetes divided into two groups matched for age, sex and metabolic control. Group A was switched from glargine to degludec while group B continued treatment with glargine. We compared HbA1c, percent of BG detections below 60 mg/dl, mean and SD of home blood glucose monitoring (HBGM), HBGI and LBGI during the three months before and after switching from one to the other insulin in group A and during the corresponding period in group B. Data are reported as median (IQR). Chi square and Mann–Whitney test were used for statistical analysis.

**Results:** During the three months after switching the percentage of patients who improved the HbA1c was higher in group A then in group B. We didn't find any statistical significant difference between the two groups for any parameter taken into account. In particular group A didn't showed any statistically significant reduction of hypoglycemic events after switching (see table).

**Conclusions:** According to our preliminary results the transition from long-acting insulin glargine to insulin ultra long-acting degludec in pediatric patients with T1DM does not seem to be able to significantly improve the metabolic control and reduce the risk of hypoglycemia.

*[Results]*

## P191
## The effect of adding metformin to insulin therapy for type 1 diabetes mellitus children: a systematic review and meta-analysis

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**Background:** Although its prescription is off-label in children with T1DM, metformin has been used to improve features of insulin resistance. We aimed to synthesize the evidence of metformin effectiveness in addition to insulin in T1DM children in improving metabolic outcomes, and features of insulin resistance.

**Methods:** We performed a systematic review and meta-analysis of randomized controlled trials evaluating the effectiveness of metformin addition to insulin therapy compared to placebo in T1DM children age 6–19 years. We performed literature searches through Ovid Midline, Ovid Embase, and Cochrane Central Register of Controlled Trials (CENTRAL) from the database inception date to February 15, 2016, and grey literature search. Two reviewers screened titles and abstracts independently, assessed full text eligibility, and extracted the data. We performed meta-analysis using fixed effects model and reported effect estimates with 95% confidence interval (95%CI). Quality of the evidence was assessed with GRADE Approach.

**Results:** We screened 727 studies, and included 6 RCTs with 324 patients. These had low risk of bias design and included adolescents (mean age 15 years). The meta-analysis showed that the addition of metformin compared to placebo resulted in similar HbA1C(mmol/mol)(mean difference [MD] = −0.04, 95%CI,-0.27, 0.19), BMI(kg/m$^2$) (MD = −0.13 95%CI,-0.65, 0.40), severe hypoglycaemia (OR = 3.82, 95%CI, 0.73, 19.90), and DKA(OR = 1.94, 95%CI,0.43,8.80). However, metformin decreased total insulin daily dose(TIDD) (unit/kg/day) (MD = −0.16, 95%CI,-0.21,-0.11), and reduced BMI z-score (MD = −0.11, 95%CI −0.21, −0.01) . No trial reported health related quality of life scores. The evidence quality was moderate to low.

**Conclusions:** Current evidence does not support use of metformin in T1DM adolescents to improve metabolic outcomes. However, Metformin may provide modest reduction in TIDD and BMI z-score.

PROSPERO registration:CRD42016035914.

| | HBA1c basal and after switch [n(%);ΔHbA1c] | | | % of hypoglycemic events (%BG < 60 mg/dl) | |
|---|---|---|---|---|---|
| | Improved | Unchanged | Worse | Basal | After switch |
| Group A | 16(55); 0.4(0.5) | 4(14) | 9(31); 0.6(0.8) | 3.5(5.9) | 3.1(5.0) |
| Group B | 9(31); 0.4(0.6) | 7(24) | 13(45); 0.4(0.4) | 4.6(6.4) | 3.5(3.9) |
| p | NS | | | NS | |

# Poster Tour 25: Psychosocial Issues

## P193
## Gambling with their health: a pilot study examining risks that adolescents take with their diabetes management

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**Objective:** Because general risky behavior (e.g., reckless driving, binge drinking) peaks in adolescence, adolescents may also take risks with their diabetes care (e.g., going 24 hours without insulin, feeling blood glucose might be low and not checking). These types of *diabetes-specific risk-taking* behaviors have not been previously researched. The aim of the current study was to describe youths' experiences with more commonly occurring diabetes-specific risk-taking behaviors.
**Method:** Thirty adolescents with T1D (age 15–19, 60% female, M A1c = 8.7 ± 1.4%) reported on how often they engaged in 38 behaviors that place them at risk for adverse events or poor glycemic control, using the newly developed Diabetes-Specific Risk-Taking Inventory (DSRI, α = .92). Semi-structured interviews were conducted with 4 different youth (age 17–19, 1 female and 3 males). The interviews were transcribed and themes were determined with qualitative thematic analysis.
**Result:** Using a cut-off median score of 3, 15 diabetes-specific risk-taking behaviors were identified as occurring at least every few months, for at least 50% of the sample. Thematic analysis focused on youth responses to these 15 most frequently occurring behaviors. The overall theme of "reducing burden" (reducing the amount of effort or time spent on diabetes management tasks) was derived from the qualitative data. For example, adolescents spoke about ignoring pump alarms in the middle of night to continue sleeping and trusting physical symptoms of hypoglycemia rather than checking blood glucose.
**Conclusion:** For the most commonly occurring diabetes-specific risk-taking behaviors, adolescents risk poor health outcomes in order to lighten the load of diabetes management. Understanding what risks adolescents take with their diabetes management and why they take them may help inform clinical intervention to decrease risk-taking and prevent adverse health outcomes.

## P194
## The impact of secondary caregivers (SCs) on parental burden in the management of type 1 diabetes (T1D) in children < 8 years old

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**Objectives:** Care of T1D in children < 8 y/o places burden upon parents who are the primary caregivers; non-parent SCs can help parents with care, potentially reducing burden while adding to parental worry. Understanding parental perceptions of SCs can help improve support for families of young children with T1D.
**Methods:** Semi-structured qualitative interviews were conducted with parents (85% mothers) of 79 youth aged 1 to < 8 y/o with T1D for ≥6 months (mean age 5.2 ± 1.5y, T1D duration 2.4 ± 1.3y, 77% white, A1c 7.9 ± 0.9%, 66% pump-treated). Interview transcripts were coded and evaluated using content analysis to derive central themes. Parents also completed surveys on healthcare needs.
**Results:** Parents cited constant vigilance as a major burden and endorsed SCs as a potential means to alleviate burden associated with T1D management. Three themes emerged: 1) difficulty finding SCs willing to provide T1D care, particularly for youth using injections without diabetes technologies (pumps, CGM); 2) difficulty trusting SCs with their child's care due to worries about SCs' T1D knowledge and ability to identify or treat fluctuating BGs; 3) intentionally raising the child's target BG range when in the care of SCs in order to reduce parental worry about the SCs' ability to identify and treat hypoglycemia in a timely way. Notably, 89% of parents endorsed needing help within the previous 6 months to educate school/childcare personnel.
**Conclusions:** While SCs may help care for young children with T1D, these findings suggest that parents have concerns about their young child's safety with SCs and may need assistance in training SCs. Structured SC education in T1D care of young children may help reduce parental worries and enhance parents' confidence in SCs' ability to manage T1D. Use of diabetes technologies may also facilitate management by SCs. In turn, glycemic control may improve if SC education mitigates the parental desire to increase the child's target BG range while with SCs.

## P195
## Quality of life in type 1 diabetes and coeliac disease: role of the gluten-free diet

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**Objective:** To examine quality of life (QoL), glycemic control and gluten free diet (GFD) adherence in youth with type 1 diabetes (T1D) and biopsy confirmed coeliac disease (CD) vs T1D only.
**Methods:** Case–control study of 35 youth with T1D and 35 with T1D + CD matched for age, T1D duration, gender and A1C. QoL was assessed in youth and parents using the PedsQL Generic Core Scale, PedsQL Diabetes Module and the General Well Being Scale; those with T1D + CD also completed the CD-specific CDDUX questionnaire and parents completed the PedsQL Family Impact Scale. Questionnaires were scored from 0–100, higher scores indicate better QoL or well-being. Scores were compared between T1D vs T1D + CD using Mann–Whitney U tests, with subgroup analyses by GFD adherence vs non-adherence and CSII vs MDI in those with T1D + CD.
**Results:** Overall mean age was 13.6 ± 3.0 years, T1D duration 7.6 ± 3.1 years, female gender 56% and CSII use 70%, with no differences between T1D + CD vs T1D. CD duration was 4.6 ± 2.7 years, diagnosed at mean age 9.1 ± 3.5 years. Based on dietitian review and celiac titers, 69% were classified as GFD non-adherent. Youth with T1D + CD reported similar generic and diabetes-specific QoL to T1D only. GFD non-adherent vs adherent youth reported lower diabetes-specific QoL (mean score 58 vs 75, p = 0.003) and lower general well-being (57 vs 76, p = 0.02), as did their parents (50 vs 72, p = 0.006), while A1C was higher (9.6 vs 8.0% / 81 vs 64 mmol/mol, p = 0.02). Youth with T1D + CD using CSII vs MDI reported similar generic and diabetes-specific QoL and A1C (8.6 vs 8.2% / 70 vs 66 mmol/mol, p = 0.44), but were unhappier having to follow a lifelong diet (59 vs 29, p = 0.007).
**Conclusions:** While overall QoL is not worse in youth with T1D + CD, those who do not adhere to the GFD have lower QoL and worse glycemic control. Novel strategies are required to understand and improve adherence in youth living with both conditions.

## P197
## Identity formation in youth with type 1 diabetes

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**Introduction:** Adolescents and emerging adults with type 1 diabetes (T1D) are confronted with illness-related stressors that may hinder important developmental tasks. As T1D may challenge the ability to become autonomous and to construct a personal identity, the present study investigated personal identity formation in these patients, and how it is related to psychosocial and diabetes-specific functioning.
**Methods:** A total of 431 patients with T1D (aged 14–26; 53.1% female) and community controls (matched 1:1 on age and gender) reported on identity, well-being, diabetes-specific problems, treatment adherence, and illness perceptions. HbA1c-values were obtained from the treating physician.
**Results:** Using cluster-analysis on both adaptive and maladaptive identity processes, six identity types or statuses were identified in line with community research (achievement, foreclosure, moratorium, troubled diffusion, carefree diffusion, and undifferentiated), with patients and controls being equally distributed. Whereas achievement and foreclosure constitute more adaptive identity statuses characterized by strong identity commitments, especially troubled diffusion is a maladaptive identity state characterized by identity rumination and a lack of firm choices. Using analyses of variance, patients in foreclosure and achievement (both characterized by high identity commitments) presented with the most adaptive psychosocial and diabetes functioning. In contrast, patients in troubled diffusion and, to a lesser extent, moratorium (both characterized by a maladaptive or ruminative type of exploration) showed the least adaptive scores on well-being, diabetes-specific problems, treatment adherence, and illness-perceptions.
**Conclusion:** The present study underscores the importance of assessing identity issues in youth with T1D making the challenging transition to adulthood. Hence, identity comprises an important clinical factor to consider in diabetes counseling and treatment.

## P198
## Treatment adherence in children with type 1 diabetes: the role of patient and parental executive functioning

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**Objective:** Managing type 1 diabetes(T1D) requires the ability to make complex and critical decisions regarding treatment, to execute complex tasks accurately and to make adjustments when problems arise.This requires effective neuropsychological competencies of patients and their families, especially in the domain of executive functioning (EF). EF refers to a set of skills necessary for independent, purposeful, goal-directed activity (e.g., the ability to self-monitor,plan, solve problems,set priorities). Research on this matter in T1D is scarce and has focused mainly on EF in young patients, leaving the role of parental EF unaddressed.This multi-informant study examined associations and interactions between child and parental EF and treatment adherence in T1D.
**Methods:** 284 patients with T1D (6–18 years old) were included. 229 mothers and 163 fathers parents filled out questionnaires on child and parental EF and on treatment adherence. Of the 11–18 year olds, 136 young patients filled out self-reports as well. Analyses within and across informants examined the associations between patient and parental EF and treatment adherence (and potential moderation effects in these associations).
**Results:** Overall, especially child EF was consistently and clearly associated with treatment adherence (between and across informants). Moreover, there was a consistent interaction effect between child and parental EF in the prediction of treatment adherence. For instance, child EF had an effect on treatment adherence especially when parental EF was good.
**Conclusions:** This multi-informant study adds to current knowledge about treatment adherence by implementing not only child but also parental EF. As the present study demonstrates the significant role of child as well as parental EF, researchers and clinicians should remain attentive towards the role of neuropsychological concepts such as EF in the domain of T1D. Implementation in clinical practice seems necessary and meaningful.

## P199
## Turkish version of the diabetes eating problem survey-revised on adolescents with type 1 diabetes mellitus

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**Aim:** To examine the reliability and validity of the Turkish version of Diabetes Eating Problem Survey-Revised (DEPS-R) for adolescent with Type 1 Diabetes (T1D).
**Methods:** DEPS-R is a 16-item self-report questionnaire to measure general and diabetes-specific DEBs.The factorial structure of the Turkish version of DEPS-R was examined by confirmatory factor analysis (CFA) and the internal consistency was tested using Cronbach's $\propto$ coefficient.
**Results:** Table 1 illustrates characteristics of the study participants. DEPS-R correlated positively with age,BMI-SDS, HbA1c, no correlation was found with diabetes duration.

*[Characteristics of Study Participants]*

The Cronbach $\propto$ coefficients for the Turkish version of DEPS-R were 0.856, 0.858 and 0.857 for the entire sample, females and males respectively.Three components were identified, explaining 52.4% of the total variation.Factor 1 was the most dominant factor,explaining 34.3% of the variance.Factors 2 and 3 explained

| | Female | Male | Total | P Value |
|---|---|---|---|---|
| n | 98 | 77 | 175 | |
| Age(years) | 14.0(9.0-18.0) | 14.0(9.0-18.0) | 14.0(9.0-18.0) | 0.411§ |
| HbA1c(%) | 8.1(5.5-15.0) | 8.1(5.9-13.3) | 8.1(5.5-15.0) | 0.303§ |
| Diabetes duration(month) | 71(12–188) | 60(12–210) | 76(12–210) | 0.247§ |
| DEPS-R score | 11.5(0–55) | 11.0(0–55) | 11.0(0–55) | 0.263§ |
| BMI-SDS | 0.16 ± 1.27* | −0.11 ± 1.24* | 0.04 ± 1.26* | 0.140** |
| BMI-SDS Insulin pump therapy, % | 25.5 | 33.8 | 29 | 0.233§§ |

Data are medians (min-max),unless otherwise indicated. BMI:Body Mass Index,SDS:Standard Deviation Score,DEPS-R: Diabetes Eating Problem Survey-Revised.P values refer to the significance of the difference between males and females. *Mean ∓ SD §Mann Whitney U test**Independent sample t test,§§Chi-Square test

9.2% and 8.8% of the variance,respectively.Although our model identified three factors,it is difficult at this point to establish obvious subscales related to these three factors.F1 appears to address maladaptive eating habits, F2 the concerns about weight and thinness,and F3 the approach of maintaining high blood glucose values to lose weight.After the suitability of data for factor analysis was assessed,CFA was performed on the 16 items of the DEPS-R. Compliance was determined between the main factors and subscales(RMSEA = 0.076).

**Conclusion:** *S*hort,self-report measure designed to screen DEB will be useful for clinicians.

## P200
## Understanding barriers to self-management among Latino adolescents with type 2 diabetes

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Type 2 diabetes mellitus (T2DM) is a growing problem among Latino adolescents. An even bigger problem is the lack of adherence to self-management of the disease in this population. Little is known about what adolescents perceive as barriers to their diabetes care. This study will elicit descriptions of diabetes self-management strategies and decision-making used by Latino adolescents and will develop an explanatory framework of T2DM self-management among these youth. This study used grounded theory in a qualitative design to explore and understand the barriers and facilitators to effective diabetes self-management from the perspective of Latino adolescents with T2DM. Twenty eight children and adolescents ages 14–20 participated in focus groups or individual interviews. We found barriers and facilitators to diabetes care. The management of diabetes has multiple levels of influence that are affected by intrapersonal, interpersonal, community and societal factors. One of the major findings in this qualitative data is the impact that "Lack of diagnosis acceptance" has as a barrier to positive diabetes self-management behaviors. Diabetes management during adolescence is challenging due to many physical, psychological and cognitive changes. In order to avoid diabetes related complications and lifelong consequences to the health of these individuals, it is necessary to understand how to overcome the barriers to diabetes self-management. The research findings of this study will help guide the development of culturally and age appropriate interventions to address the psychological needs of these adolescents and help them to accept the diagnosis of T2DM. Acceptance of the diagnosis by the adolescent and the acceptance of the parental responsibilities in diabetes care are essential to improve self-management adherence and consequently improve metabolic control within Latino adolescents.

# Poster Tour 26: Latebreakers

## P201

### Assessment of environmental factors and the risk of type 1 diabetes in children in Minia Governorate, Egypt; case–control study

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**Introducion:** Type 1 diabetes results from an interaction of genetic and environmental factors that triggers the autoimmune destruction of insulin-producing pancreatic beta-cells. Discovering those genetic and environmental risk factors and determining how they interact to cause disease are key steps toward being able to identify individuals who areat risk for T1DM and accurately assess their specific level of risk.
**The aim of the work:** was to determine the environmental risk factors of type 1 diabetes mellitus among children in Minia governorate.
**Subjects and Methods:** Our study was carried out on 220 child aged from 2–16 years old were classified into 110 diabetic patients and 110 control group, age and sex matched.A special questionnaire was designed for the purpose of the study.It included:Through history taking ( present history, family history ,perinatal , natal and postnatal history, feeding history , vaccination history and history of early childhood illness).Full clinical examination.
**Results:** The results of this study showed that there were many environmental factors which play a very important role in precipitation of T1DM among children, those factors are ; maternal factors such as ; age,gestational diabetes and patient´s factors such as early neonatal illness(RDS and prematurity), short duration of breast feeding, early introduction of cow milk and gluten, lack of vitamin D supplementation, early childhood viral infection especially mumps and allergies.
**Conclusion:** Exposure to environmental risk factors in genetically predisposed persons during pregnancy, neonatal period and early childhood are thought to play an important role in triggering the immune process leading to the development of T1DM.

## P202

### Clinical characteristics and mortality rate in pediatric diabetic ketoacidosis

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**Objectives:** Diabetic ketoacidosis (DKA) is a serious complication of acute pediatric type 1 diabetes mellitus (T1DM). This study aimed to determine the risk factors and clinical aspects of DKA.
**Methods:** Children hospitalized for DKA between January 2004 and December 2014 were included. Cases were classified as mild, moderate, or severe according to clinical and laboratory results collected during that time period. Statistical significance was defined as $P < 0.05$.
**Results:** Fifty-nine DKA cases (pH ≤ 7.3) were confirmed in 43 patients. The average age was 11.98 ± 4.40 years (range, 1.3-19.9 years). Thirty-one patients had previously experienced DKA. DKA was most frequent in moderate cases (21 cases, 35.6%), followed by severe (19 cases, 32.2%) and mild cases (19 cases, 32.2%). Clinical manifestation did not differ; however, severe cases exhibited more aggravated metabolism such as hyperglycemia, elevated corrected serum sodium, and effective serum osmolality. Female patients experienced severe and moderate cases more frequently ($P = 0.041$). Hemoglobin A1c levels did not differ between initial and recurrent cases. Two female patients (11.2 and 13.4 years) died with symptoms of brain edema. The mortality rate was 3.39% (2/59). Only blood sugar level differed significantly between surviving and non-surviving cases ($P = 0.022$).
**Conclusion:** In this study, no statistically significant differences were identified between surviving and non-surviving cases other than blood sugar levels. However, female patients should be carefully diagnosed and treated. Proper blood sugar level maintenance and continuous education are needed, especially in summer, even for previously diagnosed and insulin-treated T1DM patients.

## P203

### Hospitalization risk in children and adolescents with or without type 1 diabetes from Germany: an analysis of statutory health insurance data on 12 million subjects

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**Objective:** To compare the hospital admission risk in children and adolescents with type 1 diabetes (T1D) with that of the general pediatric population from Germany.
**Methods:** Data were provided by the German information system for health care data which contains information on all patients with a statutory health insurance (DaTraV/DIMDI). Data from the year 2011 were used. Children and adolescents (0- ≤ 19 years of age; n = 12,030,242) were included in this analysis. To identify subjects with T1D, the ICD-coded diagnosis from the inpatient and outpatient sectors, and insulin use based on ATC-code were applied. Demographic characteristics were compared between subjects with (n = 26,444) or without T1D (12,003,798). Unadjusted odds ratios (OR) with 95% confidence interval (95%-CI) were used to compare the hospitalization risk for patients with or without T1D. The study population was stratified by age-groups (0- ≤ 5; >5- ≤10; >10- ≤15, and >15- ≤ 19 years). A p-value < 0.01 was considered significant. Data processing and statistics were implemented with SQL.
**Results:** The mean age (± SD) of the general pediatric population was lower compared to that of children with T1D (10.4 ± 5.5 vs. 13.2 ± 4.3; p < 0.0001). Slightly more girls were documented in children without T1D (48.7% vs. 47.3%; p < 0.0001). In all age-groups, the hospitalization risk in children and adolescents with T1D was higher compared to that of their counterparts. The highest risk was observed in >5- ≤ 10 year olds (OR 8.1; 95%-CI: 7.7 to 8.5), followed by patients >10- ≤ 15 (OR 7.4; 95%-CI: 7.1 to 7.7) and patients ≤5 years of age (OR 5.3; 95%-CI: 4.8 to 5.7). Compared to the general pediatric population, the lowest risk was indicated in patients >15- ≤ 19 years of age (OR 4.0; 95%-CI: 3.9 to 4.2).
**Conclusions:** Children and adolescents with T1D from Germany had a 4 to 8 times higher hospitalization risk compared to the general pediatric population. High rates of elective hospital admission may contribute to these results.

## P204
## Management of childhood diabetes in Morocco: descriptive study of the current situation in public centers

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**Objectives:** Childhood diabetes represents a public health issue in Morocco, with an estimated 15 000 patients. In 2013, Ministry of Health (MoH) signed a partnership with Sanofi to create dedicated centers and to model its care management. First step was to evaluate the current situation in public centers.
**Methods:** This was an observational, multi-centric, cross-sectional study conducted in 2014. The steering committee, composed of T1D medical experts, epidemiologists and representatives of public health departments, validated a standardized questionnaire including: Management Care, Human Resources, Medicines and Education, Information System. The study was implemented in 30 centers including 3 university hospitals, representing 11 regions of the Kingdom (70%). A descriptive analysis was performed using *Epi info 3.5.3*.
**Results:** 4140 patients were monitored in the 30 centers. 87% of them were treated in University Hospitals. In these 3 centers, 90% of patients were under 18 years old. In the other centers, 85% of the patients were over 18. In terms of human resources, only 3 centers have a multidisciplinary team with pediatrician, nurse and dietician. Teams don't receive regular trainings.

80% of used insulin used are human insulins in vials delivered by the MoH.

Educational sessions are organized in 85% of the structures; only 31% of them have a dedicated education room. 68% of the centers have no standardized diabetes educational program.

All have a data base, but only 50% of them generate data analysis, mainly due to a lack of human resources and/or a lack of training.
**Conclusion:** There is clearly a need to improve staff training, and implement standardized treatment regimen and education program. MoH and steering committee have decided to initiate a standardized program for childhood diabetes with the support of Sanofi. A training program for health care professionals and patient education tools will be implemented in three pilot centers between 2016 and 2017.

## P205
## A study of type 1 diabetes mellitus from South India

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**Objective:** Diabetes in children is increasing and data is sparse and resources are poor in many parts of the country. The aim of this study is to describe the clinical profile and follow up of Type 1 Diabetes in young attending the Diabetic Child Society over the last 1.5 years.
**Material and Methods:** The diabetic child society aims to support needy children with diabetes and improve health care of diabetes in the young. A total of 218 subjects with diabetes onset below the age of 25 years are enrolled and screened for glycemic control, complications , comorbidities and self managment issues are addressed.
**Results:** Males (100) and females (118) with mean age of 17.5 years and mean duration of diabetes of 7.2 year are the subjects of the study. 16% had A1c < 7.5%, 46% had A1c between 7.5 -9% and 38% had A1c >9%.Ocular complications were seen in 12% and include NPDR , PDR , Cataract , Glaucoma and Optic atrophy . .Diabetic Kidney Disease (DKD) is seen in 9%of the subjects. Ocular and renal complications are associated with long duration of diabetes and higher A1c. Episodes of Diabetic Ketoacidosis (DKA) are seen in 7% and Mortality is 1.8%.

The co-morbidities are: Hypothyroidism (12%), Epilepsy (2.3%), PCOS (2.3%). Syndromes are: DIDMOAD (5), Down's syndrome (1), Turner's syndrome (1), SHORT (2). 10% have family history of Type 1 diabetes among siblings. Frequency of SMBG revealed that only 58% monitor regularly and barriers to insulin therapy exist.
**Conclusion:** The diabetic child society aims to support improve health care of Type 1 diabetes in young. The higher A1c, complications and frequent hospitalizations are due to non-adherence to therapy due to lack of awareness,, low socioeconomic status, illiteracy, lack of parental and psychosocial support. SMBG iand insulin are underused despite free supply. The society is endeavouring to address these issues and being nascent still would take time to reach optimum goals and hopes to attain in future.

## P206
## A study of insulin injection practices among patients attending OPD of a tertiary care hospital in Davangere, Karnataka, India

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**Objectives:** 1. To assess practices concerning insulin-injection among patients taking insulin

2. To identify the correlates of each incorrect insulin injection practice among patients taking insulin

**Methods:**
**Source of data:** As majority of diabetes patients get treatment in the medicine OPDs, this will be the source of collecting data. Permission will be obtained from the Medical Director to carry out this study in the OPD
**Sampling procedure:** As the proportion of patients incorrectly adopting various components of insulin injection practice varies across studies, an estimated proportion of 50% is adopted for the purpose of calculating the highest required sample size. With a power of 80% and 95% confidence interval and considering an absolute precision of 10%, the sample size comes to 96. Considering a non-response rate of 10%, it is calculated to be 106.
**Study subjects:** Type-1 or Type-2 diabetes patients on insulin therapy
**Study design:** A cross sectional descriptive study.
**Study period:** 2months between 1-08-2015 to 30-09-2015
**Statistical analysis:** Descriptive analysis of the data will be done using means, proportions and percentages. The association between variables of interest will be done using both bivariate (Chi-square and Fisher exact test) and multivariate tests.
**Results:** Nearly 3% of patients reported always injecting into lipohypertrophic lesions and 26% inject into them sometimes. Of the 65% of patients using cloudy insulins , 35% did not remix it before use.
**Conclusions:** Correct choice of type of insulin, dose and adherence to insulin treatment is known to control blood sugars effectively, correct injection practices is equally effective in the control of hyperglycemia. As patients under insulin therapy are required to take repeated injections, the techniques that patients adopt for storing, mixing and injecting this drug, play an important role in patient's response to insulin therapy, if done wrongly are known to be associated with a poor glycemic control.

## P207
## Complication spectrum of DKA seen in a pediatric intensive care unit in a developing country

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**Background:** Diabetic ketoacidosis (DKA) remains one of the most common endocrinological emergencies. Limited data is available on the spectrum of acute complications of DKA in children from developing countries.

**Objective:** To describe spectrum of acute complications and outcome of children admitted in the Pediatric Intensive Care Unit (PICU) with DKA.
**Methods:** Retrospective review of the medical records of all children admitted with the diagnosis of DKA in our PICU from January 2010 to August 2015 was done. Data was collected on a structured proforma and descriptive statistics were applied.
**Results:** Total 37 children were admitted with complicated DKA (1.9% of total PICU admission). There was an increase in admissions with complicated DKA from 1.8% in 2010 to 3.4% in 2015. Mean age was 8.1 $\pm$ 4.6 years and 70% were females (26/37). Mean Prism III score was 9.4 $\pm$ 6, mean GCS on presentation was 11 $\pm$ 3.8 and mean low pH was 7.00 $\pm$ 0.15. 13/37 children (35%) needed inotropic support, 11/37 (30%) required mechanical ventilation while only 1 patient required renal replacement therapy. 2 patients (5.4 %) died during their PICU stay.
**Conclusions:** Cerebral edema, shock and AKI with electrolyte abnormalities are the most common complications of DKA in children.

**Keywords:** Children, severe DKA, complications, PICU

## P208
## Introduction of an intensive outpatient education programme is acceptable to parents of children, and young people with newly diagnosed type 1 diabetes

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**Objectives:** Many successful European centres provide intensive education as 2 week inpatient admissions for newly diagnosed type 1 diabetes. Prolonged inpatient stay is resource intensive and disrupts the family unit. Our centre aimed to determine the feasibility of delivering an intensive education programme in an ambulatory care setting.
**Methods:** The curriculum, introduced in October 2013, comprised 20 hours face to face education by paediatric diabetes nurses, doctors, dietitians, psychologist and social/family support worker (SW/FSW) over 6 weeks. Sessions were scheduled around lunch. Home or diabetes unit visits were provided, as required, for injection support. Families with children diagnosed between October 2014 and November 2015 were provided with an anonymous questionnaire to evaluate programme satisfaction and highlight challenges.
**Results:** There were 54 newly diagnosed in the study period, all of whom participated in the programme. Overall programme attendance rates were high (91%). Questionnaires were completed by 14 (26%) families. 11(79%) were completed by a parent (1 with interpreter). 92-100% of families agreed or strongly agreed sessions delivered by PDSN, Drs or Dietitians were helpful. Sessions rated ambivalent by 17-38% were SW/FSW or psychology delivered sessions, complications and hyperglycaemia. Families report they could attend and reschedule appointments as required. One family reported appointment times caused difficulty collecting siblings from school. One family raised parking issues. One found the course provided more information than they could manage, others found the pace appropriate.
**Conclusion:** An intensive education programme can be successfully delivered on an ambulatory basis, despite barriers of inner city location, limited parking and a population comprising high prevalence of low socioeconomic status and ethnic minorities. Strategies to address issues highlighted by families are in place to improve accessibility to all.

# Poster Tour 27: President's Choice

## P209
## Telemedicine for care of youth with type 1 diabetes: two year follow up

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**Objective:** In the western United States, patients with type 1 diabetes (T1D) living in rural areas may have limited access to pediatric endocrinologists. Our clinic has provided clinical care for youth with T1D distant from our center using telemedicine since 2012. In this study, we examined 2-year follow up data to examine changes in hemoglobin A1c (A1c) with use of telemedicine.
**Methods:** Telemedicine clinics include pediatric endocrinologists in Aurora, Colorado, USA videoconferencing with patients at hospital diabetes centers in Casper and Cheyenne, Wyoming, USA (172 and 454 km from the clinic). We analyzed data from 26 pediatric T1D patients with at least 2 years (≥22 months) of follow up after initial use of telemedicine for diabetes care.
**Results:** Pediatric T1D patients seen at telemedicine sites in Casper (50%) and Cheyenne (50%), Wyoming were 77% male, had mean age 11.1 ± 4.0 years and T1D duration 4.6 ± 3.8 years at the initial telemedicine visit. Of the 26 patients with 2-year follow up, 50% were on insulin pumps at baseline. Mean A1c did not change from initial telemedicine visit (A1c 9.2 ± 1.5%) to the 2 year follow up visit (A1c 9.3 ± 1.6%, p = 0.75). However, glycemic control varied greatly in this cohort (A1c range 7.1-13.7% at 2-yr follow up) with most patients (92%) not achieving A1c targets (<7.5% per ISPAD guidelines). More than half (54%) had no increase in A1c at follow up. Change in A1c over the 2-year time period was not significantly associated with age, T1D duration or insulin pump use but was inversely correlated to A1c when starting telemedicine (r = −0.40, p = 0.04).
**Conclusions:** Telemedicine provides increased access to subspecialist diabetes care for pediatric T1D patients while maintaining glycemic control for most and lowering A1c for those with higher A1c levels at baseline. Further evaluation is needed to determine the effects of clinical care utilizing telemedicine on long term glycemic control in pediatric T1D patients.

## P210
## Flash glucose monitoring improves perception and frequency of glucose monitoring leading to improved glucose control

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**Objectives:** The purpose of our study was to evaluate attitude to flash glucose monitoring (FGM), the pattern of glucose monitoring and glycemic control among children with type 1 diabetes.
**Methods:** The study included 37 patients (21 boys,16 girls, age 7–18) from the pediatric outpatient clinic at Hallands Hospital Kungsbacka, Sweden, January 1, 2015-April 31, 2016. 18 patients used insulin pump. Each patient had a startup visit, and two follow-up visits. The glucose measuring frequency, average glucose value, glucose variability and frequency of hypoglycemia over the last 14 days were registered during each visit. HbA1c was measured at first and last visit. The patients valued their experience of glucose measurements and their ability to achieve a good glycemic control during each visit, and motivated any continued FGM use during the last visit (1–3 months after FGM start). Statistical analyses with Wilcoxon signed rank tests were performed.
**Results:** Patients (n = 13) with HbA1c > =58 at start of follow-up showed a statistically significant improvement in HbA1c between visit 1 (median 64, mean 70) and visit 3 (median 59, mean 63) (p = 0.006). Glucose measuring frequency increased statistically significantly between visit 1 (median 5.0, mean 7.2), and 3 (median 11.5, mean 12.6) (p < 0.001). The self-perceived experience of glucose measurements improved statistically significantly between visit 1 (median 5.1, mean 5.2), and 3 (median 9.1, mean 9.0)(p < 0.001). Also the self-perceived ability to achieve a good glycemic control improved between visit 1 (median 5.2, mean 5.2), and 3 (median 7.9, mean 7.9)(p < 0.001).
**Conclusions:** Children with typ 1 diabetes who used the FGM system could improve their HbA1c levels, this was most evident among children that started with a higher HbA1c. All children increased their glucose measuring frequency, reported an improved self-perceived experience of glucose measurements and had a positive attitude to FGM.

## P211
## Time for prandial insulin injections in children and adolescents with diabetes mellitus type 1: real life practice

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**Aim:** Guidelines recommend injecting prandial insulins pre-meal. However, pre-meal injections can be perceived inconvenient due to the variable appetite or lifestyle. The objective of survey was to assess the timing of injection of prandial insulin in real patient practice.
**Design and Methods:** 536 caregivers of children and adolescents with diabetes mellitus type 1 (T1D) were interviewed face to face in 18 Russian cities.
**Results:** 25% percent of patients inject prandial insulin post-meal more than 5 times a week (group 1). Appetite in general, including dosing insulin based on actual food intake is the primary motivation. Median declared timing of injection is 15 min after the start of the meal. Another 24,3% of patients inject post-meal 1–4 times a week (group 2). While appetite and timing uncertainty of the meal intake play a significant role, the primary factor for injecting post-meal is a low pre-meal glucose level. Finally, 50,7% always inject pre-meal (group 3), strictly following doctors' advice. There was no significant difference in mean HbA1c between groups, respectively 8,4/8,1/8,4% (group 1 / 2 / 3). About 28% from group 1 had severe hypoglycemia or coma in anamnesis (p<0,05 vs 10%- group 2; 12%-group 3), what can explain post-meal injections. Also in group 1 the frequency of measurements of glucose level during the day was higher than in other groups, that could be a result of experienced hypoglycemia in the past.
**Conclusion:** A quarter of patients with T1D in the pediatric environment regularly injects prandial insulins post-meal, mostly due the willingness to dose insulin based on actual food intake rather than dose insulin based on expected meals. This underpins a need for more practical patient education taking into account their practical situations as well as prandial insulins with faster onset of action.

## P212
## mHealth in management of type 1 diabetes: a systematic review of the published clinical trials (METTLE)

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**Objectives:** We evaluated the evidence based perspectives for the utility of mHealth technology to address the challenges for the management of T1DM.
**Methodology:** We conducted a systematic review of the clinical trials evaluating impact of mHealth technologies for the outcomes in T1DM, across the pubmed and Cochrane library by using specific MeSH, boolean operators Type 1 Diabetes AND mHealth, Apps, Adolescent, sensor, wearable, telemed, technology NOT type 2 Diabetes, conducted for a minimum period of one month.
**Results:** Cumulatively, 1367 pts were evaluated in 20 clinical trials, mean no of patients 68 ± 50, Min 10 Max 180 (95% CI 45, 92) ($p < 0.0001$). Mean duration of trial 25.6 weeks ± 14.27 (95% CI 18.92, 32.28) ($p < 0.0001$). Cumulative duration was 512 weeks, (Min 1 month- Max 1 year) Diverse evidence has evolved over 15 years, with 11 publications in initial 10 years, 9 in last 5 years (2011–2015). The established technologies utilised for evaluation include Dexcom G4™ PLATINUM CGM, mySentry system (Medtronic Inc.), sensor for physical activity integrated into a mobile phone (DiaTrace), web based tool to support the diabetes care Glucobeeb (Gb), VIE-DIAB, telemedical support program.
**Conclusions:** The systematic review evidence indicates slow evolution of the technological interface from simple telehealth models to the latest complex enablers being the mobile apps and sensor wearable technology based interventions. There is an urgent need to evaluate in trial, connected technologies including smartphone, sensors and wearable technologies to enable an evidence based evolving digital ecosystem that would be primarily data driven and link patients and care givers to enable precise and frequent management. We propose to evaluate in future trials one or more outcomes evaluated by the mHealth systems as a 3 C model- Classical (HbA1c and Glycaemic change), Critical (nocturnal hypoglycaemia) and Care centric (quality of life, adjustment of insulin dosage, behavioural health).

## P213
## Effectiveness of SmartGuard technology in prevention of nocturnal hypoglycemia after prolonged physical activity

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**Objectives:** Preventing nocturnal hypoglycaemia after prolonged physical activity using sensor-augmented pump therapy (SAP) with predictive low-glucose management (PLGM) has not been well studied. We conducted a paediatric diabetes camp study to determine whether SAP with PLGM could reduce the frequency of nocturnal hypoglycaemia after prolonged physical activity more effectively than SAP together with a carbohydrate intake algorithm.
**Method:** During a week´s sport camp, 20 children (11.7 ± 2 years old) with T1D were managed by SAP therapy, 7 with and 13 without PLGM. The settings of CGM/PLGM were customised but standard across the group. A carbohydrate intake algorithm was used, with both glycaemia level and trend as inputs. The incidence, severity, duration of hypoglycaemia and carbohydrate intake according to our algorithm were documented and compared.
**Results:** The PLGM system was activated in 74% of nights (1.24 times per night on average). No difference was found between SAP and PLGM groups in mean overnight glucose curves and mean morning glucose (7.9 ± 3 vs. 7.5 ± 3 mmol/l). The SAP group consumed significantly more carbohydrates for hypoglycaemia prevention and treatment, 10 ± 8 gS and 3.5 ± 0 gS ($P < 0.0001$) for SAP and SAP-PLGM respectively. There was no difference in the severity of hypoglycaemia; however the SAP group spent significantly longer time in hypoglycaemia (64 ± 25 min vs 38 ± 13 min, $P < 0.05$). We observed different peak periods for hypoglycaemia during nights (10 to 12 PM in PLGM group, 3 to 7 AM in SAP group, $P < 0.05$).
**Conclusion:** With PLGM, euglycaemia after prolonged physical activity was largely maintained with minimal carbohydrate intake.

## P214
## Soluble lectin-like oxidized low density lipoprotein receptor-1 as a biochemical marker for diabetic vasculopathy in type 1 diabetes mellitus

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**Background:** Oxidized low-density lipoprotein (OxLDL) acts through the interaction with lectin-like OxLDL receptor-1 (LOX-1), expressed differentially on the surface of the cells of the arterial wall and inflammatory circulating cells involved in the atherosclerotic process and endothelial dysfunction.
**Aim:** We assessed serum soluble LOX-1 (sLOX-1) in children and adolescents with type 1 diabetes mellitus as a potential marker for diabetic vascular complications in relation to glycemic control, inflammation and carotid intima media thickness (CIMT).
**Methods:** Eighty patients with type 1 diabetes were divided into 2 groups according to the presence of micro-vascular complications and compared with 40 healthy controls. High-sensitivity C-reactive protein (hs-CRP), hemoglobin A1c (HbA1c), urinary albumin creatinine ratio (UACR), serum sLOX-1 levels. CIMT was assessed using Doppler ultrasound scanner.
**Results:** CIMT and serum sLOX-1 levels were significantly increased in patients compared with controls and in patients with micro-vascular complications compared with those without ($p < 0.001$). Serum sLOX-1 was higher in patients with microalbuminuria than normoalbuminuric group ($p < 0.001$) and in patients with peripheral neuropathy than those without. The cutoff value of serum sLOX-1 at 125 pg/mL could differentiate patients with and without micro-vascular complications with a sensitivity of 82.1% and specificity of 100%. Multiple regression linear analysis showed that HbA1c, hs-CRP and CIMT were independently related to sLOX-1 levels in type 1 diabetic patients. Logistic regression analysis showed that HbA1c, total cholesterol, UACR, hs-CRP, CIMT and sLOX-1 are independently related to the presence of micro-vascular complications.
**Conclusion:** sLOX-1 could be a reliable biomarker for microvascular complications in type 1 diabetes. The relation between sLOX-1 and CIMT reflects a state of subclinical atherosclerosis and a link between diabetic micro- and macroangiopathy.

## P215
## Obesity and body mass index standard deviation score in children with type 1 diabetes in the Nordic countries

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**Objectives:** Intensified insulin therapy to optimize metabolic control reduces risk of late complications as retinopathy, nephropathy and neuropathy. However, intensive insulin therapy may increase body mass index, which in itself is a risk factor for micro- and macrovascular complications. The objectives of the study were to describe the prevalence of obesity in children with T1D in the Nordic countries, Denmark, Iceland, Norway and Sweden, and to report possible differences in body mass index standard deviation score (BMISDS) between the countries. Furthermore, to uncover possible predictors for the increased BMISDS in children with T1D.
**Methods:** The study population consisted of all children less than 15 years, with a T1D duration of more than one year and registered in the national childhood diabetes databases in the Nordic countries in the year 2012. Data completeness was almost 100%. The Swedish population-based longitudinal values from birth to 18 years of age for height and weight were used as reference for calculating BMISDS.
**Results:** There were 7212 (48% females) children included in the study. Mean (SD) age was 10.0(2.3) years and mean diabetes duration was 4.0(3.1) years. The percentages of children with obesity defined as a BMIDS ≥ 1.645 (≥95$^{th}$ percentile) were increased and different between countries 14–31 % ($P < 0.01$), lowest in Denmark and highest in Iceland. Mean BMISDS was above the mean of the reference population in all four countries, Denmark: 0.6, Iceland: 0.99, Norway: 0.71, Sweden: 0.66 ($P < 0.01$). The prevalence of obesity was higher in boys than girls ($P < 0.01$).
**Conclusion:** The average BMI in children with T1D in the Nordic countries is above the mean of the reference population with regional differences. The high prevalence of obesity in the Nordic childhood T1D populations is worrying, and in the future weight should also be a focus area in diabetes care in children.

P216

## Prevalence of cardiovascular risk factors in adolescents and young adults with type 1 diabetes and comorbid autoimmune disease in comparison to T1DM patients with early vascular complications

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**Objectives:** Cardiovascular disease (CVD), frequent and fatal complication in the course of type diabetes mellitus (T1DM) has autoimmune origin. Some autoimmune diseases, like rheumatoid arthritis, celiac or Hashimoto diseases were found to be associated with increased CVD risk. The possible association between T1DM comorbid with other autoimmune disease and CV risk has not been studied. The aim of the study was to assess the level and prevalence of classical cardiovascular risk factors in adolescents and young adults with T1DM with comorbid Hashimoto (H) or celiac (C) disease and to compare with T1DM without any additional diseases and with T1DM with early microvascular complications (MC).
**Methods:** Ninety T1DM patients, aged mean 17 yrs (10–27 yrs), with at least 5 yrs of the disease history (30 with only diabetes, 20 with H, 20 with C and 20 with MC) were studied. We assessed weight, BMI, blood pressure, lipids, metabolic control (last $HbA_1c$ and mean from the whole disease duration) together with prevalence of overweight/obesity (OB), hypertension (HT), lipid abnormalities (LA) and suboptimal metabolic control (SMC).
**Results:** The frequency of OB was 33% in the whole T1DM group, with the 50% in the H ($Chi^2 = 3.8$, $p < 0.05$) and 40% in the MC group. HT occurred in 45% in whole T1DM, with 75% in MC ($Chi^2 = 9.7$, $p = 0.01$). Lipid abnormalities were present in 34% of all studied, with 45% in the MC group. $HbA_1c > 7.5\%$ was present 80% in the whole group, with 90% ($Chi^2 = 5.3$, $p = 0.02$) in H, and 100% ($Chi^2 = 10.5$, $p = 0.001$) in MC group.
**Conclusions:** Young T1DM with Hashimoto disease occur to have increased prevalence of CVD risk factors. Celiac disease presents with the lower frequence of additional CVD abnormalities. The group with recognized MC appeared to have the most adverse CVD factor profile.

# ePoster session

## P217
## Diabetes and paramyotonia congenita: previously unreported clinical association?

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**Background:** Paramyotonia congenita (PMC) is an uncommon, autosomal dominant disorder, caused by mutations in the sodium-channels (SCN4A) that affects the skeletal muscle cells. PMC begins in infancy with sustained muscle stiffness mainly in the face, neck and limbs. Type 1 diabetes (T1D) is the most common type of diabetes in adolescence. Type 2 diabetes (T2D), Monogenic Diabetes and secondary forms rarely occur. In the literature there is no report about the association of these diseases.
**Case:** 15-year-old male, with 1-month evolution of polyuria and polydipsia. It was made a presumptive diagnosis of T1D: glucose 286 mg/dL, HbA1c 9.7%, no ketosis or acidosis and negative autoimmunity. Multiple daily insulin injections therapy was started with low needs of fast-acting insulin.

Eight days later, the adolescent began with muscle stiffness, dysphagia and dysarthria. Examination showed myotonia and hypertonia of the limbs, face and neck. Creatine kinase and myoglobin were slightly elevated and electromyography revealed myotonic discharges.

He was the second child of non-consanguineous parents, born full term at vaginal delivery with a birth weight of 4160 g (90th percentile). Both grandmothers had T2D. His father was posteriorly diagnosed with PMC with known SCN4A gene mutation. His paternal aunt had an unknown form of myotonia. Thereafter a diagnosis of PMC was done in this adolescent.

One-year later, he kept requiring low doses of fast-acting insulin, the same dose of long-acting insulin and HbA1c 6.7%. We tried to suspend insulin but hyperglycemia recurred. At that time, insulin and c-peptide were normal. A short trial with glimepiride (2 mg/day) revealed no sustained response. Good metabolic control was achieved with long-acting insulin and metformin (HbA1c 6.5%).
**Discussion:** We question the association between PMC and diabetes (could it be a common disturbance in sodium-channels?). We also want to discuss the etiology of this type of diabetes.

## P218
## Difficulties in therapy titration in a patient with type 1 diabetes mellitus and Addison disease

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**Introduction:** The association of type 1 diabetes (T1D), autoimmune thyroid disease and Addison disease, known as autoimmune poliglandular syndrome type 2 (APS type 2), rarely starts in childhood and adolescence. The development of adrenal insufficiency often presents a diagnostic problem; but sometimes difficulties in titration of T1D therapy persist after the diagnosis of APS type 2 is confirmed.
**Case report:** our patient was diagnosed with T1D at the age of 6.5 y (2003), initially in a severe DKA. The metabolic control of the disease was permanently poor and resulted in 5episodes of severe DKA. In 2006 she developed chronic lymphocytic thyroiditis and in 2010 substitution therapy with L-tyroxin was started. In December 2014, at the age of 17y and 6 mo, she came to the Outpatient Clinic with clasical symptoms of adrenal insufficiency that was confirmed with lab tests(ACTH 195.7pmol/L, plasma cortisol < 8 nmol/l, PRA 303 ng/L, aldosterone < 2 pmol/l). Substitution therapy with hydrocortisone and fludrocortisone was started. After 6 mo insulin therapy was continued via SCII but frequent hypoglycemias and high level of ACTH (316,4pmol/l) persisted. CGMS and simultaneous measurments of plasma cortisol levels every 2-4 h during 24 h revealed decreased levels of plasma cortisol at least 2 h before next hydrocortisone dose and were consistent with the time of frequent hypoglycemias as a result of a shorter hydrocortisone activity. Thereupon hydrocortisone replacement therapy was applied every 6 hours to better mimic the physiological daily cortisol profile. The aim was to reduce the number of hypoglycaemias and the oscillations of blood sugar levels.
**Conclusion:** Frequent hypoglycemias in a patient with T1D should rise the suspicion of a developing adrenal insufficiency. When the diagnosis is made, hydrocortisone therapy implementation can be compromised by the noncompliance of the patient but also different responses to the treatment that is especially present in adolescence.

## P219
## Influence of simple obesity on respiratory disorders in children

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**Objectives:** In recent years, obesity has become the leading health problem worldwide, overtaking AIDS and malnutrition. Similarly, asthma appears one of the dominating diseases in child population of developed countries. Numerous observations show that obese children more often suffer respiratory disorders, with sleep apnoea syndrome among them. However, characteristics of obesity influence on respiratory disorders is not well known. The aim of the study is evaluation of influence of simple obesity on selected parameters of specific types of respiratory disorders (obturation, restriction, sleep apnoea).
**Material and Methods:** Investigated group consisted of 30 patients with simple obesity. There were 20 girls of mean age of 14.33 years and 10 boys of mean age of 14.05 years. Mean body weight was 86.3 kg (68–107) and 87.5 kg (65–135), respectively.

We evaluated the effect of occurence and grade of simple obesity on type and intensity of respiratory sleep disorders, estimated by polysomnography, and on selected spirometric parameters (FEV1, FVC, FEV1/FVC, MEF50).
**Results:** Mean number of apnoea per sleep hour (apnoea index - AI), was 8.32 $\pm$ 9.69 in whole group, 8.98 $\pm$ 11.73 in girls and 6,99 $\pm$ 2 in boys. Mean number of hypopnoea per sleep hour (hypopnoea index - HI) was 5.95 $\pm$ 4.59, 5.87 $\pm$ 5.11 and 6.13 $\pm$ 3.31, respectively. Mean cumulative apnoea - hypopnoea index (AHI) was 14.27 $\pm$ 12.48 in entire group, 14.85 $\pm$ 15.11 in girls and 13.12 $\pm$ 2.86 in boys. We demonstrated that patients with greater BMI have higher AI, number of obturative apnoea and higher number and longer time of desaturation. There were no significant influence of obeesity on lungs function, measured by spirometric parameters (FEV1, FVC, FEV1/FVC, MEF50).
**Conclusions:** Simple obesity is linked with sleep apnoea syndrome in children, and greater obesity is connected with more severe respiratory disturbances. Simple obesity does not affect lung lungs function, measured by spirometric parameters.

## P220
## Type 1 diabetes and epilepsy: the role of GADA

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**Introduction:** Over the last years there has been an increasing interest in the potential association between type 1 diabetes mellitus (T1DM) and epilepsy.

The exact underlying mechanisms and cause-effect relationship are not well defined.

The possible mechanisms are: GAD-Abs, which have been associated in 80% of patients with new diagnosis of T1DM and in a large variety of neurologic conditions; metabolic conditions such as hypoglycemia, hyperglycemia and DKA, common problems in diabetic patients; genetic predisposition and the presence of brain lesions.

**Methods:** 775 T1DM patients followed by Diabetes Unit- Bambino Gesù Children's Hospital were enrolled in a retrospective study.

We evaluated age at diagnosis, duration of diabetes, daily insulin dose, metabolic control assessed by HbA1c, severe hypoglycemic episodes, titres of antiGADab, EEG abnormalities, antiepileptic drugs and relative drug resistance.

Exclusion criteria were duration of diabetes < 1 year, perinatal diseases, syndromes and brain lesions.

**Results:** A total of 31 patients (0,4%),18 female and 13 male, with the mean age of 6,2 years were affected by T1DM and epilepsy. The onset of diabetes preceded epilepsy in 30 patients.

23 patients presented focal epilepsy (temporal lobe epilepsy) and 8 presented generalized epilepsy 7 patients showed resistance to antiepileptic drugs.

No correlation could be demonstrated for duration of diabetes, mean daily insulin dose, metabolic control and HbA1 values.

Serum antiGADab titres was 7.5 ± 8,42 IU in T1DM patients without epilepsy; 15.4 ± 13 IU in T1DM and epilepsy patients, in drug resistance was 29 IU ± 19.

**Conclusion:** High titres of antiGADab are significantly associated to the development of epilepsy ($p < 0,01$) and ,antiepileptic drug resistance($p < 0,05$).

## P221

## Effect of serotonin modulating pharmacotherapies on Body Mass Index and dysglycaemia among children and adolescents: systematic review and network meta analysis

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**Introduction:** Currently there is limited consensus on the role of Serotonin-modulating medications (SMM) on weight gain and dysglycaemia among children with mental health diseases. We aimed to synthesize available evidence on the effects serotonin-modulating medications on body mass index (BMI), weight, and glycaemic control.

**Methods and analysis:** We conducted a systematic review and network meta-analysis (NMA) of randomized controlled trials (RCTs) evaluating the use of SMM in the treatment of children with mental health conditions, aged 2–17 years. The outcome measures are BMI($kg/m^2$, and z-score), weight, and dysglycaemia (prediabetes and diabetes). We performed literature searches through Ovid Medline, Ovid Embase, PsycINFO, and gray literature resources. Two reviewers independently screened titles and abstracts, assessed the eligibility using full texts, extracted information from eligible trials and assessed the risk of bias and quality of the evidence.

**Results:** We identified 949 study records, and included 62 RCTs that met the eligibility criteria, comparing Clozapine, Atomoxetine, Risperidone, Citalopram, Duloxetine, Amphetamine, Olanzapine, Ziprasidone, Aripiprazole, Quetiapine, Molindone, Venlafaxine, Paliperidone against Placebo or each other. The trials included patients who are 3-17years old and diagnosed with schizophrenia, schizo-affective disorder, Attention-deficit/hyperactivity disorder, depression, bipolar affective disorder, mania,Tourette syndrome, autism spectrum disorder, conduct disorders, or severe disruptive behaviour disorder. The treatment duration was 3–32 weeks. The NMA results (comparative safety) will be presented.

**Conclusions:** This NMA will be the first to assess SMM and their effects on weight and glycaemic control in pediatrics. We anticipate our results will help physicians and patients make more informed choices while considering the metabolic side effect profile.

PROSPERO registration:CRD42015024367.

## P222

## The importance of liver ultarsound scores in nonalcoholic fatty liver disease in Egyptian obese children and adolescent

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**Objective:** To assess the correlation between the liver ultrasound scores with degree of obesity and biochemical abnormalities in obese children and adolescent.

**Methods:** Forty obese children and adoloscent aged 5–18 years were enroled in the study. Lipid profile and liver function tests were done, Insulin resistance was calculated using Homeostasis model assessment (Homa-IR) and quantitative insulin sensitivity check index (QUICKI), Trans-abdominal ultrasonography (US) findings were scored according to Liver echotexture, Echo penetration and visibility of diaphragm and clarity of liver blood vessel structures, Scores ranged from 0 to 9 points. The child was considered to have mild, moderate and severe fatty liver change if the overall score was 1–3, 4–6 and 7–9 respectively.

**Results:** Fatty liver was detected in 67.5 % among obese children by US, There was a significant positive correlation between ultasound score with waist circumference (WC), triglycerides, HDL, ALT and fasting glucose.

**Conclusions:** The bedside US is a powerful and useful diagnostic tool in the detection of NAFLD. Measurements of WC is important as indicator of central adiposity and are practical tools to identify a subgroup of obese children at greater risk of NAFLD.

## P223

## Prevalence of celiac disease in a children group with type I diabetes

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**Objective:** Celiac disease is an immune-mediated systemic disorder that occurs in genetically predisposed individuals after exposure to gluten ingestion. The pathophysiology of the disease is well elicited by the direct sensitization of the small intestine to gluten, causing villous atrophy and resulting in various clinical presentations. Patients with Diabetes Mellitus type I (DM type I) have been considered at high-risk for developing celiac disease.

The purpose of our study was to determine the prevalence of celiac disease among children who are followed in our unit for DM type I. The diagnosis of celiac disease was made based on the new European recommendations (ESPGHAN 2012), that aim to simplify celiac diagnosis and consider patients with celiac disease when both, the serological (anti-transglutaminase and anti-endomysium) and the

genetic study (HLA DQ2 and/or DQ8) are positive, thus requiring less intestinal biopsies.
**Methods:** Epidemiologic descriptive study included 750 DM type I patients with age ranging from 11 months to 18 years old, followed in the period between June 2014 and June 2016. The patients were included in the study either at the time of DM type I diagnosis or during a follow up consultation.
**Results:** Celiac disease was confirmed in 28 out of 750 patients with DM type I based on the ESPGHAN recommendations, with a prevalence of 4%. If we consider the patients who required intestinal biopsies as positive for celiac disease, the prevalence can increase up to 4,7 %. We also found that patients with positive HLA DQ2 and/or DQ8 genes are 2,4 time more frequent (95%) compared to general population.
**Conclusion:** DM type 1 patients have an increased risk for celiac disease. Screening is recommended for all patients even if they appear asymptomatic. Importantly, in genetically predisposed patients (HLA DQ2/DQ8), repeated screening seems necessary.

## P224
## Precocious puberty in a boy with type 1 diabetes mellitus, hypothalamic teratoma, right forearam hypoplasia, carrier of galactosemia

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**Objectives:** Precocious Puberty (PP) is defined as pubescence before the age of 8 (girls) and 9 (boys) years. There are two main types: GnRH-dependent (called central or true), and GnRH-independent PP (peripheral, pseudo PP). In significant part of cases of central PP in boys, focal changes of the brain - tumors or developmental anomalies - are discovered. Patomechanism of the PP in these cases is unclear. It is considered that it can be effect of compression or other damage of neural pathway that inhibits GnRH-secreting neurons. Tumors localised in posterior hypothalamus or at the base of third ventricle, commonly causing PP, are hamartoma, germinoma and teratoma.
**Methods:** A case analysis.
**Results:** 10 years old boy, carrier of galactosemia with right forearm hypoplasia, suffering type 1 diabetes mellitus since the age of 8 years, treated with insulin pump, in whom since the age of 8 years and 8 months, symptoms of PP were observed - growth acceleration, acne, pubarche, testicles enlargement and distict smell of sweat. On the basis of steroid profile and LH-RH test, GnRH-depednded PP was diagnosed. Brain MRI revealed tumor in hypothalamus and pituitary stalk, appeared to be teratoma. There were no indications for surgery. In control MRI after 6 months, the image was as previous. Therapy with long-acting GnRH analogue was introduced. Child is in follow-up of our policlinic.
**Conclusions:** 1. Manifestation of PP symptoms in a child should be always thoroughly investigated.

2. In patients with true PP, one should quest for focal changes in central nervous system.

The change in glycemic profile and insulin use in child with T1DM can be one of the first signs of other diseases, including endocrine.

## P225
## The prevalence of celiac disease in patients with type 1 diabetes - assessment of the 3-year prospective study

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**Objectives:** Patients with type 1 diabetes (T1D) are at increased risk for developing celiac disease (CD). The aim of this study was to evaluate the prevalence of CD in children with T1D in a 3-year-long prospective study.
**Methods:** The study included 472 patients aged 8 months to 18 years (246 girls and 226 boys) who were patients of the Department of Endocrinology and Diabetology Children´s Memorial Health Institute in 2012–2014. In all the patients at the start of the study a serological screening of CD was performed, which included an assessment of concentration of antibodies against tissue transglutaminase (tTG-IgA) and/or deamidated gliadin peptides (IgG-DGP) - in case of a deficit of total IgA. Patients with positive antibodies underwent a biopsy of the small intestine to evaluate it histopathologically. CD was diagnosed in children with characteristic histological changes evaluated in a Marsh-Oberhuber scale as at least Marsh II.
**Results:** In the group of 472 children CD was diagnosed in 33 cases (6.7%), while in 8 cases, the CD was diagnosed before. Repeated serological tests during the period of 1–3 years were performed in 278 patients (58.9% of children included in the study). In all the patients with elevated levels of antibodies tTG-IgA or DPG-IgG CD was histologically confirmed. CD was more frequent in girls (n = 20, 8.13%) than in boys (n = 13, 5.75%). In the first phase of the study CD was diagnosed in 13 children (4.45%). Repeated serological tests detected CD in further 12 patients (4.3%): respectively after one year in 7, after 2 years in 2 and after 3 years in 3 patients.
**Conclusions:** It has been confirmed that patients with DMT1 are at higher risk for developing CD and should be regularly, optimally once a year, tested for CD using serological analysis (tTG-IgA and IgG-DPG). A longer observation of patients with DMT1 will determine how long should the screening be continued.

## P226
## Wolcott-Rallison syndrome (WRS) first case report in Pakistan

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**Case report:** 3 months old female infant presented to us with fever, vomiting and polyuria for one week duration. She is product of consanguineous marriage and seventh issue of first cousin parents. Her three siblings had history of diabetes diagnosed during infancy and all expired with complications of diabetes and severe infections. Her father was also diabetic. Our patient had developed respiratory distress and uncontrolled blood sugar. She had history of previous multiple admissions and work up at primary care center and tertiary care center where she was managed for fever and recurrent urinary tract infection. She is immunized up to date according to EPI. She was born by normal vaginal delivery and pregnancy was also uneventful. Birth weight was 3 kg. She was on mother feed. On examination, the patient was febrile, dehydrated and no dysmorphism. Her FOC 41 cm (−2SDS), Length 70 cm (−1.83SDS) and weight was 6.2 Kg (−4.2SDS). Systemic examination was unremarkable during admission and her blood sugar was persistently high with HbA1c 14.8%. Skeletal survey findings: both hands had few carpals bones which were small in size for age and irregular in shape. Coxa vera deformity was seen in pelvic x-ray. There was flattening of proximal metaphysis of right femur. Skull, spine and long bones appeared normal. Liver function test, renal function test and echocardiography were normal.
**Findings:** Both hands had few carpals bones which were small in size for age and irregular in shape. Coxa vera deformity was seen in pelvic x-ray. There was flattening of proximal metaphysis of right femur. Skull, spine long bones appeared normal.
**Conclusion:** The genetic etiology could be determined in cases of Neonatal Diabetes Mellitus, their genetic analysis for mutations should be sent in all cases.

## P227
## Prevalence of celiac disease in type 1 diabetes mellitus in children and adolescents attending diabetic clinic at National Institute of Child Health

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**Background:** The association of celiac disease and type 1 diabetes mellitus is known worldwide due to shared immunological background, since celiac disease could present in diabetic patients with Nonspecific symptoms or asymptomatically, periodic serological screening is necessary for early Diagnosis.
**Objectives:** To estimate the prevalence of celiac disease in children with type 1 Diabetes.
**Patients and Methods:** A total of 660 children with type 1 diabetes attending the National Institute of Child Health; 334 boys, 314 girls with mean age of 9.5 year $\pm$ 4.7 and mean duration of diabetes 3.5years $\pm$2.5, from Feb 2014 to May 2015. 233 children were screened for celiac disease tissue transglutaminase (tTG) antibodies IgA,IgG through Kit method in which cut off values were < 1.2. Anthropometry done, plotted on chart.
**Results:** Anti tissue transglutaminase antibody were positive in total 41 patients, more in girls 24 (60%) and boys 17 mean age in girls were 8.3 $\pm$ 3 mean age and boys were 6.6 $\pm$ 3, making the prevalence of celiac disease 17.59%, only 2 patient have serology value more than 100 times. The classical presentation of the disease was lacking in most patients, but they presented with abdominal distention, diarrhea short stature, rectal prolapse. In most cases Celiac disease was diagnosed within the first year of the diagnosis of diabetes.
**Conclusion:** Annual autoantibody screening is recommended, for early diagnosis and management of patients with diabetes type 1.
**Keywords:** Diabetes mellitus, celiac disease, anti-tissue transglutaminase

## P228
## Metabolic disorders, prediabetes and thyroid dysfunction in Belarusian children

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Possible role of thyroid subclinical dysfunction in development of metabolic disorders and development of prediabetes is discussed in clinical endocrinology during last years. Thyroid diseases are widespread in Belarus. Republic of Belarus belongs to European countries with predominantly light and moderate chronic iodine deficiency. The State Program of iodine prophylaxis with iodinated salt started 15 years ago. According to the results of screening in Brest and Minsk regions - the situation is changing. The median levels of iodine excretion in Stolin (Brest region) in 2002 yr were less 50.0 μg/L in school children, in Minsk region - less 100.0 μg/L. In 2015 yr. the median levels of iodine excretion in children of Brest region reached 105.5 μg/L, of Minsk - 145.6 μg/L. An analysis of the dietary questionnaire data showed that population during last 5 years are still not using iodinated salt. Levels of nitrate consumption (with food or drinking water) especially in rural regions are often exceeding recommended levels. Impact of different endocrine disruptors in genesis of thyroid and metabolic disorders is also highly possible.

The incidence of subclinical hypothyroidism and thyroid nodules is increasing in children and young adults during last 30 years. According to active screening in school children of Brest and Minsk regions during 2010–2015 yrs. subclinical and clinical hypothyroidism, metabolic syndrome and prediabetes, type 2 diabetes and thyroid nodules showed up to be not a rare disorder. Negative tendencies in the prevalence of subclinical hypothyroidism, association with overweight or obesity, metabolic disorders, prediabetes or type 2 diabetes in Belarusian children are impossible to explain only by non optimal iodine status or life style/nutrition habits. A restoration of active country wide monitoring programs is required to elucidate the etiology of widespread thyroid dysfunction and metabolic disorders in the aspect of endocrine disruptor influence.

## P229
## Autoimmune hepatitis in a boy with newly-diagnosed type 1 diabetes

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**Objectives:** Type 1 diabetes increases risk of other autoimmune diseases. Autoimmune hepatitis (AIH) is relatively seldom concomitant disease. It is estimated 0,1-1,9 AIH incidences per 100 thousand Caucasian habitants. The course varies from asymptomatic to very severe leading in a short time to liver failure. Untreated AIH leads to structural and functional damage, and finally to cirrhosis. The diagnosis is established on the basis of abnormal laboratory parameters (elevated levels of transaminases, GGT, gamma-globulin, IgG autoantibodies), finally confirmed by the typical infiltration of mononuclear cells and necrosis in liver biopsy. Patients with AIH are treated with steroids and azathioprine.

We describe a boy with diagnosed type 1 diabetes and AIH at the same time.
**Methods:** A 6-year old boy was admitted to hospital because of polydipsia, polyuria, weight loss, and hyperglycemia in laboratory studies. In a familiar interview father of the boy is suffering from multiple sclerosis. At admission, the patient was in a good general condition, slightly dehydrated. In laboratory scores hyperglycemia, glycosuria, elevated HbA1c, anti-GAD, decreased levels of c-peptide were noted. Subcutaneous functional insulin therapy was applied.

Due to hyper transaminasemia, additional tests were performed and elevated levels of GGT, IgG, gamma-globulin found. Infectious and toxic background, as well as nephrolithiasis bile duct were excluded. The boy was transferred to the hepatology clinic where based on the increased level of autoantibodies and liver biopsy diagnosed AIH and encorton and azatioprine treatment applied.
**Results:** Increased insulin requirements was noted over time of immunosuppressive therapy from 0,7 IU/kg/day to 1,5 IU /kg/ day, and the daily basal profile changed.
**Conclusion:** AIH can coexist with type 1 diabetes in children.

The use of immunosuppressive therapy containing steroid therapy increases insulin requirement and changes the daily basal profile.

## P230
## Challenges in the diagnosis of hypoglycemia: Hirata disease vs. factitious hypoglycemia

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**Objective:** Insulin autoimmune syndrome (IAS or Hirata Disease) is rare among children. Non-ketotic hyperinsulinemic hypoglycemia with the presence of insulin auto-antibody (IAA) is the condition to diagnose the syndrome. Our objective was to report clinical and laboratory characteristics of a patient diagnosed with IAS.
**Methods:** A 6-year-old boy started to present seizures since 7 months of age, which were treated with anticonvulsants until the age of five, when hypoglycemia was evidenced. During a hospital admission, the laboratory work-up revealed blood glucose and insulin levels of 21 mg/dL (1.16 mmol/L) and 34.7 μU/mL, respectively; other critical sample tests and abdominal MRI were normal. There was no improvement with diazoxide, somatostatin, hydrochlorothiazide and glucagon treatment. To rule out exogenous insulin administration, an inpatient investigation took place without his mother presence.

**Results:** At admission, a fasting blood glucose and insulin levels were 26 mg/dL (1.44 mmol/L) and 686.7 μU/mL, without any physical signs of insulin resistance. Extended OGTT were performed twice, with blood glucose levels ranging from 21 to 112 mg/dL (1.16-6.2 mmol/L), insulin levels from 407 to 1000 μU/mL and C-peptide levels from 1.5 to 5.2 ng/mL. Positive insulin antibody (IAA) > 500 U/ml and a negative plasma assay for sulfonylureas were obtained. The chromatography study demonstrated high molecular weight insulin, which means that almost all measured insulin was aggregated with the antibody. After IAS diagnosis was established, dietary and physical activity recommendations were prescribed and less hypoglycemic episodes were observed.
**Conclusions:** To exclude factitious hypoglycemia, four hospitalizations and the separation from the mother were required to prove that she was not injecting insulin inadvertently to her child and autoimmune hypoglycemia diagnosis was established due to the complementary laboratory work-up.

## P231
## Improving screening for celiac disease in patients with new-onset type 1 diabetes

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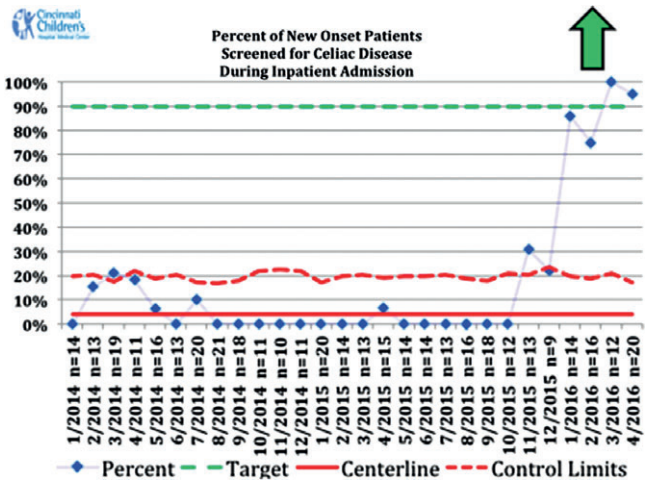
**Background:** The prevalence of celiac disease (CD) in those with Type 1 Diabetes (T1D) is 5 to 7 times greater than the general population. Variations in clinical practice exist regarding initiation and frequency of CD screening in T1D. Even if asymptomatic, undiagnosed CD is a risk for long-term health consequences.
**Objective:** Reliably identify CD among patients with T1D, starting at diagnosis.
**Methodology:** Informed by existing evidence, Quality Improvement (QI) methodology was used to develop consensus and implementation of a clinical care algorithm for CD screening at new onset T1D and surveillance of established patients. The algorithm was piloted and iterative tests performed to improve reliability. Selected care processes including % new onset T1D patients screened for CD are tracked.
**Results:** Following implementation of the algorithm in November 2015, 66 (78%) of 84 eligible patients were screened for CD at diagnosis of T1D. Three patients with abnormal TTG IgA levels ≥20 were identified and referred to gastroenterology. Screening for CD at diagnosis of T1D increased from a baseline of < 5% to >90% within the last 6 months.

*[Celiac screening at diagnosis of T1D]*




**Conclusion:** This study demonstrates successful adoption of a standard screening protocol for CD in patients with T1D which includes screening at diagnosis. Future plans include evaluation of the impact of screening for CD at the time of T1D diagnosis to advance evidence-based guidelines.

## P232
## Mammary status in adolescent girls with diabetes mellitus I (a cases history)

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The complications of diabetes mellitus type I (DMTI) are more common and more severe in patients who have poor-controlled blood sugar levels and associated with elevated levels of circulating fatty acids and hyperglycaemia.
**Objectives:** To study the mammary status, frequency and peculiarities of breasts diseases in adolescent girls with DMTI.
**Methods:** The study included 5 adolescent girls (aged 16–18 yrs) with DMTI with long poor-controlled blood sugar levels. Girls were subjected to the clinical examination, ultrasound examination of the breast. The nonparametric method of correlation analysis by Spirmen was studied.
**Results:** The investigation shows the indi-vidual level of HbAc% was >8% in all girls. Two girls had delayed physical and sex development and breast hypoplasia. The dysplasia of mammary glands (mastopathy) and cyclic mastalgia were diagnosed in all patients (rs = 1). In one adolescent girl was diagnosed cyst mastopathy, in four girls was diagnosed adenosis mastopathy.
**Conclusions:** This study has shown that breast disorders have been diagnosed in all adolescent girls with poor-controlled DMTI. Mammary status showed a positive correlation with HbAC1 levels. The DMTI in adolescents is indication for mammary observation.

## P233
## Necrobiosis lipoidica diabeticorum: a case report

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**Introduction:** Necrobiosis lipoidica diabeticorum (NLD) is a rare chronic granulomatous dermatitis. There are very few reported cases of NLD in children and adolescents. We report a case of a girl with NLD.
**Case report:** A 17-year old girl with type 1 diabetes presented with lesions on the lower extremities. She had type 1 diabetes since she was 9 years old. Microalbuminuria was detected 3 years ago. Her medical history was otherwise unremarkable. Until the age of 13 she maintained an adequate glucose control with HbA1c < 8%. Thereafter her glucose control progressively worsened with a HbA1c of 10%. Her physical examination revealed well-demarcated erytematous lesions of which central portions were yellow on both lower legs. We diagnosed NLD and consulted with a dermatologist. A skin biopsy was not performed, because the lesions were typically for NLD and topical tacrolimus treatment was given.
**Conclusions:** Diagnosis of NLD is mainly clinical as in our patient. It has been suggested that NLD is one of the possible manifestations of microangiopathy. Whether or not poor glucose control is associated with the development of NLD remains controversial. Differential diagnosis include erithema nodosum, lupus panniculitis, granuloma annulare, sarcoidosis and amiloidosis. Necribiosis lipoidica might also be a primary disease of collogen. Rarely , squamous cell carcinoma may develop in areas of necribiosis lipoidica.

## P234

## Acute sinus vein thrombosis as a complication of diabetic ketoacidosis in a pediatric patient with first manifestation of type 1 diabetes mellitus

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**Introduction:** The diabetic ketoacidosis (DKA) is the most common cause of death in children with type 1 diabetes mellitus and the all-cause mortality of the DKA is 0,15-0,33 %, mostly (57-87%) caused by brain edema. The occurrence of a cerebral sinus vein thrombosis (CSVT) in this situation is a rarity and the outcome of the patients depends on rapid diagnosis and treatment.
**Case description:** We report the case of a 13-year old boy with acute exacerbation of inflammatory bowel disease for which he underwent immunosuppressive therapy with prednisolone and a four-day antibiotic treatment. He developed acute somnolence, hyperglycaemia (blood glucose max. 575 mg/dl, 31,9 mmol/l) and moderate ketoacidosis (pH min. 7,20) in the course of this first type 1 diabetes manifestation (HbA1c 12,6%, 114,2 mmol/mol). Despite adequate therapy, clinical worsening towards Glasgow-Coma-Scale (GCS) 5 and recurrent focal and generalised seizures occured. A CT and MRI showed intracranial masses of unknown origin. Because of persisting seizures and increasing neurological deficits we performed a MRI this time including angiography, which thus revealed severe CSVT. In spite of these findings the patient was able to improve significantly with systemic heparinisation over the course of the following 3 weeks.
**Discussion:** CSVT in the context of a DKA is an extremely rare complication in pediatric patients and difficult to diagnose. In our case the manifestation of the type 1 diabetes occurred while he was treated for acute exacerbation of inflammatory bowel disease. Etiological DKA and persistent diarrhea caused a dehydration and intravascular exsiccosis and promoted the occurrence of a thrombosis. The presence of coagulopathy was excluded.
**Conclusion:** Although cerebral sinus vein thrombosis is a rare complication of a diabetic ketoacidosis, it must be considered in patients who do not respond to adequate treatment for brain edema. The outcome depends on rapid diagnosis and treatment.

## P235

## Events of severe hypoglycemia is associated with a progressive increase in hemoglobin A1c among children with type 1 diabetes - a study from the Danish Childhood Diabetes Registry

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**Objectives:** Fear of hypoglycaemia is associated with reduced quality of life and may have implications on life-style and/or diabetes regulatory behavior. The aim of this study was to investigate if severe hypoglycaemia is followed by a deterioration in metabolic control among children with type 1 diabetes.
**Methods:** A national population based study obtained from the Danish Childhood Diabetes Registry comprising data from 2010–15. Severe hypoglycemia was defined according to the 2014 ISPAD guidelines. A mixed model was applied and data were adjusted for age, gender, duration of diabetes and ethnicity.
**Results:** In the period 2010–15 the register comprised a total of 4,274 children (50.6 % boys). Mean (SD) age was 12.5 (4.0) years and duration of diabetes 5.42 (3.9) years. There were 629 (14.7%) children experiencing at least 1 severe event; 336 children experienced 1 event of severe hypoglycaemia, 148 had 2 events and 145 had ≥ 3 events. Mean hemoglobin A1c in those experiencing a hypoglycaemic event were 68.5 (13.8) mmol/mol whereas those who never experienced severe hypoglycaemia were 63.9 (15.0) mmol/mol. Hemoglobin A1c deteriorated progressively following 1, 2 and ≥ 3 events of severe hypoglycaemia by mean (SD) 1.29 (1.05); 2.04 (1.15) and 2.56 (0.97) mmol/mol ($p < 0.01$). There was an increase in pump users after a hypoglycemic event rising from 42% to above 60%.
**Conclusion:** Events of severe hypoglycemia is followed by a progressive increase in hemoglobin A1c among Danish children with type 1 diabetes.

## P236

## HbA1c levels at diagnosis of type 1 diabetes are related to age and to degree of ketoacidosis

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**Background and Objective:** The serum HbA1c level reflects the average measurement of the blood glucose levels during the preceding 2–3 months. Higher serum HbA1c levels at the diagnosis of type 1 diabetes (T1D) may represent delayed diagnosis. In the present study we evaluated whether the serum levels HbA1c levels at diagnosis of T1D were related to age and to the degree of ketoacidosis.
**Methods:** We retrospectively studied HbA1c, blood glucose and bicarbonate levels at diagnosis of 127 children (60 girls) consecutively diagnosed with T1D between January 1, 2005 and December 31, 2015. HbA1c was measured by ion exchange chromatography and plasma glucose by the glucose oxidase method. Degree of ketoacidosis was determined by serum bicarbonate level. Patients with bicarbonate < 15 mmol/l were diagnosed as having diabetic ketoacidosis. Patients were divided into 3 age groups: group 1: age 0.6 - 5.9 yrs (n = 28); group 2: age 6.0 - 11.9 yrs (n = 54), group 3: age 12.0 - 17.0 yrs (n = 45). Results are expressed as mean ± SD (range).
**Results:** The table compares biochemical data between the 3 age groups.

*[Biochemical data]*

30 patients (24%) were in ketoacidosis at diagnosis. HbA1c levels were slightly higher in patients with ketoacidosis (12.4 ± 2.4% vs 11.4 ± 2.0%; $p = 0.035$). Multiple linear regression analysis revealed that HbA1c levels were positively related to age ($t = +6.621$; $p < 0.001$) and inversely to bicarbonate levels ($t = -4.539$ ; $p < 0.001$).

| | Group 1 | Group 2 | Group 3 | P value |
|---|---|---|---|---|
| Glycemia (mg/dl) | 503 ± 224 (118–1139) | 506 ± 179 (193–1025) | 488 ± 206 (180–1014) | 0.890 |
| Bicarbonate (mmol/l) | 17.4 ± 5.7 (4.5-24.0) | 19.4 ± 5.1 (3.8-27.3) | 19.5 ± 6.4 (5.6-27.5) | 0.247 |
| HbA1c (%) | 9.9 ± 1.2 (7.4-12.2) | 12.0 ± 2.0 (8.4-17.0) | 12.4 ± 2.2 (8.8-17.5) | <0.001 |

**Conclusions:** Although glucose levels at diagnosis were not different between the age groups HbA1c levels were higher in the older children suggesting delayed diagnosis. Only 24% of the patients presented with ketoacidosis. HbA1c levels were inversely related to bicarbonate levels suggesting a more dangerous situation due to delayed diagnosis.

## P237
## Hospital experience in the management of pediatric diabetic ketoacidosis: retrospective study (2000–2015)

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**Objectives:** Our purpose was to investigate the clinical and laboratory aspects of children and adolescents admitted for diabetic ketoacidosis (DKA).
**Methods:** Medical records of 53 children and adolescents treated for DKA at a Portuguese urban hospital from 2000 to 2015 were reviewed. Following data were collected: age and gender, severity, type and rate of initial fluids, insulin infusion rate, glycaemia, pH and time to pH normalization, bicarbonate, serum sodium, serum potassium, serum phosphate, complications and duration of hospital stay. Data analysis was performed using SPSS Statistics 20®.
**Results:** Average age was 9.9 ± 4.8 years. 62.3% were females. DKA was severe in the majority of cases (43.4%). At admission, average serum glycaemia was 542.4 ± 179.5 mg/dL, corrected sodium 134.8 ± 5.4 mmol/L, potassium 4.9 ± 0.7 mmol/L and phosphate 5.1 ± 1.5 mmol/L. Initial fluid replacement was 0.9% saline in 75.5% of cases and average rate was 6.4 ± 5.5 ml/kg/h. A rate of >10 ml/kg/h was used in severe cases (p = 0.04). Insulin perfusion rate was 0.1U/kg/h in 58.5% of cases and a rate of 0.05U/kg/h was used in mild DKA (p = 0.001). Average time to pH normalization (>7.30) was 10 ± 3.4 hours and was significantly higher in severe DKA (p > 0.001), independently of type and rate of initial fluids (p = 0.14). We found a significant variation of pH, serum glycaemia, and sodium at 4, 8 and 12 hours after admission; serum potassium increased at 4 and 8 hours but significantly decreased at 12 hours; serum phosphate significantly decreased at 4, 8 and 12 hours. Hypokalemia occurred in 7 cases (15.1%). No cases of cerebral edema were reported. Duration of hospital stay was in average 10.6 ± 8.2 days and no deaths occurred.
**Conclusions:** Most cases of DKA were severe. Initial fluid therapy and insulin perfusion options were in accordance to generally accepted guidelines and we verified a successful correction of acidosis and hyperglycaemia with no complications.

## P238
## Risk factors for cerebral edema in children and adolescents with diabetic ketoacidosis

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**Objectives:** Cerebral edema (CE) is a rare life-threatening complication of Diabetic ketoacidosis (DKA) in children. We analyzed the biochemical and therapeutic risk factors for CE in DKA.
**Methods:** A retrospective review of 256 children, hospitalized for DKA between February 2003 and March 2015. The demographic characteristics, biochemical variables and therapeutic interventions were compared between the patients with and without CE.
**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 survived with neurologic consequences. Cerebral edema was significantly associated with severe DKA: lower initial pH (p < 0,001) and bicarbonate (p < 0,001), higher initial blood glucose (p = 0,003), urea level (p = 0,036) and baseline serum osmolality (p = 0,036). During the treatment of DKA low serum phosphate level was found significantly associated with CE (p = 0,027). We also found significant dependence between the development of CE and the initiation of treatment for DKA in another facility before the hospitalization in our hospital (p = 0.010), bicarbonate application (p < 0,001), higher fluid volume infused initially (p = 0,005) and delayed potassium substitution (p = 0,003).
**Conclusions:** Severe ketoacidosis, hyperglycaemia and dehydration at presentation and low serum phosphate during treatment are significantly related to cerebral edema formation in children with DKA. The initial severe acidosis and hyperglycaemia probably cause brain injury that progresses to cerebral edema in the course of developing hypophosphatemia and cerebral hypervolemia.

## P239
## Acute decompensations of T1DM children in the emergency unit

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**Objectives:** To analyse acute decompensations in T1D children attended in an emergency unit of a tertiary hospital. To review the epidemiologic characteristics, severity and main causes of acute complications in these patients and the therapeutic procedures.
**Methods:** Review of episodes of acute decompensation in T1D patients younger than 16 years treated in the emergency unit from March 2013 to July 2015.We excluded T1D patients with some known intercurrent illness. Analysis of clinical and analytical variables. Comparison of these data with those corresponding to the previous two years.
**Results:** 38 episodes(50% female) corresponding to 28 patients, 10% of T1D children controlled in our Hospital. Average age was 8,8 years(2–16). T1D average duration was 3 years (1 month-9 years). Last year's average HbA1C was 8,1% before decompensation. The most frequent reasons for the visit were vomiting(44,7%), hypoglycaemia(26,3%), hyperglycemia(15,7%) and convulsion (13,1%).52% required observation in the emergency unit and 31,5% needed hospitalization. 5 patients presented DKA (ketoacidosis) (1 mild, 2 moderate and 2 severe).The severe cases staid in intensive care unit. Regarding the treatment,2 patients carried insulin pumps and 92,8% were treated with multiple insulin injections. We observed a reduction of 47,2% in the number of episodes in respect of the two previous years.
**Conclusions:** A small number of our T1D patients require attention in emergency due to acute complications. Compared to the previous years, diabetes decompensation rate is lowering as well as time spent under observation in emergency room. Decompensations can be prevented and treated at home if phone communication with the diabetic team is available. It is very important to prevent hypoglycemic episodes, especially in toddlers and patients with unaware hypoglycemias. Continuous glucose monitoring systems are useful tools to avoid them, so they are specially recommended in patients at risk.

## P240
## Risk factors for severe hypoglycemia in children and adolescents with type 1 diabetes

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**Objective:** The aim of our study was to determine the risk factors for severe hypoglycemia in a population of children and adolescents with T1D.

**Methods:** We performed a retrospective study (2005–2015) on 300 patients with a mean of 9.6 ± 4.2 years (range 2 to 16 years). Data were collected from the specialized counseling records where a questionnaire on possible acute metabolic accidents is filled systematically at every visit. Severe hypoglycemia is defined as blood glucose < 70 mg / dL with disorders of consciousness (confusion, seizure and coma). Age, sex, duration of diabetes, level of education of parents, glycated haemoglobin (HbA1c), insulin regimen, number of glucose control per day, causes, treatment and recurrence of hypoglycemia were recorded.
**Results:** Overall incidence of hypoglycemia was 2.3 events per 100 patient / year. Confusion was the most common clinical sign (60%). Hypoglycemia was often unexplained (55%). Other causes were found: vomiting, intense physical activity, travel, less food consumption, error in injection, less blood glucose control. HbA1c was between 7.5% and 8% in 53% of cases. Treatment of hypoglycemia was given in a hospital setting in 40% of cases. Use of glucagon at home was low (17%). Recurrence of hypoglycemic episodes was 34%. Neither glycemic control nor duration of diabetes nor level of education of parents seem to play a role in the occurrence of hypoglycemia. Factors related to severe hypoglycemia are school age between 5 and 10 years (40%) and insulin regimen with two injections of human insulin (66.7%).
**Conclusions:** Frequency of severe hypoglycemia is relatively low in our population of diabetic children. It is not associated with lower HbA1c or intensive insulin therapy. It seems to be mainly related to the management of diabetes. Prevention must go through an assessment and improvement of our therapeutic education program given to diabetic children and their families.

## P241
## Extremely severe ketoacidosis with multiple organ failure at onset of diabetes type 1 in 17-month girl - a case report

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**Introduction:** Complications of severe DKA are relatively rare - pretty rarely multiple organ failure can be observed. We present the case report of extremely severe DKA in 17-month girl with cardio-respiratory, kidney and liver failure and intestinal ischemia with perforation.
**Case report:** Parents came with 17-month girl to the hospital because of weakness, vomiting and fever - the child was wrongly diagnosed with pharyngitis. After 2 days they came back with unconscious child. A girl diagnosed with DKA (glucose 2259 mg/dL, pH 7.1; BE −21.1 mmol/L) was moved to ICU.

On admission the condition was described as very heavy - in shock, extremely dehydrated. Laboratory tests confirmed DKA and hiperosmolar-hyperglycemic state (Na 167 mmol/l, eff. osmolality: 404 mOsm /kg). As a treatment parenteral fluid, insulin iv, pressor amines and antibiotics were used. Despite intensive treatment, the further complications were observed - child required intubation and respiratory support. Next the development of multiple organ failure with the dominant image of liver and renal failure was observed (ALT: 2174 U/L, ASPT:3759 U/L, cr.:2,95 mg/dl). Moreover, due to intestinal perforation, bowel resection and jejunostomy were necessary. The child was presenting permanent unstable glucose levels (80-400 mg/dl), treated with 20-40% of glucose iv and insulin iv. Insulin requirements were dynamically variable depending on liver and kidney function. After a month´s stay in the ICU and improvement of general condition, child was transferred to the Dept.of Children Diabetology to introduce subcutaneous insulin therapy and parent's education. Finally the girl with complete normalization parameters of liver, renal and the relatively stable glucose was discharged home after 3 weeks.
**Conclusion:** Extremely severe DKA with multiple organ failure as mentioned above probably results from the coincidence of some adverse factors as: rapid dehydration in small child, delayed/wrong diagnosis and young age of parents.

## P241
## High incidence of diabetic ketoacidosis at diagnosis of type 1 diabetes among Polish children aged 10–12 and up to 5 years of age: a multicenter study

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**Objectives:** Despite its characteristic symptoms diabetes is still diagnosed late causing the development of diabetic ketoacidosis (DKA). The aim of this retrospective cohort study was to estimate the incidence of DKA and factors associated with the development of acidosis at diabetes recognition in Polish children aged 0–17 between 2010 and 2014 year.
**Methods:** The study population consisted of 2100 children with newly diagnosed T1D in the years 2010–2014 in 7 hospitals in eastern and central Poland. The population living in these areas accounts for 35% of the Polish population. DKA was defined according ISPAD Guidelines, as a capillary pH < 7.3. The analysed data included age, sex, diabetes recognition, pH, HbA1c, fasting C-peptide, BMI-SDS.
**Results:** DKA was observed in 28.6% of children. There were two peaks in DKA occurrence: in children < 5 years of age (33.9%) and aged 10–12 (34%). The highest incidence of DKA was noted in children aged 0–2 (48.4%). In the group with DKA, moderate and severe DKA occurred in 46.7% of children. Girls and children < 2years of age were more prone to severe DKA. The multiple logistic regression analysis showed the following factors associated with DKA: age ($p = 0.002$), fasting C-peptide ($p = 0.0001$), HbA1c ($p = 0.0001$), no family history of T1D ($p = 0.0001$) and BMI-SDS ($p = 0.0001$).
**Conclusion:** The incidence of DKA is high and remained unchanged over the last 5 years. Increasing the awareness of symptoms of DKA is recommended among children < 5 years of age (especially < 2 years of age) and aged 10–12. Children < 2 years of age and girls were at the highest risk of severe DKA.

## P243
## Management and outcomes in paediatric ketoacidosis - West Midlands experience

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**Objective:** Well defined national guidelines exist for the management of diabetic ketoacidosis (DKA). Adherence to these protocols are crucial to improve regional patient care outcomes. We aimed to assess adherence and the frequency of DKA complications associated with the network adopted BSPED 2009 guidelines.

**Methods:** Prospective audit of DKA management in paediatric units within the West Midlands region in United Kingdom was performed from 1st April 2015 - 3rd August 2015.
**Results:** Data was available for 29 patients (17 females) with a mean age 12.2 years (range 1–18 years). Mean duration of diabetes 5.5 years (SD 4.3 years, range 2–13 years). 49% were newly diagnosed Type 1 diabetes of whom 42% reported a delay in diagnosis (2–10 days). 73% experienced moderate or severe DKA. Children with mild DKA had higher ketone levels at presentation. Fluid boluses were given to 50% and 72% of children with mild and moderate DKA respectively. Contrary to guidance 2 patients received insulin infusion prematurely, and experienced rapid shift in blood glucose. Of those commenced on 0.05u/kg/hr, all increased their rates by 2–9 hours. Mean duration of acidosis was significantly longer in children commenced on 0.05 u/kg/hr vs those commenced on 0.1 u/kg/hr (mean 21 hrs vs 12.3 hrs, $p = 0.001$). Hypokalaemia occurred in 17%, all newly diagnosed, (n = 5 ) and hypoglycaemia in 38% (n = 11). Hypoglycaemia was associated with inappropriate fluid change in 14% of patients.
**Conclusion:** This audit highlights a low threshold for bolus administration relating to severity of DKA, related to 2009 guidelines, and variations in insulin introduction. Rates of hypoglycaemia and hypokalaemia were high, raising awareness across the region. Recent didactic NICE guidance on fluid management in DKA is anticipated to reduce these complications, as well as the new primary care referral pathway. Prospective regional audit and outcome comparison with the new NICE guidance, and referral pathway is underway.

## P244
## Sever hypertrigliceridemia in the course of ketoacidosis in a patient with newly diagnosed type 1 diabetes mellitus

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**Introduction:** Mild hypertrigliceridemia is a common complication found in poorly treated diabetes. Prevelance of mild hypertriglyceridemiais found in about 50% patients with diabetic ketoacidosis (DKA). Severe hypertrigliceridemia (TG > 22,4 mmol/l [>1959 mg/dl]) is a rare complication found in 1% patients with T1DM.
**Aim:** A case report of 2-year-old-girl in which clinical picture of type 1 diabetes mellitus was accompanied by DKA and severe hypertrigliceridemia.
**Case report:** A 2-year-old-girl was admitted to the Emergency Department with DKA (pH-7,1, $HCO^{3-}$ 8,8 mmol/l, BE −21,1 mmol/l), glucose level of 556 mg/dl, hiperlipidemia (TG 11470 mg/dl [131,1 mmol/l]). After recover from DKA she was discharge from Intensive Care Unit and trasfered to Departmet of Children Diabetology. At our departmet she was continued an intravenous fluid and an intravenous infusions of insulin. The breestfeding was reduced. After 3 days of intensive intravenous infusions of insulin she was transitioned to subcutaneous insulin (insulin pump: DD 3,8 (IU), basal 1,2 IU). At the time of diagnosis antibodies associated with type 1 diabetes were strongly positive (anti-GAD 375,79 U/ml, IA-2 451,5 U/ml). The administered treatment result in nearly normal glycemic values. Beacause of long lasting lipd disturbances we decided to determine if diabetic lipaemia was caused by loss of function mutations in LPL. Genetic test revealed no mutations in genes affecting LPL.
**Conclusions:** Diabetic lipaemia can be caused not only by profound insulin deficiency. Additional factor which should be taking into consideration in very young children is breast-feeding, which is associated with increased mean toatal cholesterol (TC) and LDL levels. Morover, sever hypertrigliceridemia may result in mutations in genes encoding lipoprotein lipase (LPL).

## P245
## Identifying barriers to the timely diagnosis of type 1 diabetes in young people in the primary care (community) setting

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**Objectives:** In the UK, the majority of young people presenting for the first time with signs and symptoms of type 1 diabetes (T1D) are initially seen by their primary care doctor (general practitioner, or GP). Mis- or delayed diagnosis is not uncommon, and increases the risk of diabetic ketoacidosis-related morbidity. This study sought to identify the specific challenges faced by GPs in this setting in order to develop effective care pathways and recommendations for improving the timely diagnosis of T1D.
**Methods:** An online survey questionnaire was distributed to all GPs within a geographically defined health administration area in the UK. Questions included: demographics; training experiences and clinical knowledge on the diagnosis of childhood T1D; referral pathways; and equipment access.
**Results:** 551 GPs were directly approached. 63 responded (11.4%) and were representative of GPs in England in terms of prior experience. 38 (63%) responders had diagnosed T1D in a child before. Once T1D was suspected, 87% and 100% indicated they would perform urinalysis and a finger prick blood test respectively on the day of presentation. However, 38%, 19%, and 27% also chose to test for venous blood glucose, fasting blood glucose and HbA1C respectively to confirm their diagnosis. All responders would arrange urgent referral to hospital or call the local children's diabetes team for advice. All respondents had access to a glucometer, however use was not routinely considered in the 'sick child' with 23% using it less than once a year. 43% rated their previous T1D training as 'barely adequate' or 'inadequate', and 82% indicated that further training was required.
**Conclusions:** Our study provides evidence that more training/education on childhood T1D in primary care is needed. Whilst there was appropriate use of urinalysis and finger prick blood testing, education is required to raise the awareness for T1D and avoid unnecessary tests so as to prevent delay in diagnosis.

## P246
## GAD autoantibodies long after clinical onset in T1D: search for heterogeneity and better classification

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Antibodies to GAD65 (GADA) are not always measured at clinical onset of type 1 diabetes (T1D) while they could help to identify its autoimmune nature. We determined the prevalence of autoantibody positivity to GADA in type 1 diabetes (T1D) patients later in the disease course, and investigated correlations between persisting GADA positivity (GADA persistence) and various clinical and biological markers of associated diseases.

This retrospective study used clinical and laboratory data of 990 patients (at time of measurement: median age [IQR] 16.7 [9.1] years, ≥6 months duration of diabetes) attending our clinic. GADA was measured by ELISA (DASP/IDS proficiency program). Differences between GADA persisters (GAD titre ≥6 IU/ml) and GADA negatives were assessed by Students *t* test or Mann Whitney U test. Correlations with clinical parameters and complication markers were tested with linear regression.

After a median [IQR] time since onset of 7.8 [9.5] years, from all tested patients, 58.8% (582/990) had persistent GADA levels (GADA ≥6 IU/ml) which was significantly associated to female sex and obesity ($p$ = 0.001 and 0.042). In addition, initial HbA1C was higher in GADA persisters ($p$ = 0.044). Parameters that correlated with GADA level (multivariable analysis) were sex, age, age of onset, triglycerides and disease duration. Predictors for GADA status were sex, age of onset, age, TSH, triglycerides and variation in HbA1c (expressed as SD).

With 58% of patients showing GADA long after onset, this test can be applied later in the course of diabetes to corroborate the autoimmune nature and can thus help classify diabetes . Despite significant differences in clinical parameters between GADA positives and GADA negatives, demonstrating marked heterogeneity in T1D, their clinical relevance remains to be established. It is yet unknown why so many patients possess persistent autoimmunity against GAD.

## P247
## Emergency advice for families of children with diabetes - the story of a helpline

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**Objective:** To describe the changes in out-of-hours emergency advice to families of children with diabetes over the last 15 years, the reasons for change and impact on hospital attendance.

The local emergency clinical helpline for children with diabetes (DiabNet) was discontinued in August 2015. We have looked at its service and how it informed the support we deliver today, especially out of hours advice provided currently by paediatric registrars.

**Background:** DiabNet was established in 2000 as a collaboration between three Scottish Health Boards. This helpline was staffed by Paediatric Diabetes Specialist Nurses using shared protocols and guidelines and was initially open 24 hours a day, 7 days a week. Over the years, it evolved to offer a more tailored service, as changes in diabetes management led to families being better equipped to manage most situations.

Consequently, Diabnet helpline was discontinued. Families now contact the paediatric registrar on-call for emergency advice. To support this change, registrars were trained using interactive teaching sessions, flow charts on the intranet and a call proforma to ensure a standard approach. Completed forms are used for audit and training purposes.

**Results:** There are 223 children with Type 1 diabetes in NHS Tayside. There were approximately 120 calls to the helpline per year. 32 calls were made in NHS Tayside 2014–15 (<1/week). 35 out of hours calls were logged in the 8 months since withdrawal of the DiabNet helpline, 3 of which resulted in admission.

**Conclusion:** Recommendations from NICE in 2015 suggest that 24 hour emergency advice be available to families of children with type 1 diabetes from "their diabetes team". Few units would be able to support this and paediatric trainees have limited exposure to childhood diabetes. With our current approach, early results suggest that safe and effective advice can be provided by medical trainees with no increased rate of hospital attendance.

## P248
## Variations in the relationship between glucose and HbA1c may contribute to clinic and country differences in HbA1c

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**Objectives:** In many countries there is a large range between clinics in mean HbA1c. Our aim was to investigate if this range is influenced by variation of the relationship between mean glucose levels and HbA1c.

**Methods:** Mean glucose over 7, 14 and 30 days was collected with blood glucose (BG) tests, Continuous Glucose Monitoring (CGM) and Flash Libre (FGM). Patients were included if over 1 month > 8 BG tests/day or CGM/FGM >30% of the day was registered. We calculated the Hemoglobin Glycation Index (HGI) for each patient (HGI = the difference between observed HbA1c and that calculated from the regression equation of the clinic).

**Results:** 59 patients with type 1 diabetes were included: age 11.6 ± 4.0 years, diabetes duration 4.6 ± 2.9 years and HbA1c 52.2 ± 10.3 mmol/mol (6.9 ± 0.9%). 2 patients were of non-Swedish origin. Correlations between glucose over 30 days and HbA1c was: BG: r = 0.75, CGM: r = 0.70 and Libre: r = 0.93; all p < 0.001. The relationship between mean glucose levels, CGM (n = 25) or FGM (n = 20) when available, otherwise BG (n = 14), and HbA1c in a linear regression equation was: HbA1c (mmol/mol) =11.94 + (4.58 x glucose [mmol/l]), r = 0.82, p < 0.001. HGI ranged from −13.9 to +6.3 mmol/mol. When comparing thirds (table), there was a rather small difference in measured HbA1c compared to Soros 2010.

**Conclusions:** There seems to be a smaller difference in the variation of mean glucose levels and HbA1c in our clinic with a very homogenous ethnic background. However, Swedish children seem to get lower HbA1c for the same BG levels compared to populations with mixed ethnicity. This can affect HbA1c comparisons between clinics and countries. Comparing percentage of patients below target HbA1c may be a better measure than mean HbA1c.

| | Low HGI | Moderate HGI | High HGI |
|---|---|---|---|
| Glucose, mmol/l | 9.0 | 7.8 | 9.1 |
| Glucose, mg/dl | 162 | 141 | 164 |
| HbA1c, mmol/mol | 48.0 | 50.2 | 57.1 |
| HbA1c, % | 6.5 | 6.7 | 7.4 |

*[Comparison of HGI levels]*

## P249
## Findings from a pre-clinic questionnaire given prior consultation at an NHS paediatric diabetes outpatient service in England - the patient's perspective: a survey of patient/carer experience of a paediatric diabetes outpatient service

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**Objectives:** To assess

1. What patients really want from their clinic visits.
2. Patient experience of a consultation focused by a pre-clinic questionnaire.

**Methods:** A prospective survey conducted between Feb-Mar 2016 in the Paediatric diabetes out-patient clinic. Pre-clinic questionnaires were handed out to patients/carers prior to clinic appointment enquiring about their general health, diabetes control and expectations from the clinic. Clinic consultation was tailored according to individual patient's responses. A Post-clinic questionnaire was completed by patients/carers to assess their experience of clinic.

**Results:** 50 questionnaires were shared with 85% response. Mean HbA1c was 68 mmol/mol (36-130 mmol/mol). Patients reported satisfaction with their general health(80%), home life (84%) and diet (80%) but were less satisfied with their mood (57%), school (66%) and social life (77%). They expressed desire to discuss Insulin doses (23%), hyper/hypoglycaemias (18%), exercise (14%), travel (9%), school/exams (9%), mood (9%), carbohydrate counting (7%), social life

(4.5%) and other (6% CGMS, pump cannula change). 32% reported issues in diabetes control.

They expressed desire to see a doctor (23%), diabetes nurse (11%), psychologist (11%), podiatrist (9%) and dietician (7%). 18% needed to see >1 member of diabetes team. 4.4% wanted to speak to a member of diabetes team on their own.

Post consult questionnaire showed >93% of patients were able to discuss everything and meet a particular member of diabetes team. 80% preferred a "One stop diabetes clinic" with all members of the MDT together besides the psychologist. 83% felt pre-clinic questionnaire was useful in making their clinic consultation patient/carer centred.

**Conclusions:** Pre clinic questionnaire should be considered as a useful tool in understanding patient expectations of a clinic visit. Our experience shows that patient's expectation of visit can be efficiently blended with their clinician's improving patient's overall satisfaction.

## P250
## Variation in 24 hour basal insulin requirements with age in children and young people (CYP) with type 1 diabetes mellitus (T1DM)

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**Objectives:** To study changes in insulin basal rates as a proxy for insulin sensitivity in CYP with well controlled T1DM (mean HbA1c 7.3%, range 5.2-8.5).

**Methods:** Insulin pump settings (total daily dose (TDD), sensitivity ratio) from 227 (110 M) CYP with T1DM aged 2–19.5 years were related to age, sex and body mass index (BMI).

**Results:** There were no differences between the sexes for age, BMI, sensitivity, TDD/kg or glycosylated haemoglobin (HbA1c). HbA1c did not change across the age range and was not influenced by insulin dose or % basal insulin delivery. Sensitivity ratio was inversely related with age ($r = -0.75$; $P < 0.001$) and partly with BMI with no effect of sex. The percentage basal insulin increased with age: 0.6% /year. The highest basal rates were between 18.00-24.00 h (0.7 (SD 0.5) Units/h) and between 06.00-12.00 h (0.6 (SD 0.5) Units/h) compared to the other times ($P = 0.004$) with the time frames 00.00-06.00 h and 06.00-12.00 h showing the greatest increases with age.

**Conclusions:** Insulin requirements change with age in part related to changes in Growth Hormone secretion. Little is known of the impact of age on the circadian variation in insulin secretion. These data suggest that there is a circadian variation in insulin sensitivity as reflected in basal insulin delivery rates. The change in insulin sensitivity decreases with age across the whole study population and is not influenced by sex and only partly by BMI. Although Growth Hormone has been implicated in the pubertal alterations these data would suggest that other factors, either intrinsic or extrinsic, may influence insulin sensitivity through childhood and adolescence.

## P251
## Insulin- induced insulin resistance in a 12 year old boy with Leukemia on steroid therapy: continuous glucose monitoring system can have a role

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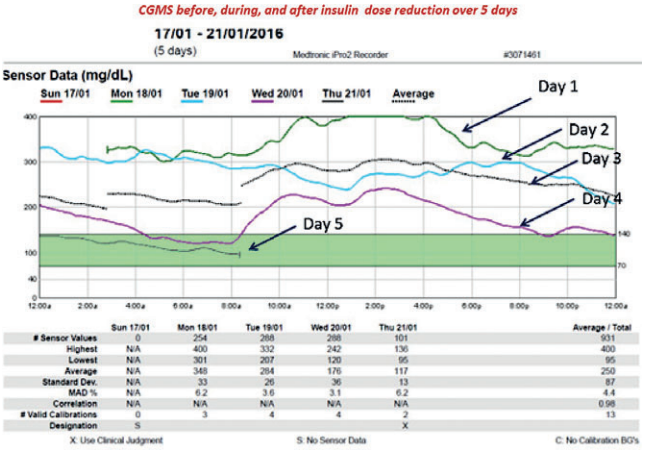
**Introduction:** Somogyi described patients with hyperglycemia despite being on high doses of insulin.

**Case presentation:** A 13 year old boy,Down syndrome,hypothyroidism and newly diagnosed acute lymphocytic leukemia.

He developed hyperglycemia during the first cycle of steroid therapy. His BMI 31.8 kg/m2,severe acanthosis nigricans,high insulin level and normal HbA1C 5.6%. Insulin therapy was started (0.5unit/kg/day) for 3 weeks. Insulin dose decreased significantly till discontinued, while still on prednisone. The diagnosis of dysglycemia induced by steroid in an obese patient was entertained. Metformin was started. After the 2nd cycle of steroid, he developed severe mucositis that required TPN with glucose infusion rate 2-3 mg/kg/min. Hyperglycemia worsened with blood glucose average 400 mg/dL that required insulin therapy with increased Insulin requirements up to 1.5unit/kg/day. However, the patient had persistent severe hyperglycemia.

A possibility of insulin induced insulin resistance was raised and gradual decrease in insulin dose and spacing of rapid insulin applied. Blood glucose showed dramatic drop and in 5 days he was receiving basal insulin 0.2 unit/kg/day and no rapid insulin. CGMS was done all through taht period which confirmed the suggested possibility.




*[CGMS before, during & after insulin dose reduction]*

**Conclusion:** Reduction of the insulin dose rather than increase might be the key step in the normalization of the blood glucose level when insulin induced insulin resistance is suspected. CGMS can help its detection.

## P252
## Kindergarten diabetes care for the toddlers with type 1 diabetes (T1D) according to parents views

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**Background:** In the last decades there is a clear trend of increasing incidence of T1D in developing countries and the age group under 6 years. Parents of patients from that particular age group often complain of inadequate support and diabetes care during kindergarten time. We present a pilot study for diabetes management at kindergartens in our municipality. Our aim was to understand the parents'attitude towards diabetes care in the kindergarten.

**Methods:** Parents of all patients under 7 years of age who attend kindergarten were invited to participate. We collected only parents' opinion for provided support specific to diabetes through a specially developed questionnaire. A 76.5% of total number of approached parents accepted to participate.

**Results:** In total, 13 parents were interviewed (12 mothers), mean age 36.3 ± 4.06 years, 11 (84.6%) university graduates. Mean age of their children is 5.75 ± 1.5 years, mean duration of T1D 2.52 ± 1.9 y., and BMI is appropriate for age and sex. All of children use insulin analogs, 7 (53.8%) are on pump therapy. Mean HbA1c is

7.55% ± 0.74. In 46% families were offered to transfer their child to other kindergarten by kindergartens staff because of the difficulty of diabetes care. Most of the parents are taking care for children during kindergarten time (76.9%); 69% of parents measure blood glucose between 2–3 times/day and inject insulin in the kindergarten; 30% of children attend half day, and 23% are with their mother in kindergarten during the whole day. Of all parents, 77% (10) estimate diabetes care and support as inadequate. Their recommendations are "to open a specialized diabetes group/kindergarten (50%)", "education of kindergarten staff (100%)", etc.

**Conclusion:** The study demonstrates lack of support to the youngest children with diabetes in our municipality. Specially developed approach to kindergarten based care with broad stakeholders support is urgently needed.

## P253
## Identifying the barriers to effective diabetes 'transitional care'. A qualitative study of patient satisfaction and experiences of transition

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Disparities in the quality of care for patients with type 1 diabetes (T1D) undergoing transition from children's to adult services are well recognised. Poor planning and ill-defined care pathways promote patient disengagement with many becoming 'lost' to specialist follow-up for years. This study sought to obtain the views of young people's experiences of transition to identify perceived barriers to an effective and rewarding transition experience.

A qualitative questionnaire was distributed to all youth with T1D aged 14–19 yrs, undergoing 'transition' (June-Sept 2015) within a regional diabetes network in the UK. Areas explored included views on clinic process; information provided and access to structured education.

189 youth participated in the survey. 74% reported discussing transition with their diabetes team prior to the first appointment. 81% had a good understanding of transition and its aims /objectives; yet only 66% had been given written information about this. During clinics, patients received input from either a paediatric (63%) or adult diabetologist (24%). Only 53% felt that teams explained things well to them, and that there was sufficient time to explore (69%) and address (65%) their concerns. 88% reported receiving structured education during the transition process. 94% indicated a preference to see the same team members during visits and preferred clinics to be scheduled mid afternoon (3-5 pm), on a working day (50%) and at their local hospital (80%). Narrative feedback highlighted recurring themes including communication style; information giving / sharing and constancy of support.

Our study provides evidence that youth with T1D deem consistency of care, providing timely and relevant information and being listened to and treated like an adult as indicators of rewarding and engaging transitional diabetes care. The voice and opinions of young people with T1D should be used to develop care pathways that reflect their specific needs and requirements.

## P254
## High remission rate in children with type1 diabetes in Sweden but minor differences in age

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**Objective:** To study remission rate, defined as < 0.5 U/kg/BW, in children with Type 1 diabetes (T1D) in relation to clinical parameters at diagnosis and during the first 2.5 years (15 first clinical visits).

**Methods:** Data obtained from 4162 subjects, age 1–18 years at diagnosis, 44.8 % females. These individuals were registered in the Swedish pediatric diabetes quality registry (Swediabkids) and diagnosed between 2007/01-2012/05.

**Results Table.:**

Table. Remission in relation to certain clinical parameters. * < 0.01, # < 0.05

| | Onset | Visit 5 | Visit 10 | Visit 15 |
|---|---|---|---|---|
| <0.5 U/kg/BW | 90 ± 25* n = 468 | 51 ± 10* n = 1185 (33%) | 53 ± 11* n = 477 (15%) | 56 ± 10* n = 98 (9%) |
| ≥0.5 U/kg/BW | 56 ± 10* n = 98 (9%) | 56 ± 14* n = 2412 | 58 ± 12* n = 2687 | 63 ± 13* n = 969 |
| <0.5 U/kg/BW | 12.7 ± 4.9* | 10.1 ± 4.3 | 10.1 ± 4.3 | 10.4 ± 4.3# |
| ≥0.5 U/kg/BW | 11.9 ± 4.3* | 10.4 ± 5.0 | 10.8 ± 4.2 | 11.5 ± 4.1# |
| <0.5 U/kg/BW | | 0.5 ± 0.4 | 1.3 ± 0.9 | 2.3 ± 0.9 |
| ≥0.5 U/kg/BW | | 0.8 ± 0.7 | 1.9 ± 0.8 | 2.5 ± 0.8 |
| <0.5 U/kg/BW | −0.27 ± 1.5 | 0.42 ± 1.1 | 0.5 ± 1.1 | 0.48 ± 0.9 |
| ≥0.5 U/kg/BW | −0.5 ± 1.5 | 0.52 ± 1.1 | 0.5 ± 1.1 | 0.68 ± 1.0 |

**Conclusion:** Remission in children with T1D was associated with lower HbA1c and higher pH at onset but only to minor difference in age.

## P255
## Clinical characteristics of slowly progressive autoimmune diabetes mellitus of youth in a single center

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**Objectives:** Diabetes mellitus (DM) was mostly type 1 DM (T1DM) in childhood, but recently there is a dramatic increase of type 2 DM (T2DM). Sometimes it is not easy to classify based on clinical features, especially in case having clinical phenotype of T2DM with autoantibody positivity. It is named as type 1.5 DM or slowly progressive autoimmune DM of youth. This study was designed to evaluate the clinical characteristics of T1.5DM.

**Methods:** A total of 95 subjects were enrolled in the study. Subjects were classified into 3 groups: T1, T1.5, and T2DM. Age at diagnosis, follow-up duration, BMI Z score, presence of DKA at the time of diagnosis, and treatment modality as well as laboratory findings such as autoantibody status, HbA1C, fructosamine, serum and urine C-

peptide were compared between groups. Mann-Whithney U test, Kruskal-Wallis test, and Chi-square test were used for statistics using IBM SPSS Statistics ver. 20.0 (IBM Co., Armonk, NY, USA).
**Results:** Among 95 subjects, type 1, 1.5, and 2 DM were 51 (53.7%), 11 (11.6%), and 33 (34.7%), respectively. Age at diagnosis and BMI Z scores were lower ( $p < 0.001$), and DKA was more common in T1DM. Serum c-peptide levels were significantly lower in T1DM (0.52 vs. 2.28 vs. 3.61 ng/mL, $p < 0.001$). Autoantibody positivity was 94.1% in T1DM, and anti-GAD autoantibody was most common. The titers of anti-IA2 autoantibody were significantly higher in T1DM compared to T1.5DM (45.95 vs. 4.86 U/mL, $p < 0.001$). In T1.5DM, the mean duration was 3.22 years, among them 27% turned out autoantibody negative. Twenty five percent of the patients with persistently positive autoantibody needed intensive insulin treatment during follow-up.
**Conclusions:** It is valuable to check autoantibody for classification and management. It is important to closely monitor patients with T1.5DM because they may need intensive insulin treatment within several years.

## P256
## Towards a personalised care of T1DM in a non-profit organisation, T1 Diams, in Mauritius

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**Introduction:** T1Diams, a Mauritian non-profit organisation, is specialised in the care and self-management of Type 1 Diabetes in the island of Mauritius. In 2015, they revised and implemented a new global approach ('Le Pt'1 medicale') for the management of patients with Type 1 Diabetes. The aim of the study is to give a preliminary results on this new protocol.
**Methods:** This prospective study was carried out, in 2015, for a period of 3 months. Patients having an HbA1c greater than 8.75% was included. Their parents were also present. They were given intense therapeutic education at home and during outdoor activities. Consultations with an eye specialist, a medical practitioner, a dietitian and a psychologist/social worker were scheduled. A questionnaire on knowledge of Type 1 diabetes (what is T1D, Surveillance, Hypo-Hyper, Insulin and nutrition) and another to evaluate the impact of T1D on quality of life (SF36) was carried out before and after completion of the program. HbA1c values were noted before and at the end of the study. Microalbuminuria was also carried out. Data was collected on a tablet.
**Results:** 45 patients were identified and only 38 patients (20 Male and 18 females) having $16.2 \pm 6.2$ years completed the study. . All of them were seen by the diabetes educators and general practitioner. Proactive mental health support was provided to all patients by the psychologist/social worker, 42% (n = 16) eye specialist, 21% (n = 8) dietitian. 81% (n = 31) had a recent Hba1c. There was a decrease of $1.39 \pm 2.77$ in HbA1c ($P < 0.05$). 5 cases of microalbuminuria and 5 cases of proteinuria were diagnosed.
**Conclusion:** This study has shown that the management of T1D requires a multidisciplinary approach. With an intense medical and psychological care, there is a positive outcome of metabolic control and quality of life. This study lays the foundation for the second phase of the project.

## P257
## Diabetes education and regular self-monitoring of blood glucose in the management of people with type 1 diabetes

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**Aims:** To observe the impact of diabetes education and regular self-monitoring of blood glucose (SMBG) on acute complications in people with type 1 diabetes.
**Methodology:** This prospective study was conducted at Baqai Institute of Diabetology and Endocrinology, Karachi - Pakistan. People with type 1 diabetes aged < 25 years, who attended the outpatient department from September 2011 to September 2013, were included in the study after obtaining informed consent. Structured diabetes education was given through one to one sessions and group sessions along with 24 hour telephonic helpline service. All other relevant clinical care were provided as per standard guidelines. The study participants were provided glucometer and strips, advised to monitor their blood glucose at home on different specified timings. Blood samples were collected for HbA1c at baseline and after every six month.
**Results:** Out of 106 people with type 1 diabetes, 50 (47.16%) were males and 56 (52.83%) were females. Mean age of the participants was $16.42 \pm 5.42$ years with mean duration of diabetes of $6.78 \pm 4.15$ years. Based on 18,093 blood glucose readings, there were 778 (4.3%) and 4921 (27.2%) blood glucose readings in hypoglycemic (<70 mg/dl) and severe hyperglycemic (>250 mg/dl) ranges respectively were obtained during eighteen months. Six episodes [2 for severe hypoglycemia and 4 for severe hyperglycemia / diabetic ketoacidosis (DKA)] required hospitalization. Mean HbA1c of the participants at baseline was $11.28 \pm 2.69\%$ which decreased significantly to $9.79 \pm 2.41\%$ ($p = 0.001$) after 18 months.
**Conclusion:** The results of the study suggest that with diabetes education and regular SMBGs, better glycemic control is achievable and acute complications of diabetes can be prevented in people with type 1 diabetes.
**Acknowledgment:** This is a study from "Insulin my life" project, a collaborative project of World Diabetes Foundation, Life for a Child program and Baqai Institute of Diabetology and Endocrinology.

## P258
## Transient extreme insulin resistance in childhood onset diabetes mellitus type 1 presenting with severe diabetic ketoacidosis, hyperlipidemia and acute pancreatitis

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**Background:** Mild increase in serum lipid concentrations is a common feature of diabetic ketoacidosis (DKA) while severe hyperlipidemia (HL) with milky plasma is rare. HL is an uncommon cause of acute pancreatitis (AP), especially in children. The risk for developing AP rises when serum triglyceride level exceeds 11 mmol/L (1.000 mg/dL). Some extent of insulin resistance (IR) is present in almost all cases of DKA while severe IR is exceedingly rare.
**Case report:** We report on a 5-year-old, previously healthy, non-obese girl with newly diagnosed diabetes mellltus type 1 who presented with distended abdomen, severe abdominal pain, hypovolemic shock and altered mental status. Laboratory examination revealed DKA. As well, her serum was milky showing severe HL (triglycerides: 241.97 mmol/l; ref. < 1.7 mmol/l and total cholesterol 40.1 mmol/L; ref. < 5.0 mmol/l), while the CT scan showed signs of AP.

In spite of insulin and fluid therapy introduced according to ISPAD DKA protocol, blood glucose levels remained high with prolonged metabolic acidosis until extremely high doses of insulin were administered (up to 1.1 IU/kg/h). Due to severe HL and AP two courses of plasmapheresis were performed with consequent decrease in triglyceride and lipase levels. However, we also noticed restituition of insulin sensitivity, reverse of acidosis and clinical improvement.
**Conclusion:** To the best of our knowledge this is the first report of co-existence of DKA, HL and AP accompanied with extreme IR in pediatric patient. Plasmapheresis was shown to be an effective treatment for severe hyperlipidemic pancreatitis in a child with DKA. Nevertheless, we also observed recovery from extreme IR that was not previously reported in such settings.

## P259
## Second national examination of HbA1c in Bulgarian children with type 1 diabetes mellitus: an impact of education and social status

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**Objectives:** 1. To evaluate the actual level of HbA1c in a cohort of Bulgarian patients with type 1 diabetes aged 0–18 years in 2014.
- With the same standardized method: HPLC /Bio-Rad/
- With the same device in a Central lab /Sofia/
2. To compare the mean levels of HbA1c in patients studied in 2012 and 2014.
3. To analyse the factors - sex, age, educational level and family social status on the glycemic control

**Methods:** 1. A standardized method: HPLC /Bio-Rad/ for measurement of HbA1c in a Central lab was used.
- The survey was conducted in 11 paediatric endocrine practices in the country: 498 diabetic children were examined (261 boys and 237 girls) from January to September 2014. The results were compared to that of the previous study in 2012.
2. Statistical analysis: SPSS for Windows, Version 16.0. USA, Chicago, SPSS Inc.

**Results:** 1. The mean level of HbA1c for diabetic patients studied in 2014 (8.43% ±1.69) is significantly lower compared with patients studied in 2012 (8.93% ±1.98).
2. Significantly more patients in the second study (36%) have optimal control with HbA1c < 7.5% compared to that from the first study (24.9%)
3. Significantly lower proportion of patients with poor glycemic control (HbA1c > 9%) was found in the second study (30.3%) compared to the first one (42.7%).
4. The analyses of the factors influencing the control of diabetes showed that:
- The patients from the lower social status and educational level of the parents have the highest level of HbA1c in both studies.
- Teenagers in both studies had significant higher HbA1c compared to other age groups (p = 0.003)-mean HbA1c is 9.19% for the first study in 2012 and 8.8% for the second study in 2014.

**Conclusions:** Maintaining a good glycemic control is most difficult by teenagers and children from families with low social status. Recurrent training is required for these patient groups with social support to their families. The latest have more difficult access to the specialized paediatric centres.

## P261
## Our experience of using sensor augmented pump

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**Background:** In October 2014, we started to introduce the sensor augmented pump (SAP: Minimed 620G with Enlite®) for patients with type 1 diabetes for the first time in Japan. SAP which is available in Japan is only Minimed 620G with Enlite®. So far about 100 patients in our hospital had started to use SAP by April 2016, whereas over 30 patients stopped using them.

**Methods:** We retrospectively analyzed the clinical features of patients who started SAP. The reasons why some patients stopped SAP were examined. Then we identified 35 patients who had used SAP for more than one year (aged 2 to 75, HbA1c 7.63 ± 1.14 %). We retrospectively examined whether their HbA1c had improved or not. The factors which might affect on the blood glucose control were analyzed. Then we asked them how they felt about SAP by the questionnaire.

**Results:** The major reasons for stopping SAP were the itching and the bothering by wearing the sensors. The level of HbA1c in 35 patients who continued SAP for 1 year, had not changed (7.63 ± 1.14 % to 7.65 ± 1.03 %). Their average blood glucose level and standard deviation had not changed (192.4 ± 81.3 mg/dl to 180.7 ± 70.3 mg/dl). Some patients, whose HbA1c were high level before using SAP, improved significantly. The using time of the sensors per week, age, nor sex were not related to the improvement of HbA1c. Their satisfaction about Minimed 620 G with Enlite® was high (7–8 points at ten points of perfect scores), even though HbA1c in many patients was not improved. Almost all of them answered that they felt that it was comfortable and convenient to use SAP, because of showing glucose level and its trend.

**Conclusion:** Thirty % of patients stopped using Minimed 620 G with Enlite system because of the sensor troubles. Thirty-five patients so far continued using it for more than 1 year. SAP had not changed blood glucose control significantly in one year. However, many patients felt highly satisfaction to use the SAP system.

## P262
## Comparison of diabetes management outcomes in under 5 s in 2 UK diabetes centres

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**Introduction:** Type 1 diabetes in the under 5 s presents unique challenges. Insulin pump therapy (CSII) is considered to be the treatment of choice.

**Objectives:** A cross-sectional audit to compare HbA1c and BMI in children diagnosed under 5 years of age in 2 different UK centres [Alder Hey (AH) and University College London Hospitals (UCLH)]. Similar approaches to dietetic education with carbohydrate counting and pre meal insulin advised from diagnosis. Treatment at diagnosis varied between centres.

**Methods:** Data was obtained by retrospective record review. Treatment at diagnosis, current treatment, height, weight and HbA1c were collected. Patients diagnosed before the age of 5 and currently under the age of 6 were included for analysis. Patients were excluded if diagnosis and initial management was in another centre. BMI SDS was calculated for each patient. Descriptive statistics were used to compare centres and treatment types.

**Results:** 30 patients diagnosed between November 2012 and February 2016 were identified. All patients at AH started on multiple daily injection therapy (MDI) and 11/18 patients converted to CSII 6 days - 1.7 years post diagnosis, 5 patients moved to pump therapy within 6 weeks of diagnosis. UCLH commenced 11/12 patients on CSII at diagnosis.1 patient commenced MDI. The mean and median HbA1c achieved in each centre were similar and there was no statistical difference in BMI SDS. Patients on CSII had a tendency to a lower HbA1c and BMI SDS.

| | | BMI SDS | Mean HbA1c |
|---|---|---|---|
| Centre | AH | −2.13 -2.02 | 60 |
| | UCLH | −2.08 -1.84 | 57 |
| Treatment | CSII | −2.13-2.02 | 57 |
| | MDI | −0.8-1.5 | 62 |

*[Comparison BMI and HbA1c]*

**Conclusions:** No statistical difference in HbA1c or BMI SDS was observed. Some patients on MDI achieved similar outcomes to those on CSII. More detailed enquiry is needed to understand the factors other than treatment choice that impact on glycaemic control and weight.

## P263
## Clinical experience of insulin degludec for better type 1 diabetes control in Lithuanian paediatric patients

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**Objectives:** Insulin degludec decreasing variability of glycaemia and improving glycemic control.
**Methods:** We analysed 69 (27 boys) children at the age 4–17 years (mean 14.55 ± 3.13) with type 1 diabetes (DM1). DM1 duration was 6.0 ± 4.22 years and poor control of diabetes: high HbA1C (mean 8.93 ± 1.9), high variability of glycaemia, high rate of hypo- and hyper- glycaemia, dawn phenomenon. Study included 60 patients with multiple dose injections (MDI) and 9 insulin pump users. Insulin degludec therapy was started in same paediatric diabetes centre. Two groups were conducted in this study: 36 children with HbA1c < 9.0% and had higher rate of hypoglycaemia; 33 children with HbA1C ≥9.0%. Insulin degludec was administered once-daily at the same time. The final dose of insulin degludec was considered, when the lowest of three pre-breakfast glycaemia value was 4.0-8.0 mmol/L. The percent change of rates of general/nocturnal (00:00–-06:00 hours) hypoglycaemia and hyperglycaemia was analyzed (n = 19) before changes of treatment and 1–3 month after switching insulin degludec.
**Results:** The final insulin degludec dose of first group was 78.6 ± 14.4% of previous basal insulin dose. Second group achieved good glycaemia control with - 81.4 ± 16.8%. The difference between groups was not significantly (p = 0.563). The final dose of insulin pump users was 99.3 ± 10.1%. About 25% (n = 17) of patients had dawn phenomenon and the dawn phenomenon expression disappeared for 80% of them. The changes of general and nocturnal rate of hypoglycaemia before and after switching decreased 2.84 ± 3.18% (p = 0.021) and 6.89 ± 13.9% (p = 0.883), respectively. The general rate of hyperglycaemia decreased 9.13 ± 19.43% (p = 0.09).
**Conclusions:** The basal insulin requirement for patients with MDI was decreased, independent of control of DM1. Although the rate of hypo- and hyper- glycaemia did not decreased significantly, but the insulin degludec decreased variability of glycaemia and shown less prominent dawn phenomenon.

## P264
## Patients commenced on insulin pump therapy despite failing to meet NICE criteria show improvements in diabetes management - a pilot study

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**Objectives:** In England poor diabetes is an exclusion criteria for commencing insulin pump therapy. We evaluated whether Children and Young People (CYP) with type 1 diabetes who do not meet the criteria for insulin pump therapy would show an improvement in control if pump therapy was introduced.
**Methods:** 9 (4 M) CYP, aged 13 to 17 years commenced insulin pump therapy after a team assessment of motivation. None of the CYP fulfilled the NICE criteria for pump therapy: minimum of 6 blood glucose tests per day, carbohydrate counting and correcting blood glucose concentrations between meals. Pump therapy was started following structured education and the CYP contracted to undertaking a minimum amount of blood glucose testing. Pump therapy was commenced for an initial period of 6 months and CYP were allowed to continue after this time period.
**Results:** All 9 CYP completed the first 6 months of the study and all 9 remain on pump therapy. The median duration of therapy was 1 (range 0.75 - 3.25) year. The median HbA1c at pump start was 11% (9.3-13.2). Mean pump therapy duration was 1 year (0.75-3.25) and was associated with a mean reduction in HbA1c to 8.5% (7.4-11.6) after 6 months (P = 0.009). This reduction was maintained after the 6 months period with a mean HbA1c of 9.1% (7.8-12.9). Pump therapy was also associated with a reduction in admission frequency and presentation in Diabetic Ketoacidosis and an improved quality of life. There was also an increase in participation in diabetes care managing illness/exercise and use of temporary basal rates.
**Conclusions:** Insulin pump usage in this pilot study appeared to be associated with an improvement in diabetes control and better engagement of the CYP with diabetes care. These initial observations in a hard to help group suggest a more formalised study is warranted to ascertain the overall benefits for this group of CYP.

## P265
## Diabetes care and preventation by VNOW fitness device technology

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**Objectives:** VNOW is a Indian fitness device start up that check on human health via fitness watch and band with regular monitoring of step count, calorie burnt, motion time, mileage, sleep time, deep sleep, light sleep, wake up time, heart rate, average heart rate & heart rate during workout each & every second of our life for a proper knowing of our body.To study effects of daily routine of diabetic patients by a VNOW fitness device technol,ogy and see whether it may control and prevent the diabetic complication.
**Methods:** Total of 50 diabetic patient were taken as subject with an equal ratio of male and female of age group between 20 to 50 years. VNOW device put on the wrist of diabetes patient for one month and regular reading were taken with VNOW device .Blood glucose was measured on daily basis and daily data of their step count, calorie burnt, motion time, mileage, sleep time, deep sleep, light sleep, wake up time, heart rate, average heart rate & heart rate during workout measured with VNOW device Technology.
**Results:** 1) VNOW device reading showed there was increase in heart rate, less calorie burnt and average sleep count in the age of 20–30 years diabetic patients.
2) VNOW device reading showed there was less increase in heart rate, average sleep count and heart rate during workout in the age group of 30–50 years of diabetic patients.
**Conclusions:** Young diabetic patients of the age group 20–30 years, showed increase in the blood glucose level and other diabetes complication due tosedentary lifestyle. In diabetes patients of age group of 30–50 have showed a control level blood glucose level and controlled heart rate , sleep time which may be due to proper diet and physical activity. VNOW device technology helps diabetes care and preventation.

## P266
## Longitudinal observation of clinical course of type 1 diabetes (T1DM)

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**Objectives:** Children with T1DM are more often overweight or obese than their healthy peers, it especially affects girls in puberty. The goal of the work was to determine the relationship between body weight and metabolic control in children with T1DM.
**Methods:** A retrospective analysis was carried out on the clinical course of diabetes in children with diagnosed T1DM under the care of pediatric diabetology department in Bialystok. The analysis included the diagnosis period and the 5-year follow-up. Anthropometric data (BMI-SDS), HbA1c, the type of insulin therapy (pens vs pump) and the daily dose of insulin per kilogram body weight (DDI/kg) were assessed.
**Results:** The study included 112 children (51.79% boys). The existence of a statistically significant trend of annual growth of BMI-SDS ($p = 0.0006$), HbA1c ($p < 0.0001$) and DDI/kg ($p < 0.0001$) has been shown in the years of observation. The girls however have shown a significantly higher percentage of visits in which they had abnormal metabolic control (HbA1c > 6.5%) (84.5% vs 77.9%; $p = 0.0190$). Analysis of the long-term treatment of DM1 has shown a significant correlation between variation of BMI-SDS and the variation of HbA1c ($B = 0.04$, $p = 0.0147$), taking into account individual patient variability. However, in the multivariate model, which takes into account factors i.e. age at the time of the test ($B = 0.07$, $p = 0.0032$), DDI/kg ($B = 0.06$, $p = 0.5080$), the type of therapy ($B = -0.07$, $p = 0.2501$) and individual variability of patients showed no significant relationship between HbA1c and BMI-SDS ($B = -0.02$, $p = 0.2985$). Age and variability of patients explained 82% of the variation in BMI-SDS during the 5-year follow-up.
**Conclusions:** The age of patients with diabetes is a strong predictor of BMI-SDS. It seems that the clinical course of diabetes (expressed as HbA1c) has less impact on annual growth of BMI-SDS than the non-diabetes factors, i.e. physical inactivity or a high-fat diet.

## P267
## What do young people think about the diabetes transition service they receive?

M. Gardiner[1]

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**Objectives:** User views are vitally important to shaping and developing services, particularly in a cohort that can be challenging to engage and has consistently higher failure to attend rates than other age groups. Service providers need to understand the key issues affecting young people's clinic attendance and clinic experience and what changes are required to better meet the expressed need of the cohort.
**Methods:** A paper questionnaire designed and evaluated by the Lead Nurse was offered to all transition service users over a 4 month period. The questionnaire encouraged both simple box ticking from a list of options and free text comments on a range of issues, was completed immediately before or after attending their clinic appointment and submitted via a sealed box in the clinic waiting room.
**Results:** 77% response rate, equal male and female respondents.

Mean self-reported age at diagnosis 6.6 years.

96% thought it very worthwhile to maintain good control of their diabetes and reported themselves as knowing enough about managing blood glucose and hypos.

22% did not know who to contact for diabetes advice at evenings and weekends.

Most didn't mind but 33% would want to be admitted to an adult ward.

11-33% wanted more information about particular topics like family planning, travelling, drugs and exercise. Only 7% wanted to know more about long term complications.

The most frequently raised critical comment related to clinics running late and waiting around, but there was a balance of positive comments about friendly, helpful and understanding staff.

**Conclusions:** All service users were sent key findings and action feedback along with reminders of team contact details including accessing out-of-hours advice and documenting preference for hospital admission environment.

A county-wide transition education event was delivered and a detailed audit of appointment waiting times was undertaken towards improving operational efficiency.

## P268
## Comparison of blood sugar outcome between two groups of young diabetics attending annual diabetic camps (2014 v/s 2015) in Mauritius

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**Introduction:** The aim of this study is to compare blood sugar outcome between two groups of young diabetics attending annual diabetic camps (2014 v/s 2015) in Mauritius.
**Methods:** A seven-day camp was organised by non-governmental organisation, T1 Diams (Type 1 Diabetes Mellitus Support) in 2015 for 55 diabetic members aged 4–40 years. Blood glucose levels were compiled on Microsoft Excel® and analysed on IBM **Statistical Package for the Social Science** (SPSS) ®. Data from 2014 diabetic camp was computerised for comparative study. Authorisation to conduct the study was obtained from the managing committee of the organisation.
**Results:** Two cases of severe hypoglycaemia were noted requiring administration of intramuscular Glucagon injection. No case of ketoacidosis was reported.
**Conclusion:** This study has confirm the positive impact on metabolic control when attending a diabetic camp in Mauritius. Glycaemic control was improved. The benchmark has been established for future comparison among T1 Diams camps. In any case, present day camping experiences are essential.

**Results:**

| Variables | 2014 | 2015 |
|---|---|---|
| ***Age (years)*** | 16.3 ± 3.6 (11–27) | 15.75±6.8 (4 –40) |
| ***Gender*** | | |
| Male (n [%]) | 11(41) | 23(42) |
| Female (n [%]) | 16(59) | 32(58) |
| ***Insulin regimen*** | | |
| No insulin regimen(Honeymoon phase) | 0(0) | 2(4) |
| MDII with NPH insulin (n [%]) | 1 (4) | 0(0) |
| MDII with rapid-acting insulin analogue and long- acting insulin analogue) (n [%]) | 26 (96) | 53(96) |
| CSII (n [%]) | 0 (0) | |
| ***Average blood glucose*** | | |
| Breakfast | 8.23 ± 5.18 | 6.93± 4.39 |
| Lunch | 8.32±5.92 | 7.55± 4.02 |
| Dinner | 7.89± 3.94 3.94 | 8.33± 4.00 |
| Bedtime | 13.0 ± 6.10 | 12.6 ± 7.09 |
| ***Average HbA1c before camp*** | 9.55±2.77 | 9.41±2.28 |
| *Hypoglycemia*(n [%]) | 18(5.3) | 71(14.9) |
| *Normoglycemia*(n [%]) | 187(55.2) | 266(56) |
| *Hyperglycemia*(n [%]) | 134(39.5) | 138(29.1) |

*[Table showing the differences between 2014 vs 2015]*

## P269

## Optimizing annual urine microalbumin screening for type 1 diabetes mellitus patients in diabetes clinic

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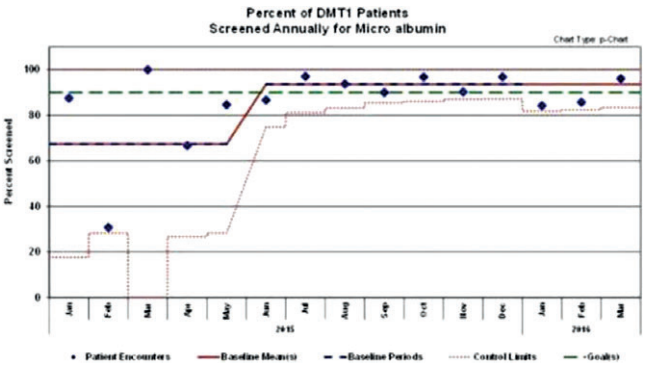
**Objectives:** To Increase the % of T1DM patients (Age ≥ 10 years, T1DM for ≥ 5 years) screened yearly for urine microalbumin in our T1DM clinic from 67% to 90% by June 30, 2015 and sustain until 12/31/2015.

**Methods:** Diabetes team made aware of the guidelines for urine microalbumin screening; "Best Practice Alert" built in EMR (electronic Medical record); process flow map made; urine sample collected in clinic; order placed, labels printed, LPN alerted and provided urine specimen cup to patient; water provided for hydration. Urine sample collected, stored in fridge for up to max 1 hour, transported to the lab from clinic via a lab tube system. Results were followed by the provider and appropriate evaluation made based on test results.

**Results:** The number of eligible T1DM patients screened for the microalbumin increased from a baseline of 67% to 94% by 12/31/15.




*[ISPAD Microalbumin p chart]*

**Conclusions:** This QI project is a part of an institution-wide initiative towards journey to best outcomes. We demonstrate here the success of a comprehensive, multidisciplinary approach to optimizing the recommended screening with annual urine microalbumin in patients with T1DM Age ≥ 10 years, T1DM for ≥ 5 years (ADA/ISPAD). Similar strategies may be adapted to achieve success in optimizing recommended health maintenance screenings, not just for patients with T1DM but with other chronic illnesses as well. Ongoing efforts need to continue to maintain the successful established work flow to achieve the best results.

## P270

## Basal insulin rate in insulin pump T1DM treated pediatric patients - seeking for optimal

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**Objectives:** Recommended basal insulin rates for insulin pump (IP) T1DM treated patients are about 40-50% of total daily insulin dose. Regarding growth and puberty, need for appropriate bolus insulin increases. There was an idea for evaluation basal insulin rates in insulin pump treated pediatric T1DM patients in regard of their metabolic control and body mass index.

**Methods:** Average basal insulin rates during 3 months were evaluated in IP treated T1DM pediatric patients and correlated with HbA1c results for that period and BMI index .

**Results:** We analyzed data from 41 patients (21 M/17 F) mean age 14,1 ± 2,2 ( 9–17), mean diabetes duration 7.1 ± 2.38 years (3–15). Average HbA1c of whole group was 8,2 % (6,2-9,8), and mean total insulin dose was 0,91 IU/kg/day ( 0,56-1,22). Mean basal rate was 0,41 IU/kg//day (45% of total daily dose), and BMI of 84,3% patients indicated normal weight. Best regulated patients (mean HbA1c 7, 2%) had basal rate 0,30-0,40/kg/day, and 90,5 % of them had regular BMI. Mean HbA1c was worse (9,1%) in patients with basal rate under 30 % od total daily delivered insulin, and there were 29 % undernoutrished among them. 16,7% of patients with basal rate over 0,41 IU/kg/day were obese and their mean HbA1c was 8,4%.

**Conclusion:** Basal insulin rate is very important factor for attaining good metabolic control and normal BMI in IP treated T1DM children and adolescents. Ideal basal insulin rate in our patients was lower than recommanded probably because of higher bolus insulin needs in regard of of growth and puberty.

## P271

## An audit of the success of the 'Four Stage Plan' admission in adolescents with type 1 diabetes (T1DM) in reducing HbA1c and future hospital admissions with DKA or severe hypoglycaemic episodes

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**Objectives:** Managing T1DM requires a motivating and supportive clinical team. At times it may be useful to "reboot" the situation in Children and Young People (CYP) with T1DM adolescents with type 1 diabetes. At University College Hospital London CYP who are finding it hard to cope with their diabetes are offered an admission to hospital for a period of 2–4 weeks to help improve overall control. We undertook on audit of this practice to determine how effective the intervention was.

**Method:** 10 (8 F) CYP aged 14 to 17 years were admitted for a 4 Stage Plan between May 2014 and January 2016. Each admission followed a similar pattern with intravenous insulin therapy to recalculate insulin requirements, followed by a period of 4–7 days recommencing on their initial treatment, pump or injections with all diabetes care carried out but ward staff to insure doses are correct. Once doses were established the patient slowly took over their own care first supervised, leading to graded discharge and finally discharge with frequent outpatient follow up. During this period the patient receives intensive teaching and motivation and where appropriate psychology input.

**Results:** Follow up was available on all 10 patients with a median follow up of 0.9 (years (range 0.5 - 2.0). Median HbA1c before admission was 12.7% (9.9 - 15.0); HbA1c declined in the three months after the 4 stage plan admission to 9.9%(8.6 - 14.0) (p = 0.05);HbA1c then rose thereafter such that the most recent value 0.9 years after the intervention was slightly but not significantly lower than before the admission with HbA1c 11.4% (9.6 - 14.0). There was a slight reduction in Diabetic Ketoacidosis admission rate.

**Conclusions:** The 4 stage plan appears to produce a transient reduction in HbA1c (Hawthorn effect). Strategies now need to be devised to enable CYP to maintain this improvement. This is less about motivation and more about maintenance of interest.

## P272
## Does singing improve glycaemic control?

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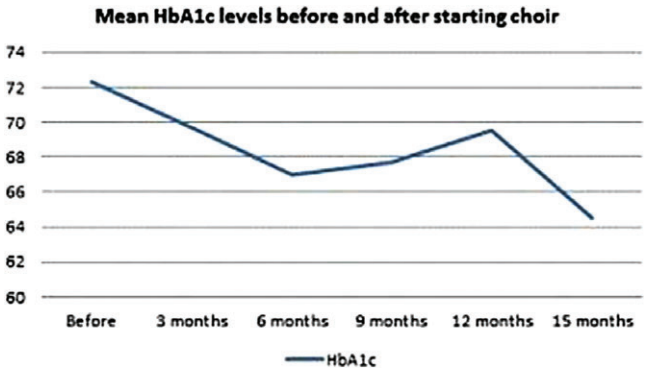
**Objective:** "Highs and Lows" choir was started by our paediatric diabetes team at a University Hospital to provide peer to peer support to children with Type 1 diabetes and their families in a non-clinical setting. The aim of the study was to find if there was an improvement in glycaemic control in the children who participated in the choir.
**Method:** 16 children with type 1 diabetes attended weekly choir practice and they also had multiple opportunities to perform choir concerts at different times. Children and families had opportunities to discuss about their diabetes care with paediatric diabetes team members who facilitated the choir. HbA1c levels of the above group were analysed before and after the initiation of choir at 3 monthly intervals.
**Results:** The mean age of the children were 10.9 years (7.6 - 13.6 years). The mean duration of diabetes was 6.2 years and 13 (81%) were using insulin pump. The mean HbA1c levels of the group before they joined choir was 72.3 mmol/mol (8.7%). The mean HbA1c levels of this group at 3, 6, 9, 12 and 15 months after starting choir were 69.7(8.5%), 67(8.3%), 67.7(8.4%), 69.5(8.5%) and 64.5(8%) mmol/mol respectively.
**Conclusion:** The children attending the choir had 7 mmol/mol (0.7%) reduction in their mean HbA1c levels over a period of 15 months. Team members facilitating the choir reported positive impact on the children's personal confidence and on their attitude towards diabetes. They also reported that choir also offered children and parents to developed friendships and networking opportunities. We have not measured quality of life benefits but we plan to look into this in a prospective way in future.




*[HbA1c levels before and after starting choir]*

## P273
## Evaluation of a senior nurse led pilot delivering weekend healthcare professional advice for children newly diagnosed with diabetes

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**Objectives:** National Best Practice Tariff (BPT) requires all newly diagnosed children to be discussed with a senior member of the children's diabetes team within 24 hrs of diagnosis and for this to be documented in patient medical notes. The pilot aimed to demonstrate meeting this requirement, adding value to the patient journey by assuring specialist advice to facilitate quality clinical care planning from diagnosis.
**Methods:** Over 7 months, 2 senior children's diabetes nurses initiated contact with the on-call paediatric consultant or registrar at weekends within an agreed timeframe, when diabetes team paediatricians were not on-call. Data about each contact was recorded on a specifically designed form. The senior nurses undertook this without remuneration, taking time in-lieu when possible.
**Results:** 31 nurse contacts made, representing nurse cover for 60% of the weekends.

It proved challenging at times to contact medical staff, with up to 35minutes of delay / unsuccessful attempts.

No newly diagnosed were identified during any of the contacts, therefore it was not necessary to check accuracy of medical record entries.

10 occasions of discussion and advice for pre-existing patients, largely initiated by the Registrar regarding calls for clinical advice they had received (out-of-hours process for cohort) or current inpatients.
**Conclusions:** The effort, inconvenience and intrusion into personal life to voluntarily deliver an enhanced weekend service that could not demonstrate meeting BPT and did not add sufficient value to the patient experience determined continuance was unwarranted. Insufficient evidence of need or effectiveness to business plan for permanent nurse-led service enhancement resulting in the proposal for the BPT requirement to be met by medical staff evoking an existing escalation policy in the event of a newly diagnosed child presenting at weekends.

## P274
## Should children's diabetes specialist nurses wear uniform? A service user survey

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**Objectives:** The Director of Nursing led a project that saw Trust Specialist Nurses (Adult services) wearing a uniform that resulted in positive feedback from patients and other hospital staff relating to increased visibility and identification of senior nurses within the hospital and expressions of greater patient confidence in consultations. Empirical evidence based on almost 30years of professional practice suggests some children find uniforms intimidating and frightening.
**Methods:** Service user views were sought through surveying a randomly selected sample of children from our cohort over a 3 month period using email, however responses to the 'question' were included if submitted via another media such as phone message or face-to-face. Responses were collated and analysed by the Lead Nurse.
**Results:** 45% of those invited to take part in the survey submitted a response.

63% firmly reported their view that children's diabetes specialist nurses should not wear uniform.

31% did not have a preference

5% thought children's diabetes nurses should wear uniform.

Powerful individual comments were presented in a colourful pictorial way for example; 'yes on the ward, no in clinic at training events or home visits', 'I think they should wear their own clothes because I wouldn't want to wear uniform', 'no can't see the point, doesn't make them better at their job - more appearance over substance. Could scare younger children by formalising interactions', 'no, doctors don't!'

Interestingly, patients felt uniform would not add anything to their confidence in or experience of professional consultations with their Team.
**Conclusions:** Actively seeking and valuing patient views to inform service design and development means accepting the majority opinion. Children's diabetes specialist nurses will abstain from the Trust direction to wear a uniform.

## P275
## Reasons for insulin pump discontinuation

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**Aims:** To explore reasons for discontinuing insulin pump usage in children with Type 1 Diabetes
**Methods:** Children in the Ayrshire region of Scotland who commenced insulin pump therapy between May 2008 and December 2015 were identified using the Scottish national database (SCI-diabetes)(88 children/young people). Eight of these children discontinued use ( 5 Females :3 Males) after different durations .Seven were teenagers and one four year old. Each patient/ parent was contacted and a prospective survey was undertaken in the form of a telephone questionnaire to determine the parents and patient's views about discontinuing pump usage.
**Results:** Regarding the pre-pump period, respondents generally felt well informed about the pump, and felt involved in the decision. 50% felt they expected the pump to be on for a "trial" period. Most respondents gave positive remarks about their time on the pump. Discussion about the reasons for pump discontinuation revealed varying opinions. 75% didn't like being on the pump ,62% continued to have poor control of their diabetes and 37% continued to have high HbA1c. Other reasons were issues in school , limited sports activity ,cannula insertion, too much effort and "always attached to something". Decision was made jointly with diabetes team ,child and parent and 75% felt the right decision was made and they didn't regret the decision. The four year old was able to unlock the pump hence it was withdrawn.
**Conclusion:** Approximately 9% of the total number of patients commenced on insulin infusion discontinued it. They were mostly older children / young people. A lack of improvement in glycemic control or dislike of the pump were the 2 main reasons for discontinuation. When preparing a child for pump therapy, time should be given to initially exploring their expectations, and what criteria may be used to determine whether the pump may be discontinued. This was a small study but revealed significant view points of the patients.

## P276
## Evolution of body mass index in children with type 1 diabetes mellitus

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**Objectives:** The prevalence of childhood overweight and obesity has risen during the last 30 years. Not only children with type 2 diabetes, but also those with type 1 diabetes (T1D) are overweight and obese. In children with type 1 diabetes, obesity has been linked to an increased cardiovascular risk. A better understanding of the evolution of weight patterns in the years after diagnosis of T1D, may be important to identify those children with a risk for excess weight gain. Identification of these subgroups might lead to intervention strategies to decrease excess weight gain.
**Methods:** We retrospectively analyzed data of all children with type 1 diabetes followed at the department of Pediatric Endocrinology in the University Hospital Leuven (UZLeuven) and diagnosed between June 1991 and February 2015. Data as age, sex, BMI and tanner score were extracted. A total of 396 subjects were included in the database and more than 6000 BMI measurements were analyzed. The longitudinal BMI SDS measurements were analyzed using linear mixed models.
**Results:** Standardized BMI (BMI SDS) using all data (n = 6088) was 0.3, with a deviation of 0.95. Seventeen % of the male patients and 19% of the female patients were obese or overweight. An increase in BMI SDS was seen as a function of (1) time since diagnosis and (2) age, both being independent predictors. Data of girls and boys were compared and a significant stronger relation between BMI SDS and time since diagnosis, as well as with age, was seen in girls.
**Conclusions:** These data suggest an import increase in BMI in children with type 1 diabetes, especially in girls. Given the increased risk of metabolic syndrome and other complications in overweight children, special attention is needed to prevent this evolution.

## P277
## A collection of case studies: Investigating the efficacy of a psychological intervention designed to promote higher levels of self-esteem within adolescents exhibiting poor diabetes self-management

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The aim of the study was to identify whether improving self-esteem in adolescent diabetic patients with a poor diabetic control could have a beneficial impact upon their overall glycaemic control. The cohort of patients identified took part in six self-esteem focused sessions. The self-image profile questionnaire was used to measure self-esteem pre and post intervention and data was collected relating to biological glucose levels (HbA1c). Analysis of our data identified a positive correlation between increased self-esteem and improved diabetes management.

## P278
## Visceral fat and fatty liver could predict subclinical atherosclerosis in lean adolescents with Type1 diabetes

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**Background:** There is more than 11-fold higher prevalence of cardiovascular complications in patients with T1DM compared with normal population.
**Objective:** To assess the relationship between subclinical arthrosclerosis and visceral fat and fatty liver.
**Subjects and Methods:** The study was performed on 110 of adolescents with type 1 diabetes mellitus attending the Pediatric Diabetes Clinic of Suez Canal University Hospital. Their mean age was (14.2 $\pm$ 0.7) years. Their mean duration of diabetes was (6 $\pm$ 3) years. This study was a case–control study. Group 1 consists of 55 adolescents with T1DM and normal carotid intima media thickness (cIMT). The second group included 55 adolescents with T1DM and subclinical atherosclerosis. There was no significant difference between the two groups as regard weight, height, BMI and waist circumference. All adolescents were normotensive, normo-albuminuric and had no retinopathy. Lipid profile and Hba1c were measured. An experienced radiologist who was blinded to clinical data performed ultrasonography scanning. The cIMT, subcutaneous fat, visceral fat thickness, and area were estimated. Hepatic steatosis was diagnosed

based on enlarged liver size and evidence of diffuse hyperechogenicity of liver relative to kidneys.
**Results:** The mean visceral fatwas significantly higher in adolescents with increased cIMT (4.8 ± 1.6) than in the normal CIMT group (3.9 ± 1.4), P < 0.05. Liver size was significantly larger in adolescents with increased cIMT (13.73 ± 2.26) than with normal cIMT (12.63 ± 2.20) (p 0.022). There was a significant linear regression between cIMT and visceral fat, age and liver size.
**Conclusion:** Visceral fat, liver size and patient' s age could be a predictor of subclinical atherosclerosis.

## P279
## Neutrophile to lymphocyte ratio in children and adolescents with type 1 diabetes

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**Objectives:** Angiopathy and consequently cardiovasular disease are well known long term complications of type 1 diabetes (T1D). Leukocytes play a key role in the development of atherosclerosis as low-grade chronic inflammation is one of the underlying causes. High neutrophiles and low lymphocytes indicate an increased risk of atherosclerosis. An increased neutrophile to lymphocyte ratio (NLR) correlates with a less favorable cardiometabolic profile and has been shown to be a marker for mortality in cardiovascular disease in adults. Several biomarkers to identify a subclinical atherogenic risk in patients with T1D have been discussed recently. We investigated if NLR in children with T1D is increased and might represent a useful tool to detect first signs of macroangiopathy preceding atherosclerosis.
**Methods:** In a retrospective analysis we compared data of 121 children and adolescents (61 male, 60 female) with T1D (mean age 12.06 ± 3.92 SD, mean diabetes duration 4.77 years ± 3.17 SD, mean HbA1c levels 66.60 mmmol/mol ± 12.11 SD) to 121 healthy children and adolescents (mean age 12.12 ± 3.97 SD). CRP values > 10 mg/l indicating an acute inflammation were considered as exclusion criteria.
**Results:** NLRs in children and adolescents with T1D were lower than in healthy controls (1.96 ± 2.80 vs 2.53 ± 1.93 SD, p < 0.001) . The lower NLRs in patients with T1D were due to lower absolute neutrophil counts (3.17 ± 1.19 SD vs. 4.92 ± 2.62 SD, p < 0.001).
**Conclusions:** Correlations between NLR and BMI have been described in children over 7 years of age and confirmed by our results. NLR cannot be used in T1D as an atherogenic marker as patients with T1D have a reduced amount of circulating neutrophils.
The reasons for this reduction of neutrophils in T1D are still unknown, immmunopathogenetic causes are being discussed.

## P280
## Evaluation of serum cystatin C in type 1 diabetic children and adolescents as an early indicator of diabetic nephropathy

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Diabetic nephropathy is a major cause of morbidity and mortality among young adults with type 1 diabetes. Clinical management and therapeutic intervention from early stage of DN is of major importance to prevent progression to end stage renal disease. The aim of this study: is to evaluate serum cystatin c and albuminuria in Type 1 Diabetic Children and Adolescents.
**Methods:** In the present case control study, we evaluated the level of serum cystatin c in 85 patients with type 1 diabetes mellitus at Diabetes, Endocrinology and Metabolism clinic in pediatric hospital Cairo university, patients categorized into two groups (normoalbuminuric and microalbuminuric) according to A/C ratio.
**Results:** Our study revealed increased level of serum cystatin c in microalbuminuric diabetic patients. Serum cystatin c negatively correlated with GFR. Also, it was found that serum cystatin c increased in parallel with the severity of renal disease, poor glycemic control and duration of diabetes.
**Conclusion:** Serum cystatin c measurement might become a useful and accurate noninvasive tool for early detection of diabetic nephropathy.

## P281
## Prevalence and risk factors for microalbuminuria in children and adolescents with type 1 diabetes: long-term experience of a single centre

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**Objectives:** Diabetic nephropathy is a late complication of type 1 diabetes mellitus (T1DM) and microalbuminuria (MA) is an early and reversible sign of diabetic renal disease. Aims of this longitudinal study were: to define the prevalence of MA in children and adolescents with T1DM; to identify which risk factors are predictive for the development of MA.
**Methods:** Seventy children and adolescents with T1DM [57% male; age at T1DM onset (T0) 5.95 ± 3.16 yrs] were enrolled. The mean follow-up (FU) period was 7.18 ± 1.89 yrs. Blood and urinary tests were performed once a year from the T0. MA screening was evaluated by urinary albumin concentration (UAC) or by timed urine collections for urinary albumin/creatinine ratio (ACR). MA was considered persistent (PMA) when at least 2 out of 3 consecutive evaluation of UAC and/or ACR were found positive.
**Results:** PMA was found in 13% of patients. Subjects with PMA compared to normoalbuminuric ones had both significantly higher GFR at T0 (p = 0.025) and UAC at 1-year FU (T1) (p = 0.045). Predictive cut-off values for PMA development were 160 ml/min/1.73 m2 for GFR at T0 (sensitivity: 57%, specificity: 75%) and 8.5 mg/L for UAC at T1 (sensitivity:75%, specificity:80%). Relative risk for PMA was 23-times higher when UAC was >8.5 mg/L (p = 0.004). Kaplan-Meier survival curves as a function of age at T0 showed an increased probability of developing PMA among children in which T1DM onset occured between 5 and 11 years of age compared to those with younger onset (p = 0.014) and a pubertal diabetes duration >5 years was also a significant risk factor for PMA (p < 0.0005).
**Conclusions:** Age at T1DM onset, pubertal timing, high UAC, and hyperfiltration predispose to PMA development and increase the risk for diabetic nephropathy. Specific cut-off values at T1DM onset and during first years of FU could provide indications to avoid disease progression.

## P282
## To study the prevalence of musculoskeletal abnormalities in type 1 diabetes patients

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**Objectives:** To know the prevalence of musculoskeletal abnormalities (MSA) in type1 diabetes patients. To find the correlation between the duration of diabetes and glycemic control with MSA.
**Methods:** This cross-sectional observational study was performed in 107 T1DM patients attending diabetes clinic at KLES Diabetes Centre, Belagavi. Subjects were evaluated for MSA between the age group of 5 to 25 years using standardized questionnaire which included age, sex, disease duration and muscular pains. Deformities were assessed using Chippaux index, Q angle, and special tests assessed by Prof. of KLES Physiotherapy College. The mean HbA1c was analysed for glycemic control. Skin changes over foot were assessed.
**Result:** Musculoskeletal abnormalities was present in 62(57.94%) subjects. Among lower limb deformities - foot abnormalities were seen in 54(50.46%). Of which Hallux valgus was seen in 24(44.44%) pes planus 16(29.6%) pes cavus was 7(12.96%), other foot abnormalities in 7(12.96%) and skin changes were seen in 10(9.34%). Genu valgus was seen in 3.73% and varum in 2.80%. In upper limb deformities prayer sign was present in 27(25.2%) subjects of which 13(48.14%) had thenar & hypothenar wasting with significant p value (p = < 0.001). Thus presence of prayer sign was associated with muscle wasting. Pearson Correlation Coefficient between foot abnormality and prayer sign is (r2 = 35.443) with p value (p = < 0.001) which were significant. Our study did not show significance between duration of diabetes (p = 0.24) and glycemic control (p = 0.68). 3(2.80%) had spinal abnormalities. Muscular pains were present in 22(20.56%) subjects.
**Conclusion:** Musculoskeletal abnormality is common with T1DM with higher prevalence of foot and hand abnormalities. This study suggests that clinicians should regularly screen for MSA for early intervention and prevention of long term functional disabilities.

## P283
## Blood pressure regulation determined by ambulatory blood pressure profiles in children and adolescents with type 1 diabetes mellitus: impact on diabetic complications

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**Objectives:** The combination of high blood pressure and chronic hyperglycemia significantly contributes to the development of diabetic complications. Ambulatory monitoring of blood pressure (ABPM) has been recognized as standard to assess blood pressure (BP) regulation.
**Methods:** We evaluated 24-hours BP regulation in 3529 type 1 diabetic children from Germany and Austria and studied the influence of BP parameters including pulse pressure (PP) and blood pressure variability (BPV) on microalbuminuria (MA) and diabetic retinopathy (DR).
**Results:** In general, BP was increased in the diabetic children compared to healthy German controls, while nocturnal diastolic BP and dipping were reduced. PP showed reverse dipping but to a lesser extent than expected. Children with microvascular complications had higher BP parameter, except of nocturnal PP in MA and diurnal and nocturnal PP in DR. Reverse dipping of PP was more pronounced in the children with early signs of diabetic complications. BP alteration was stronger in girls than in boys and increased with age.
**Conclusions:** Our data show that there is an early and close link between 24-hour blood pressure regulation and the development of diabetic complications not only for systolic, diastolic and mean arterial BP but also for the derived BP parameter pulse pressure and BPV. We assume that early and sufficient control of these parameters already in childhood and adolescents might reduce the development and progression of diabetic complications.

## P284
## The use of urinary C-peptide as a marker of beta cell function in children and adolescents with type 1 diabetes

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**Objectives:** To examine the association between urinary C-peptide and stimulated serum C-peptide as a marker of beta-cell function; and to assess the role of C-peptide as predictor for microalbuminuria (MA) in adolescents with type 1 diabetes (T1D).
**Methods:** Twenty-six (14 males) children (age mean ± SD 15.1 yrs ± 2.2; duration mean ± SD 4.5 yrs ± 2.3) were recruited. Subjects had a fasting mixed-meal tolerance test. Serum glucose and C-peptide were measured at baseline, 30', 60', 90' and 120'min. Serum cystatin-C, uric acid and A1C levels were collected at baseline. Urinary C-peptide-to-creatinine ratio (UCPCR) was collected at 120 min. Albumin-creatinine-ratio (ACR) was measured in 3-overnight urine samples. Pearson correlation examined the association between serum C-peptide (baseline, AUC and peak) and ACR; and between serum C-peptide and UCPCR. Student's t-test was used to compare differences between MA and non-MA groups; multivariate analysis examined the effect of variables as predictors for MA.
**Results:** Five subjects (19%) had MA. Mean A1C% ± SD was 8.0 ± 0.68; ACR mg/mmol was 0.98 ± 1.15. Baseline C-peptide ug/L mean ± SD was 0.55 ± 0.42; peak C-peptide was 0.84 ± 0.64 and UCPCR nmol/mmol was 0.23 ± 0.58. UCPCR correlated with serum C-peptide at all times except baseline ($r > 0.70$, $p < 0.0001$); with C-peptide peak ($r = 0.67$, $p = 0.001$) and with AUC ($r = 0.90$, $p < 0.0001$) adjusting for age, gender and duration. There was a negative trend correlation between baseline C-peptide and A1C ($p = 0.06$). ACR was positively associated with serum uric acid ($r = 0.51$, $p = 0.01$). No differences were found between MA and non-MA or between upper-ACR and lower-ACR groups.
**Conclusion:** Urinary C-peptide correlates with stimulated serum C-peptide and may be used as an alternative tool for assessment of beta cell function in T1D children. The association between serum uric acid and ACR suggests its role as a potential biomarker for vascular complications and as an additional therapeutic target in T1D.

## P285
## Predictors of renal complications in pediatric patients with type 1 diabetes mellitus: a prospective cohort study

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**Objective:** Clinically evident diabetic nephropathy (DN) is rarely encountered in childhood, even if early structural and functional subclinical abnormalities are detectedable few years after diabetes diagnosis. The aim of this study was to examine which variables among demographical and clinical parameters could influence the development and progression of DN in a cohort of type 1 diabetes patients diagnosed during childhood. Secondary aim was to evaluate the incidence rate of microalbuminuria.
**Research design and method:** We longitudinally evaluated of 137 young patients with type 1 diabetes diagnosed between 1994 and. Median duration of follow-up was 11.8 years ($1^{st}$ - $3^{rd}$ q: 9.7-15.0). Overnight albumin excretion rate, degree of metabolic control and other metabolic parameters, presence of other microangiopathic complications and autoimmune comorbidities were restrospectively collected.
**Results:** DN showed a frequency of 16/137 cases (11.7%), with an incidence rate of 10.0 ´ 1000 person-years. A significant relationship was found between DN and HbA1c mean values of the last 4 years (P = 0.004), age at diabetes diagnosis (P = 0.013), presence of retinopathy (P = 0.011) and subclinical peripheral neuropathy (P = 0.003).
**Conclusions:** Strong predictors of DN were age at type 1 diabetes diagnosis and mean HbA1c levels. Even if the incidence of DN is lower than previously reported, periodical screening is mandatory. Moreover, borderline microalbuminuria as additional risk factor deserves attention.

## P286
## Diabetic cardiomyopathy is associated with endothelial dysfunction in children and adolescents with type1 diabetes mellitus (T1DM )

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**Background:** Type 1DM is a risk factor for cardiovascular disease. Cardiomyopathy is defined as disease of the myocardium associated with cardiac dysfunction. Endothelial dysfunction is the earliest event in atherosclerosis and cardiovascular disease.
**Objectives:** To assess cardiac function in relation to endothelial function in Egyptian children and adolescents with T1DM.
**Methods:** One year cross sectional study on 40 children and adolescents with T1DM and 40 healthy controls. They were subjected to laboratory investigations (lipid profile, Microalbuminuria, $HbA_1C$), conventional and tissue Doppler echocardiography. Flow mediated dilation (FMD) of brachial artery was assessed by measuring brachial artery diameter at baseline (A) and at one minute after release of pressure (B). The absolute change in brachial artery diameter in mm [FMD (B - A)], and the Delta change (Δ FMD) = (B - A)/ A were estimated.
**Results:** The absolute difference and the delta change in the brachial artery diameter was significantly reduced in patients compared to controls. Diastolic dysfunction was proved in all studied diabetics in form of decreased E/A, Em/Am and increased E/Em .A significant decrease was found in E/A ratio in patients compared to controls. A significant negative correlation was found between HDL level and Em/Am. The factor with the strongest impact on FMD of brachial Artery were LDL level and age.
**Conclusions:** Diastolic abnormalities detected in type 1 diabetic children suggests an early functional effect of specific diabetic cardiomyopathy. Endothelial dysfunction and risk of atherosclerosis exist early in type1DM. Dyslipidaemia is a contributing factor in such events. Early recognition of these events is recommended to prevent progression of atherosclerosis and cardiovascular disease.
**Abbreviations: Em(cm/s) =** peak early diastolic myocardial velocity at mitral valve ring, **Am(cm/s) =** peak late diastolic myocardial velocity at mitral valve ring , **(cm/s) =** centimeter per second.

## P287
## BMI before disease onset is an important determinant of adult overweight or obesity in young adults with type 1 diabetes

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**Background:** The initiation of insulin therapy in children with type 1 diabetes (T1D) is often associated with weight gain. It has been suggested that excessive weight gain is a risk factor for the development of adult overweight/obesity.
**Objective:** We evaluated the prevalence of overweight/obesity in young adults who developed T1D during childhood. We studied BMI before the disease, at diagnosis of T1D, after 6 months of insulin therapy and at young adulthood, and we examined if the change in BMI in the 6 months after diagnosis is associated with adult overweight/obesity.
**Methods:** We retrospectively studied growth data of 71 children (29 girls) with T1D who attained final height at a mean (SD) age of 18.0 (0.4) yrs. Age at diagnosis was 11.4 (3.0) yrs. Measured heights and weights were used to calculate BMI z-scores based on the Flemish BMI reference values. BMI z-scores between 1 to 3 yrs before diagnosis (available for 64 patients), at diagnosis, 6 months after diagnosis and at young adulthood were calculated. Data of patients with overweight/obesity at adulthood (BMI ≥ 25 $kg/m^2$; group 1) were compared with those with BMI < 25 $kg/m^2$ (group 2).
**Results:** 18 (25%; 10 girls) patients had overweight/obesity at adulthood (range: 25.0 - 35.2 $kg/m^2$). BMI z-score was higher ($p < 0.001$) in group 1 than in group 2 at all studied time points (before: +1.4 (0.9) vs −0.1 (0.8); at diagnosis: +0.6 (1.2) vs −1.0 (0.9); at 6 months: +1.0 (0.9) vs −0.3 (0.6)). 11 out of 15 subjects of group 1 had overweight/obesity before diagnosis whereas only 7 out of 49 subjects of group 2 ($p < 0.001$). The change in BMI z-score during the first 6 months after diagnosis was not different between patients of group 1 or 2 (+0.5 (0.8) vs +0.7 (0.7)).
**Conclusions:** 25% of the studied young adults with T1D had overweight/obesity. Most of them had already overweight before the onset of T1D. We conclude that BMI before the onset of T1D is an important determinant of adult overweight/obesity.

## P288
## Incidence of lipoatrophy associated with rapid-acting insulin analogs in children with type 1 diabetes mellitus

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Lipoatrophy (LA) is a rare complication of treatment with insulin analogs. Some authors report the raising incidence of lipoatrophy following the use of insulin pumps (CSII). It is relevant not only because of the cosmetic problem, but also because of the variability of absorption it causes in the site of injection. The aim of our study was to evaluate the current prevalence of insulin-induced LA in children with type 1 diabetes (T1D).

Routine examination of insulin injection sites were conducted in 1763 patients in our outpatient clinic from 2009 till 2015. In case of lipoatrophy, medical and anthropometric data were collected.

We identified 43 children (55% boys) treated with rapid-acting analogs: aspart (90.5%) and lispro (9.5%). Overall prevalence of lipoatrophy was 2.5%. All patients, except one, were on CSII. The mean age and diabetes duration at the onset of lipoatrophy were 8.86 ± 3.85 (2.24-17.49) years and 2.85 ± 2.60 (0.11-13.16) years, respectively. The mean HbA1c was 6.8 ± 1.19 (5.3-10.8)%, mean daily insulin dose 0.78 ± 0.28 (0.28-1.48) units/kg. Most of the LA cases were

multiple (69%). All changes were localized to the insulin injection sites (abdomen was the least often location). In 29 patients, lipoatrophy resolved after switching to different insulin analog and changing the site of insertions after average 7 months (2–12). Total regression of single lesions was observed faster - after 2.5 months (1–3). In four cases recurrence of LA lesions was seen, despite of insulin change. Concomitant autoimmune diseases (thyroiditis, celiac disease and/or arthritis) were present in about one-third of the cases (mostly in cases with multiple lesions).

Lipoatrophy reactions remain a potential problem when managing T1D patients. Regular routine examination of insulin injection sites with early intervention is essential. In cases of localized LA the beneficial therapeutic approach is to change the insulin molecule and the site of insulin injections.

## P289
## Overweight, obesity and metabolic syndrome in T1D paediatric patients

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**Objectives:** We aimed to determine the prevalence of overweight, obesity, metabolic syndrome and its components among a paediatric population of T1D patients.
**Methods:** We conducted a cross-sectional study in our tertiary paediatric hospital Diabetes Clinic that included 256 patients at least one year into T1D diagnosis. Age, gender, ethnicity, time since diagnosis, additional diseases/drugs, total daily insulin dose (TDI) and delivery method, anthropometrics, blood pressure, HbA1c, lipids, and presence of microvascular complications were obtained from clinical records. Patients with TDI ≥ 1U/Kg were considered insulin resistant.
**Results:** Patients were 52% female and 91% white; median age was 11 (4–17)yr. Median T1D duration was 5.5 (1.2-14.3)yr; intensive insulin treatment was delivered by multiple daily injections in 79.7%; global mean HbA1c was 7.9 ± 1.6%. Overweight was present in 21% and 9.8% were obese. Among those above 10 yr, 7.4% met metabolic syndrome criteria: 5.9% had high triglycerides, 5.5% had low HDL, but none had hypertension.

Patients with TDI ≥ 1U/Kg (18%) were older (14.3 vs 8.1 yr), had longer diabetes duration (6.3 vs 3.5 yr), were more obese (2.8 vs 1.6 BMI-SDS), had lower HDL-c (37.4 vs 52.1 mg/dL), had higher triglycerides (168 vs 131 mg/dL) and had higher ALT (49 vs 22U/L); there was no difference in age of onset or in HbA1c levels.
**Conclusions:** In our country, the prevalence of overweight in youth is 30%, amongst which 10% is obese. The increasing number of overweight in T1D is associated with insulin resistance and metabolic syndrome. In this "double diabetes" scenario, as the weight comes up, insulin resistance also grows, increasing the TDI and ending in an even heavier child.

In these patients, our next goal will be to study how a change in life style and an improvement in peripheral insulin sensitivity will be able to postpone a TDI increment, cutting this vicious circle and reducing the risk for future vascular complications.

## P290
## Perceived efficacy of the ISPAD science school for physicians on fellows' career development, scientific expertise, networking and social opportunities: the JENIOUS* evaluation survey

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**Objective:** The ISPAD Science School for Physicians (ISSP) is an international program aimed to enhance endocrine fellows' knowledge in principles of research methodology. This study investigated the fellows' perceived efficacy of the ISSP on career development, scientific skills and production, scientific networking and social opportunities.
**Methods:** A survey was sent to 361 fellows who attended the ISSP between 2000 and 2015, to test the efficacy of the ISSP on 4 major areas: career development, scientific enhancement (overall 18-items rated on a 5-point Likert scale), scientific networking and social opportunities (overall 20 fixed choice items).
**Results:** 84 (23%) participants completed the survey (63% female; mean age 37 ± 6 yrs; 63% from Europe). The ISSP attendees were residents (37%) or fellows (26%) in pediatrics (29%), pediatric diabetes (21%) or pediatric endocrinology (20%). For 81% of attendees the ISSP supported their career, helping to achieve a research position (60%), to be engaged with diabetes care (65%) or research (75%) or to start a research fellowship (48%).The ISSP was effective in increasing interest in diabetes research (95%), and enhancing the number (62%) and the quality (85%) of scientific productions. After the ISSP, 40% of attendees had ≥2 abstracts/year accepted at international meetings and 30% won research grants. The ISSP promoted scientific networking (93%): 58% of attendees continued to share knowledge and clinical cases, and 15% started research collaborations. About social opportunities, the ISSP helped to meet new friends (93%) with 83% of participants still in contact with other attendees, primarily by Facebook (29%) and mail (16%). Finally, 96% of attendees recommend the ISSP as an effective scientific program.
**Conclusions:** The ISSP is effective in improving engagement with diabetes research, supporting career opportunities, increasing scientific skills and enhancing networking and social connections among young scientists.

## P291
## Changes in insulin dose and diabetes knowledge during a diabetes camp for patients with type 1 diabetes

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**Objectives:** The aim of this study was to evaluate the changes in insulin dose and diabetes knowledge after a week-long residential diabetes camp for patients with type 1 diabetes.
**Methods:** This is a descriptive retrospective study including data of 42 subjects who attended to an Educative Summer Camp in 2014 and 2015. They attended to diabetes education classes during at least one hour per day, practised exercise, used supervised carbohydrate counting method, and took a 32 question diabetes questionnaire at the beginning and at the end of the camp. We collected data on age, duration of diabetes, blood glucose at least six times per day, HbA1c levels before the camp, and the test scores.
**Results:** We evaluated 42 patients diagnosed of Type 1 Diabetes Mellitus, with a mean age of 13.95 years. The average duration of diabetes was 3.67 years. The mean glucose was 151.88 mg/dl, with an estimated HbA1c of 6.92%. The mean HbA1c prior to the camp was 7.38%. The mean insulin dose prior to de camp was 0.78 IU/kg, and at the end of the camp 0.60 IU/kg, absolute difference −20.44%. The mean questionnaire score at the beginning of the camp was 25.73 (80.43% of correct answers), and at the end 29 (90.63% of correct answers).

**Conclusion:** The results showed a decrease in the insulin dose and the HbA1c average, as well as an improvement in diabetes knowledge after a diabetes camp where patients practised exercise, followed a supervised diet and took specific lessons. This could encourage patients and proffesionals to take part into diabetes camps.

## P292
## Trial of diabetes education for staff of Japanese schools with a low incidence of type 1 diabates

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**Objectives:** Incidence of type 1 diabetes mellitus (T1DM) is low in Japan. Many schools have no school nurse, yet school staff members are key people in the school life of children with T1DM. However, their knowledge of T1DM is poor, and those who do have experience with T1DM are unable to share it. Further, cooperation between medical and school staff is slow to improve. We held a workshop for school staff members and evaluated their character and the workshop's effect.
**Method:** Before and nine months after the workshop, staff members who did (WS) and did not (CO) participate in the workshop completed a questionnaire on the necessity of, their self-confidence with respect to, and difficulty with the management of T1DM children. Mean necessity (MNS; scores ranged from 1–5), self-confidence (MSS; 1–5), and difficulty (MDS; 1–10) scores were compared between the two groups.
**Results:** We received responses before and after the workshop from 28 WS and 22 CO participants. Initial MNS for both groups (WS 4.47, CO 4.42) was high. MSS for WS (3.19) was significantly lower than that for CO (3.68; $P < 0.05$), whereas MDS for WS (3.69) was higher than that for CO (2.54; $P < 0.05$). Nine months later, MNS and MSS were unchanged, except that MSS for CO increased (WS: MNS 4.34, MSS 3.34; CO: MNS 4.53, MSS 3.94). MDS increased to 4.19 for WS and 3.29 for CO (no significant difference between groups).
**Conclusions:** The school staff members recognized the necessity of management for T1DM children, but their self-confidence was low. Staff members who had lower confidence and more difficulty in managing T1DM children tended to participate in the workshop. Those who did not participate in the workshop had higher confidence. If they were overconfident, they may not have recognized the importance of such training, and might manage such children inappropriately. Approaches to this problem other than workshops might therefore also be necessary.

## P293
## SPECTRUM CGM education programme: psychological elements of pediatric modules

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Based on experiences in pediatric diabetes education a product-independent CGM program called SPECTRUM was developed with age-appropriate tools and curricula for parents of young children with T1DM, adolescents and adults. It combines practical education on all relevant technical aspects, coaching in structured data analysis with psychological elements to support the acceptance of the device and families´ long-term motivation.

Qualitative data on psychological challenges associated with CGM in pediatric care were assessed by the pediatric team members of SPECTRUM: families' expectations on effort of using CGM, information overload, and frustration due to unexpected glucose fluctuation, young children´s refusal of the device, overreaction to glucose variation and alerts, and adolescents` difficulties using CGM in social situations.

To address these challenges several psychological elements were included in the 5 pediatric modules of SPECTRUM for parents of young children and the 5 modules for adolescents: worksheets on realistic expectations for adolescents and parents; role models on introducing the device to young children; practical aspects of CGM in nursery and school; discussion of parents' and adolescents' emotional reactions on alerts and unexpected glucose variation, e.g. coping with feelings of guilt, anxiety or learned helplessness; cognitive behaviour techniques to prevent from overreaction on hypo alarms; step-by-step introduction of different alarms to prevent children, parents and other carer from overload; worksheets to support positive parent-adolescent cooperation ("coaching contract"); role models for focussing on successes at structured CGM data analysis.

SPECTRUM strives for qualified, structured information on CGM for young people with T1DM and their families and also for supporting their motivation to sustainably use CGM and improving their quality of life. An evaluation of SPECTRUM will be done within the framework of a clinical trial.

## P294
## Diabetes care at your doorstep - DAUD: an educative support

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Education is a one of the strongest pillars for the basis of good glycemic control. Our team at Diacare has come up with this ground breaking idea of "**DAUD- DIABETES CARE AT YOUR DOORSTEP**". A team of well trained diabetes educators along with a diabetic nurse visit all our T1D patients at their place of residence. Here they go through a detail history of the patient, including their medical history, anthropometric data, SMBG charts, meal patterns, previous and current glycemic patterns. Based on this the parents, family and siblings along with the patient are counselled and educated on ways to improve their glycemic variability and their Quality Of life(QOL). The unaffordable patients are provided with essential amenities - insulin, syringes, glucometers and strips through our various programs - CDIC, LFAC, Diacare trust, RSSDI. In this manner we have been able to create 20 centres of references or "satellite centres" as we name them, across the state of Gujarat. An additional support through the availability of smart-phones is provided for day to day contact in form of DAUD mobile application which tracks the progress of the patient. We are trying to acquire support for providing smart-phones to the unaffording population too. All the patients shall be tracked and encouraged to stay on the platform in the future. The kids and adolescents are also counselled and helped to be independent and if they are interested they are trained to become diabetes educators.

This endeavour has helped us in multiple ways:

1. Improve level of diabetes education, awareness and knowledge about diabetes complications.
2. Improve the glycemic status.
3. Improve QOL
4. Remove the prejudices and taboos against T1D.

5. Empower these patients to take care of their own situation.
6. Make them independent by opening them to variety of career choices.
7. Creation of our own type 1 diabetes registry for proper follow up and management of the patients.

## P295

## Epidemiological data of type 1 diabetes mellitus in children in Uzbekistan, 1998–2014

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**Objectives:** We aimed to determine the incidence, prevalence and mortality of type 1 diabetes (T1D) in Uzbekistan in children < 15 years old.
**Methods:** In a prospective study from 1998–2014, we ascertained incidence, prevalence, mortality, and cause of death via data collected by regional endocrinology dispensaries in Uzbekistan's 14 administrative divisions. Time trends were evaluated using Poisson regression. Additionally, data from a national audit in 2011 was used to determine age structure for new T1D diagnoses between 2008–2010.
**Results:** Over 1998 to 2014 T1D prevalence roughly doubled (7.8 to 15.3 / 100,000 population aged

<15 years, p = 0.10), following a doubling of incidence (1.5 to 3.1 /100,000 < 15 years), 5.6% annualised increase, p = 0.001), with a fall in mortality per 1,000 patient years (24.5 to 2.0, p = 0.001). There was a female preponderance, with a male:female ratio 0.89 in 2008–2010.

In every year, T1D incidence was highest in the 10–14.99 year age-group, although the proportion of diagnoses under 5 years of age increased from 6.0% of total diagnoses in 1998–2002, to 13.4% in 2008–10. Peak age of onset in 2008–2010 was 13 years. Notable regional variation was evident, with incidence being highest in Tashkent-City (p = 0.005, one-way ANOVA).

The commonest cause of death was chronic renal failure - responsible for 18 out of 50 deaths in children < 15 years from 2003 to 2014.
**Conclusions:** Our results provide the first long-term epidemiological data for T1D in Uzbekistan and the region. Uzbekistan is country of low but rising T1D incidence and prevalence, and falling mortality. Attention to improving clinical care is warranted, to reduce long-term complications.

## P296

## Advance in insulin therapy of Japanese pediatric and adolescent type 1 diabetes: the cohorts of the childhood-onset type 1 diabetic patients in Japanese study group of insulin therapy for childhood and adolescent diabetes (JSGIT)

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**Objective:** The aim of this study was to clarify whether the introduction of multiple daily injection, insulin analogues and CSII for insulin therapy in Japanese pediatric and adolescent type 1 diabetes since 2000 to 2014.
**Methods:** We compared insulin regimens, HbA1c among three cohorts of childhood-onset type 1 diabetic patients in JSGIT, 786, 852 and 1078 patients, in 2000, 2008 and 2013 cohorts.
**Results:** The frequency of multiple daily injection using regular and NPH-insulin, and CSII were 55% and 0.3% in 2000. The frequency of multiple daily injection using rapid acting and basal long acting insulin analogs, and CSII were 70% and 26% in 2014. The regular and NPH-insulin were rarely used in 2014. HbA1c was 8.6% in 2000, 8.2% in 2014. HbA1c has been improved before and after using basal long acting insulin analogs. The frequency of CSII in 0–5 year's old patients was 40% in 2014.
**Conclusions:** The insulin therapy advanced greatly by using insulin analogs and CSII since 2000 to 2014.

## P297

## Update of trends in childhood type 1 diabetes in Germany

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**Objectives:** To estimate updated age- and sex-specific time trends of childhood type 1 diabetes (T1D) in children 0–14 years of age in North Rhine-Westphalia, Germany, in the period 1996–2014 with an average risk population of 2.687 million children.
**Methods:** Newly diagnosed T1D cases were ascertained by means of three data sources: a prospective hospital-based active surveillance system (ESPED), annual inquiries among practices, and a computer-based documentation system for quality control and scientific research in diabetes care (DPV). Completeness of ascertainment was estimated by the capture-recapture-method. Point and interval estimates (95% CI) of incidence rates (per 100,000 person-years) were based on Poisson distribution. Age- and/or sex-standardized rates were estimated by the direct method using equal weights. Poisson regression analysis was applied to assess time trends.
**Results:** Between 1996 and 2014, 11,774 newly diagnosed children with T1D aged 0–14 years (6,209 boys, 5,565 girls) were registered. Ascertainment was estimated to be 99.1% complete. The overall incidence rate was 22.8 (22.3-23.2). The incidence among boys was higher than among girls (23.4 vs. 22.1, p = 0.002). Age-specific estimates for age groups 0–4, 5–9, 10–14 years were 15.9, 25.6, 26.8, respectively (p < 0.001). The average annual incidence increase was estimated at 3.0% (2.7%-3.4%) with no difference between boys and girls (3.1% vs. 2.9%, p = 0.412). Age-specific trends were similar among boys (0–4, 5–9, 10–14 years: 2.5%, 3.3%, 3.3%, p = 0.407) but varied significantly among girls (0–4, 5–9 and 10–14 years: 3.1%, 3.6% and 2.0%, p = 0.023).
**Conclusions:** This study confirmed the incidence of childhood T1D in Germany to increase steadily. Interestingly, differential trends between sexes were observed among 10–14 year-old children. Further research is needed to identify causes of the continuous rise of diabetes incidence and in particular of differential trends between sexes.

## P298

## The onset age of type 1 diabetes in Polish children from Wielkopolska province has become younger

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**Objectives:** In Poland, the first epidemiological register was conducted in Wielkopolska (1970–1985), where the estimated average incidence rate was $4.4/10^5$ in children aged 0–16 years. The next data (1998–2003) showed the growing trend with incidence rate around $11.2/10^5$ in children aged 0–14 years and with highest incidence peak in children aged 10–14 years. We aimed to assess the current incidence of type 1 diabetes (T1DM) in children aged 0–14 years from Wielkopolska, Poland.
**Methods:** The analysis involved new cases of T1DM that were recorded in Childhood Diabetes Registry from 2008 to 2014. The denominator for the analysis were children ≤14 years with permanent residency in the study area. Total, sex-, and age-specific incidence rates per 100,000 person-years were calculated for each calendar year. A direct standardization method was used to estimate age and sex standardized rates. The 95% CI was calculated using the Gaussian approximation to the Poisson log-likelihood. The demographic date was obtained from the Statistical Office in Poznan.
**Results:** 695 new cases of T1DM: 309 girls and 386 boys were identified from 2008 to 2014. The mean age was 9.0 ± 4.4 years. The trend for increased incidence of T1DM has been observed in children aged 0–14 (**2008: 15.6/$10^5$**, 95% CI: 8.6-22.4; **2014: 22.9/$10^5$**, 95% CI: 17.9-27.9). The highest annual incidence was reported among those aged 5–9 years (**2008–22.8/$10^5$**- 95% CI: 15.6-30.0; **2014–28.8/$10^5$**- 95% CI: 21.1-36.2). The fastest incidence increase was found in the youngest age group
(**2008–7.1/$10^5$**, 95% CI: 3.2-11.0; **2013–17.4/$10^5$** , 95% CI: 11.5-23.2; **2014–13.9/$10^5$** , 95% CI: 7.9-19.9).
**Conclusions:** The incidence of T1DM raised up in Wielkopolska, predominantly in the younger age-groups. The highest incidence peak was observed in children aged 5–9 years. Such rapid increase in very short period rather is associated with environmental factors than changing in genetic background.

## P299

## Characteristics of type 1 diabetic patients attending a winter diabetic camp in Mauritius

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**Introduction:** Diabetic camps have become an integral part in the life of people with type 1 diabetes and a different setting to improve DSME (Diabetes Self-Management Education).
**Aim:** To determine the characteristics of type 1diabetics attending a winter diabetic camp in Mauritius.
**Methods:** During a 7-day camp, organised by T1Diams (Type 1 diabetes mellitus support) non-governmental organisation, the epidemiological data of 27 Type 1 diabetic patients was collected and compiled on a personal computer. The data was analysed on Microsoft Excel®. Clearance was obtained from the managing committee of the organisation.
**Results:** 27 patients attended all the 7 seven days. 11 male and 16 female patients were present with mean age of 16.3 years ( 16.5 years male and 16.1 years male).The mean age of onset of diabetes was 9.96 +/− 4.5 years. On average they attended the camp 4.4 times during the last 8 years. Mean weight was 52.1 +/− 10.7 kg, height 160 +/− 8 cm and a BMI 20.3 +/− 3.68. No patient on insulin pump, 1 patient was on a twice daily insulin injection and the rest on basal-bolus insulin regimen. The average ratio of rapid acting insulin to long-acting insulin was 1.55 +/− 0.65.
**Conclusion:** This study is the first of its kind ever conducted in the only residential diabetes camp in Mauritius. Data compiled on the diabetic camp by T1Diams has established the benchmark for future studies.

## P300

## Association of rs7093069- IL2RA and rs7647305-SFRS10 polymorphisms with diabetes type 1 in children

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**Background:** The etiology of diabetes type 1 is multifactorial and involves genetic and environmental factors. Family and population studies confirmed the strong genetic influence and inheritability in the development of these diseases. Most papers evaluating the relationship of rs7093069 and rs7647305 polymorphisms with lipid metabolism and obesity. Possible differences in overexpression of the IL2RA, SFRS10, ETV5 and DGKG genes polymorphisms on diabetes type 1 remain unclear.
**Objective and hypotheses:** To identify the association between polymorphisms of IL2RA, SFRS10, ETV5 and DGKG genes and diabetes type 1.
**Method:** The study was performed in 94 patients with diabetes type 1 and 160 healthy volunteers. The two single nucleotide polymorphisms (SNPs): rs7093069 - IL2RA and rs7647305 - SFRS10, ETV5 and DGKG were genotyped by TaqMan SNP genotyping assay using the real-time PCR.
**Results:** Rs7093069 T alleles were more frequent in patients with diabetes type 1 in comparison to control($p < 0.005$ with OR = 2.9). Rs7647305 T alleles were more frequent in patients with type 1 diabetes in comparison to control ($p < 0.005$, OR = 2.5).
**Conclusion:** Rs7093069 T/T and rs7647305 T/T polymorphisms could contribute to development of diabetes type 1. The main risk factor for 7093069 is T allele. In case of rs7647305 the main risk factor is also allele T.

## P301

## Higher C-peptide, higher neutrophil and lower natural killer peripheral counts at type 1 diabetes onset - biomarkers for a longer remission phase?

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**Introduction:** The natural history of Type 1 Diabetes (T1D) develops through distinct phases with particular immunologic and metabolic features. In remission phase a partial and transient restoration of endogenous insulin production occurs.
**Objective:** To identify clinically useful biomarkers for longer remission phase.
**Methods:** Prospective evaluation of 28 T1D children in three disease time-points (T1-onset; T2-remission phase; T3-established disease). Patients and 28 age-matched controls PB samples were analyzed by

flow cytometry. Metabolic data were prospectively collected. In this data subset, relations between cellular populations, metabolic data and remission phase duration were explored.

**Results:** 28 T1D children aged 5-16y (mean 10 ± 2,6y), 46% male. T1 samples were collected 4 ± 2 days after diagnosis (mean ± SD); T2 occured at 111 ± 45 and T3 at 397 ± 106 days. C-peptide level was positively related to remission time (r = 0,389; p = 0,05). Children with C-peptide levels >0,4 at T1 had higher neutrophil counts (p = 0,03). Relative neutrophil count at onset was positively related to remission duration (r = 0,412; p = 0,03). Inversely, NK count in T1 was negatively related to remission phase duration (r = −0,538; p = 0,003). At remission phase entrance, children with lower C-peptide (<0,4) had significantly lower neutrophil levels (p = 0,02), higher Th1 (p = 0,04) and total IFN-producing cells (p = 0,05). Neither Th17/Tc17, Th1/Tc1 nor Treg related significantly with remission phase time.

**Conclusions:** Higher peripheral neutrophils may signal less pancreatic infiltration and therefore a less severe initial beta-cell mass destruction. That translates into higher C-peptide levels at disease onset and eventually a longer remission phase. Lower NK counts may predict a longer remission phase due to increased pancreatic migration with a possible protective role in insulitis. Immunologic characterization along the natural history of T1D may disclose biomarkers to direct future immune interventions.

## P302
## Waxing and waning autoimmune measures: are autoantibodies a useful measure two years after diabetes diagnosis?

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**Objectives:** To assess the autoantibody (Ab) status and factors associated with presence or absence of Ab two years after clinical diagnosis of Type 1 Diabetes (T1D).

**Methods:** T1D patients diagnosed between 12/2004 and 6/2008 with minimum of 3 Ab measured at both onset of T1D and 2 years after diagnosis were included (n = 141): age 9.5 ± 4 (1.2-18.9) years, 96% Caucasian, 59% male. Measures of T-cell autoreactivites to 10 analytes, Ab (GADA, IA-2A, IAA, ICA) and BMI percentile at onset and 2 years were collected. IAA only drawn within 7 days of beginning insulin therapy.

**Results:** At baseline 11 (8%) of those with clinically diagnosed T1D were negative for all measured Ab [ 21 (15%) 1 Ab+; 46 (33%) 2Ab+; 50 (35%) 3Ab+; 13 (9%) 4Ab+]. Two years after diagnosis 3/11 (27%) of those originally Ab negative were positive for one Ab. Of those with positive Ab at baseline, 40/130 (30%) were negative for an Ab that was measured positive at baseline. Those individuals who lost at least one Ab were more likely to be younger age; 8 ± 4 years (lost Ab) vs. 11 ± 4 years (no change Ab) (p = 0.01). There was no difference in gender, race or BMI in those with unchanged Ab compared with those losing Ab. Twelve subjects (8%) were Ab + at baseline but negative at 2 years (all of these individuals were positive for diabetes associated T-cells). GADA was Ab that most commonly converted from positive at baseline to negative at 2 years (26/141 (19%)) [IA-2A (10/141 (7%)), ICA (13/141 (9%))].

**Conclusions:** The autoimmune process in T1D is continuously evolving, even after T1D diagnosis. Those who are younger at diagnosis tend to have more rapid conversion to negative Ab, possibly supporting the concept that the autoimmune process evolves more rapidly in this young group. Given that 10% of patients with clinical T1D and positive responses to T1D associated T-cells were Ab negative at 2 years indicates that Abs may not be useful tool to assess diabetes "type" more remote from the time of diagnosis.

## P303
## Corelation among whole genome methylation status and line-1 expression in various age grouop of diabetic rat brain

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**Objectives:** Emerging data suggest that epigenetics also play a key role in the pathogenesis of diabetes. LINE 1 is an autonomous, non-LTR retrotransposon and the L1 retrotransposons constitute around 17%, of the human, mouse and rat genomes respectively. Transposable elements make up sizeable components of all eukaryotic genomes, varying from 14% to over 80%. Retroelements constitute a predominant class of elements in eukaryotic genomes and subdivided into two categories: LTR elements and non LTR elements. The mammalian genomes contain a preponderance of non-LTR retroelements. Under normal physiological conditions, the retroelements remain by and large transcriptionally silent but are activated in response to biotic and abiotic stress conditions. Our objectives were to study the transcriptional expression of L1Rn elements in different brain regions of epileptic rats and correlate with corresponding DNA methylation levels.

**Methods:** Real time PCR analysis using RNA isolated from various brain regions and various tissues from old and young wistar rats of both diabetic and control rats was carried out to determine the change in L1 transcripts. DNA methylation assay was performed using COBRA method.

**Results:** There was no significant change in the expression of L1Rn in various brain regions of 2 month old and 18 month old rats except cerebral cortex.

**Conclusion:** In conclusion, the degree of hypomethylation in promoter CpG islands in LINE-1 repetitive sequences do play essential role in LINE-1 element expression. Besides tissue specific factors do play pivotal role in LINE-1 expression.

## P304
## The efficacy of vitamin D supplementation on the improvement of serum 25-hydroxyvitamin $D_3$ status and HbA1c levels in pediatric patients with type 1 diabetes mellitus

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**Background:** Recently, studies have outlined clinical evidence on the non-classical role of vitamin D in type 1 diabetes mellitus (T1DM). Multiple studies have suggested a link between vitamin D deficiency in early life and the development of T1DM later in life. Local data has shown a significant proportion of T1DM patients with Vitamin D inadequacy.

**Objective:** This study aims to study the effect of Vitamin D supplementation on the Vitamin D status and HbA1c levels of T1DM pediatric patients with vitamin D inadequacy.

**Subjects and Methods:** A prospective cohort, interventional study of 34 subjects with Type 1 diabetes mellitus ( 21 females, 13 males ), with mean age of 14.5 ( SD 5.23, 11.07-18.49 ), with mean duration of T1DM of 5.74 years. All subjects had

(1) a diagnosis of diabetes following the ISPAD guidelines diagnostic criteria,

(2) had baseline measurements of 25(OH)D, HbA1c, ALT, Creatinine, and Sun Exposure Score,

(3) received Vitamin D supplementation, and

(4) had post-supplementation measurements of 25(OH)D, HbA1c and Sun Exposure Score.

**Results:** At baseline, Vitamin D deficiency was noted in 100% of the subjects. Further, 64.71% of the subjects had poor glycemic control. Post-supplementation, Vitamin D levels improved, with 11.76% of subjects having sufficient levels and 58.82% having insufficient levels. However, 61.76% of subjects still had poor glycemic control. There was an increase in 25(OH)D level post-supplementation ( $p < 0.01$ ). However, no significant change in HbA1c levels was noted ( $p = 0.32$ ).
**Conclusion:** Vitamin D deficiency is prevalent in patients with Type 1 Diabetes Mellitus. Vitamin D supplementation was associated with a statistically significant increase in 25(OH)D levels. Despite this, there was no statistically significant change in the HbA1c levels of the subjects. There is a need to look at other factors contributing to the glycemic control of these subjects.

## P305
## Clinical profile and outcome of children with diabetic ketoacidosis: type 1 diabetes mellitus a real challenge for low income Nation

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**Background:** The objective of the study was to study clinical profile and outcome of DKA children in Nepal. Nepal is a poor and developing nation and childhood diabetes is a real challenge.
**Methods:** We retrospectively analysed the case records of 30 children (17 boys and 13 girls) with type 1 diabetes mellitus admitted to our hospital from January 2010 to August 2015. They were managed using a standard protocol including intravenous fluids and insulin infusion. Data was analysed by using SPSS version 21.
**Results:** The median age at presentation was 9 years. Among 30 diabetic children 21 were presented with severe diabetic ketoacidos. Polyuria with polydipsia was the commonest clinical presentation. All of them had elevated HbA1C levels and length of stay in the paediatric intensive care unit was 3.9 days. The median time for the arterial blood gases to become normal was 20 hours and for urinary ketones to become non-detectable was 26 hours. Severity of diabetic ketoacidosis was significantly associated with the presence of infection, history of omission of insulin, poor compliance, and presence of shock at time of presentation, length of stay in the hospital, final outcome ($p < 0.01$ for each of these associations). Only one child was expired due to DKA and rest all children were doing well on follow up.
**Conclusion:** The outcome of active management of diabetic ketoacidosis in children is rewarding. Parents should understand the importance of the need for regular insulin injections and regular monitoring of blood glucose.
**Keywords:** Type 1 diabetes mellitus, DKA, blood glucose.

## P306
## Clinical profile and outcome of Type 1 diabetes mellitus in tertiary care centre of Eastern Nepal

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**Ojective:** The objective of this study was to study the clinical profile and outcome of patients admitted with Type 1 diabetes mellitus in tertiary care centre of Eastern Nepal.
**Method:** A prospective descriptive study was carried out in the Department of Pediatric and Adolescent medicine, at BPKIHS, Dharan, which is a tertiary care centre in Eastern Nepal from January 2014 to February 2015. Details of socio-demographic, clinical, laboratory, treatment and outcome parameters were recorded in a pre-designed proforma. Data was analysed using SPSS version 21.
**Results:** Out of 24 samples, median age was 11.5 yrs(range = 4–18 yrs). Females were 58.3%. 66.7% were admitted with DKA. Most patients were from lower socio-economic status and rural background. The classical symptoms were polyuria, polydipsia and polyphagia were present in all cases. 46% were newly diagnosed. 37.5% presented with DKA at onset.
**Conclusion:** Type 1 diabetes mellitus though not curable is a treatable disease. Besides compliance to insulin, self monitoring of blood glucose, dietary restrictions and regular follow-up, compassionate counseling plays a major role in achieving good glycemic control is important to avoid life threatening complications like Diabetes ketoacidosis.
**Keywords:** Type 1 diabetes mellitus, DKA, blood glucose

## P307
## Maximising diabetes care in resource poor setting

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**Background:** Diabetes mellitus disease now at global epidemic proportions with developing nations to shoulder as much as 75% of the global diabetes burden by 2035 portrays a developing nations diabetes emergency on the horizon. Sub-Saharan - the worst hit by HIV/AIDS on the globe also records high prevalence and deaths from either diabetes or both. HIV therapies are known to influence obesity and predispose clients to obesity and diabetes whereas HIV/AIDS itself damages the immuno-neurological processes over time, leading to AIDS associated dementia and others.
**Methods:** Pilot study from December 2014 of identifying the diabetic foot neuropathy needs in diabetics with immuno-compromised disease and addressing them amid several complex disorders by conducting routine bi-monthly neurological assessment using tools like 10 g monofilament, hand held doppler, thermometer and blood pressure cuff. The study anticipates incorporating annual routine HIV testing to all 68 registered diabetic clients and providing timely and appropriate interventions.
**Results:** The study is ongoing with no results yet, but the complexity of enormous health issues point to an urgent need of addressing diabetes in HIV/AIDS.
**Conclusion:** HIV/AIDS and diabetes are serious interwoven health complications that enormously weigh down poor family funds, overstretch already burdened health care by many other diseases, few staff and limited funds. The main goal of this study is prioritising neurological assessment of all registered diabetics so as to enhance quality of life of diabetics especially in HIV.

## P308
## Risk factors for poor metabolic control and mortality in diabetic children in Cameroon

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**Introduction:** Although the management of diabetes in children is free of charge in Cameroon, majority of children followed have a poor metabolic control. To address that issue, the present work aimed to identify factors related to poor metabolic control to see either there are modifiable or not.
**Methods:** A cross sectional study, including diabetic children followed for at least a year in the 9 clinics of the country. Socio demographic, education and nutritional variables were studied, related to HbA1c through a logistic regression. Incomplete files and rare diabetes (e.g. lipoatrophic) excluded. Data were analysed through Excel and Epi info software.

One hundred and fifteen patients were included from which 83 boys. Median age was 17 years. Low mother educational level, been orphan, living far from the clinic appeared to be the most relevant risk factor for poor glycaemic control.

**Conclusion:** Poor glycaemic control is found mostly in situation of precarity, suggesting a more intensive and educational strategy for children living in that condition in a holistic approach.

## P309
## 60 hours hybrid-closed-loop (HCL) in everyday life: the DREAM5-study

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**Introduction:** Previous DREAM studies showed the safety of the CE-marked closed loop (DreaMed Substance Administration System©) in overnight use (1 night, adolescents) at a Camp and at home (4 nights, all age groups).

The actual aim was to evaluate the system for a 60 hours continuous use, weekend time at home without remote monitoring.

**Methods:** All subjects had in randomized order one weekend with sensor-augmented pump therapy (SAP) or HCL: in the intervention arm only the amount of carbohydrate was entered into the bolus calculator, the rest of insulin dosing was delivered automated and wirelessly by a tablet computer.

Primary endpoint was the percentage of glucose values between 70–180 mg/dl.

**Results:** 5 adults, 5 adolescents, 5 children (10f, 5 m) experienced in sensor use were included: (median, [IQR]): age 16.8y [12.9-18.5], diabetes duration 10.66y [7.1-13.8], pump use 10.7y [5.3-12.6], HbA1c 7.6% [7.2-8.2].

After evaluating adolescents and adults, glucose (mean[IQR]) was 173[163,186] mg/dl vs. 156[141,184] mg/dl, SAP vs. HCL, p = NS).

Percentage of time in 70–180 mg/dl was 50.2% [44, 67] vs. 67.8% [44, 75], p = NS).

No events of ketosis or severe hypoglycemia were observed.

7 events < 60 mg/dl in SAP- and 8 in HCL-use occurred.

**Discussion:** The results confirm the security of this HCL in an „around the clock"-use. The system is safe and effective in use as well as in administration of automated corrections.

The "missing" remote monitoring did not lead to a worsening of results or rising of dangerous events.

| | SAP | HCL |
|---|---|---|
| Time in 70–180 mg/dl [%] | 50.2 [44, 67] | 67.8 [44, 75] |
| Mean Sensor Glucose ± STD [mg/dl] | 173 [163,186] | 156 [141, 184] |
| Mean SMBG [mg/dl] | 211.60[173, 250] | 146.14 [137, 181] |
| Area_Above 250 mg/dl [mg/dl*min] | 12822.5 [4250, 40607] | 8874.75 [1740, 11565] |
| Area_Below63 [mg/dl*min] | 175.0 [0, 350] | 179.9 [0, 1495] |
| Time in 80–120 mg/dl [%] | 16.4 [8, 21] | 23.9 [16, 37] |

*[Comparison of Periods]*

## P310
## Virtual pump clinic toward diabetes home care model for children and their families

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**Aims:** The aim of the project was to study impact of virtual pump data analysis on glycaemic control, patient satisfaction to enable patient empowerment and better home management of diabetes. The impact of the practice on acute glycaemic events and hospital admissions were analysed.

**Methods:** A prospective analysis was performed on virtual pump clinic consultations over a period of 6 months.

The families were advised to upload the pump data at least once between clinics. The data was analysed by the Paediatric Diabetic MDT on twice weekly open basis on Tuesday and Friday pm. The families would either text, email or call the team to alert them with their list of concerns, analysis and solutions to the issues for the MDT to address.

The families were asked to attempt adjust dose regimes first which was reviewed and validated or altered by the MDT team. This enabled patient empowerment and a very satisfying patient experience.

**Results:** 31 children were on pumps out of the 140 patients. The maximum change in HbA1C was 36 mmol/l. The average A1C was 55.6 mmol/l with a median change in A1C of 3. 43-mmol/l. There was a reduction in the number of calls to the MDT with poor compliance in the study period. There were no admissions with acute complications like DKA in that period. The confidence of the patients using the service improved dramatically.

**Conclusions:** Virtual pump clinic is an innovative approach to patient care embracing the evolving technology for empowering patients toward self management of the children's diabetes by their families from the comfort of their homes. Confidence in approaching their own care and continuing care is the key to achieving better health standards and this was reflected in the mean A1C at 55.6 mmol/mol (national average 75 mmol/mol). The reduction in acute admissions with DKA delivered better care and had cost saving benefit. Patient experience had tremendously improved in this big leap toward home care diabetes model.

## P311
## Use of professional continuous glucose monitoring in children with type 1 diabetes mellitus: an open label randomized control trial

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**Objective:** To assess efficacy of insulin dose adjustments, based on data from p-CGM and SMBG, in improving glycemic control when compared to SMBG alone.

**Methods**

*Participants:* Children (2–10 years) with Type 1 diabetes mellitus (T1DM) for at least 6 months, on basal-bolus insulin regimen and self monitoring of blood sugars (SMBG). Children having DKA within 2 months prior to enrolment were excluded.

*Intervention:* Children in Intervention group underwent professional continuous glucose monitoring (p-CGM) (iPro®2 Professional CGM, Medtronic, USA) for 3–5 days along with SMBG. Control group had only SMBG.

**Objective:** To assess efficacy of insulin dose adjustments, based on data from p-CGM and SMBG, in improving glycemic control when compared to SMBG alone.

**Outcome:** Change in HbA1c 3 months after p-CGM.

*Randomization:* It was done using computer generated random number list. Group allocation was concealed from investigator and participants using opaque sealed envelopes.
**Results:** *Numbers randomized*: Out of 310 patients screened for eligibility a total of 68 patients were randomized, 34 each to either arms.
*Recruitment:* closed
*Numbers analyzed*: Thirty children in intervention group and 33 in control group. Intention to treat analysis was also performed.
**Outcome:** There was more decrease in unit change in HbA1c, percentage of low sugar records and total insulin requirement per day, after 3 months follow-up, in intervention group when compared to controls. However, they were not significant except for total insulin Units/kg/day (p value 0.014). In sub-group analysis of children with baseline HbA1c > 7.5%, there was a significant mean fall of HbA1c by 1.27%.
*Harms:* Two patients had premature removal.
**Conclusions:** Addition of p-CGM along with SMBG may help in adjusting insulin dose more effectively especially in children with higher baseline HbA1c.
*Trial registration:* Clinical Trial Registry of India (CTRI) (REF No 2015/04/008867).
**Funding:** None

## P312
## CGM-based treatment decisions with the Dexcom G5 Mobile CGM System is safe and effective for both adult and pediatric type 1 patients

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**Objective:** The objective of this human factors study was to conduct a validation test on critical knowledge related to replacing self-monitoring blood glucose testing for diabetes treatment decisions with the Dexcom G5 Mobile CGM System and to evaluate the ability to support safe and efficacious training of the system.
**Methods:** The study included a total of 49 participants with diabetes and divided in 3 user groups using intensive insulin therapy - adults (≥ age 18; n = 16); self-managing children/ adolescents (age 12–17; n = 17); caregivers (n = 16). A risk assessment was completed to identify the highest risk tasks when using the Dexcom G5 as well as non-adjunctive use. Several scenarios were tested - stacking insulin using SMBG and when to use/not use CGM to determine a treatment decision. Each participant used the tutorial for self-training or 1:1 training with their healthcare professional for their instruction. A small sample of CGM experienced participants (n = 9) received no training and then all participants were tested on their knowledge.
**Results:** The results of the study suggested that there were no significant differences between the two formal training methods: self-training and 1:1 training. Participants who were formally trained achieved a 99.5% success rate across the high risk scenarios using CGM for treatment decisions. 7 failures were observed in the scenario related to insulin stacking with SMBG, showing that insulin stacking is not a unique risk to using CGM. Participants who did not receive formal training achieved a 91% success rate across the high risk scenarios using CGM for treatment decisions.
**Conclusions:** Based on the usability testing performed in the Summative Usability Study, the critical knowledge is effectively communicated in the training and Instructions for Use, and non-adjunctive use risks of the Dexcom G5 are largely mitigated. Thus, safe and effective use of the Dexcom G5 for CGM-based decision making is concluded.

## P313
## Safe hypoglycaemia prevention in children with type 1 diabetes by using SmartGuard™ algorithm in sensor-augmented pump therapy: post suspension glycaemic control depends on users behaviour

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**Background:** Sensor-augmented insulin pump (SAP) with MiniMed®640G system features the SmartGuard algorithm which stops insulin delivery based on predicted sensor glucose levels. This offers prevention of hypoglycaemia.
**Methods:** The prospective, multicenter study in pediatric patients assessed 6 weeks of SmartGuard use after a 6 week run-in phase with SAP (without automated suspension). The setting for SmartGuard was "suspend before Low 70 mg/dL" Primary outcome was the potential reduction in the frequency of hypoglycemic episodes and hypoglycemic intensity (AUC and time < 70 mg/dl). Post suspension glycemic values were evaluated in context to management during hypoglycemia.
**Results:** 24 Patients (age:11,7 ± 5,1y; T1D duration 7,2 ± 4,2y, CSII:5,9 ± 4,4y, CGM:0,8 ± 2,0y; $HbA_{1c}$:7,5 ± 0,6%,BMI:19,2 ± 2,5 kg/m2) took part of whom 18 followed strictly the protocol.3.15 ± 1.03 predictive suspensions per day were observed, no severe hypoglycemia occurred. Time in suspension was 155 ± 47 min/d, In comparison number of excursion ≤ 70 mg/dL/d (1,02 ± 0,52 to 0,72 ± 0,36;p = 0,027), AUC < 70 mg/dL [mg/dl*d] (0,76 ± 0.73 to 0,38 ± 0,24;p = 0,027),time/day ≤ 70 mg/dl (73 ± 56 min to 31 ± 22 min) were lower in phase 2.

The table shows the superiority of non-acting when SmartGuard is triggered.
**Conclusion:** SmartGuard is a safe approach to reduce the risk of hypoglycaemia in pediatric age; best results are met without human intervention. This approach should be included in future education sessions.
*[: Average values at / during / after activation o]*

| | Glucose value at begin of insulin suspension [mg/dl] | Glucose value at resume of insulin infusion [mg/dl] | Minimal Glucose value during suspension [mg/dl] | Glucose value 1 h after resume of insulin infusion [mg/dl] | Time of suspension [min] |
|---|---|---|---|---|---|
| **24 hours (all)** | 105,0 ± 7,5 | 103,4 ± 11,1 | 85,1 ± 13,8 | 162,0 ± 15,1 | 58,8 ± 7,1 |
| **During day (08 am - 10 pm)** | 105,6 ± 8,7 | 104,3 ± 10,4 | 84,3 ± 15,0 | 174,4 ± 17,7 | 54,1 ± 8,1 |
| **During night (10 pm - 08 am)** | 102,4 ± 5,4 | 101,4 ± 12,1 | 87,4 ± 12,0 | 137,3 ± 13,8 | 67,9 ± 13,1 |
| **Without meal during/after suspension** | 106,6 ± 3,6 | 104,0 ± 10,7 | 83,4 ± 8,5 | 138,7 ± 10,3 | 66,3 ± 8,2 |
| **With meal during/after suspension** | 109,5 ± 3,0 | 109,5 ± 3,0 | 81,0 ± 10,6 | 190,8 ± 26,5 | 50,7 ± 11,4 |

## P314

## Physical activity (PA) in youth with type 1 diabetes (T1D): variable impact on metabolic outcomes

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**Objectives:** PA is often associated with favorable metabolic parameters due to enhanced insulin sensitivity and higher lean body mass. We studied associations of frequency and amount of PA with metabolic measures in 136 youth aged 8–17 y/o with T1D.
**Methods:** Youth reported frequency, amount, and type of PA in a typical week; moderate and vigorous PA (4 and 8 METs, respectively) were combined. Youth were compared by frequency of PA (0–5 vs 6–7 days/week (d/wk)). Blood was assayed for glycemic control (A1c; 1,5-anhydroglucitol (1,5-AG)) and lipids. Body composition was assessed by DXA. Clinical data (e.g., insulin dose, zBMI, BP) were obtained by chart review.
**Results:** Youth (49% male) were 12.8 ± 2.6 y/o, with T1D for 5.9 ± 3.1 yrs, A1c 8.1 ± 1.0%, 70% pump Rx, BG monitoring 5.7 ± 2.4 X/d. Median PA was 9.5 hours/wk (range 0–42); 6% had PA 0 d/wk, 17% 1–3 d/wk, 29% 4–5 d/wk, 49% 6–7 d/wk. Youth with PA 6–7 d/wk were more likely to be male (62% vs 38%; p = .002), younger (12.3 ± 2.5 vs 13.4 ± 2.5 y/o; p = .01), with shorter T1D duration (4.8 ± 2.6 vs 7.0 ± 3.2 yrs; p < .0001) than youth with PA 0–5 d/wk. Many metabolic parameters differed between PA groups (Table). No variables were significantly correlated with total hr/wk of PA when adjusting for d/wk of PA.
**Conclusions:** These data in T1D youth suggest that PA frequency favorably impacts insulin resistance, body composition, lipids, and possibly glycemic excursions (1,5-AG). Further research is needed to determine a means to improve A1c with PA.

| | PA 0–5 days/week (n = 70) (51%) | PA 6–7 days/week (n = 66) (49%) | P value |
|---|---|---|---|
| zBMI | 0.8 ± 0.7 | 0.5 ± 0.9 | 0.05 |
| Fat mass (%) | 30 | 25 | <0.0001 |
| U/kg/day | 1.0 ± 0.3 | 0.9 ± 0.2 | 0.03 |
| A1c (%) | 8.1 ± 0.9 | 8.1 ± 1.2 | 0.7 |
| 1,5-AG (μg/mL) | 2.9 ± 1.8 | 3.7 ± 2.1 | 0.02 |
| Total cholesterol (mg/dL) | 169 ± 31 | 162 ± 24 | 0.19 |
| Triglycerides (mg/dL) | 118 ± 61 | 103 ± 50 | 0.09 |
| HDL / LDL (mg/dL) | 54 ± 13 / 91 ± 26 | 59 ± 14 / 81 ± 21 | 0.04 / 0.04 |
| BP (SBP / DBP) (mmHg) | 110 ± 7 / 67 ± 5 | 108 ± 7 / 66 ± 6 | 0.07 / 0.3 |

*[Metabolic parameters by frequency of PA]*

## P315

## Detection of common pathogenic genes in children with special type of diabetes mellitus and its clinical application

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**Objectives:** To explore the clinical value of common pathogenic gene detection in the diagnosis and treatment in hyperglycemia infants and children.
**Subjects and Methods:** Subjects were in-patients with hyperglycemia, age of onset before 1 year-old,or insulin antibody negative and with family history of diabetes. Gene sequencing for *ABCC8*, *KCNJ11*, *INS* and *GCK* were performed and potential mutations were analyzed. The patients with *ABCC8* and *KCNJ11* gene mutations were treated with sulfonylurea, patients with *GCK* mutations were given the lifestyle intervention and others with insulin.
**Results:** Total 21 patients were enrolled, 15 patients were found with pathogenic gene mutations, 52.4% in *ABCC8* gene and *KCNJ11* gene (11/21). The patients with *KCNJ11* or *ABCC8* gene mutation are with average age 2.01 ± 1.62 months or 2.52 ± 2.60 months, respectively. *GCK* gene mutations were detected in children with age of onset more than or equal to 12 months, at 58.33 ± 43.02 months of age. There existed significant statistical difference among the onset ages of the three genetic variants, $P = 0.001$. The onset random blood glucose levels were significantly higher in the patients with *INS* gene mutation (66.70 mmol/L) than those of *GCK* gene mutation patients (9.73 + 1.97 mmol/L, $P = 0.003$). 11 patients with *ABCC8* or *KCNJ11* gene mutation were treated with sulfonylurea and 9 patients reached euglycemia.
**Conclusions:** Mutations in potassium channel related genes (*KCNJ11* and *ABCC8*) were the most common cause of neonatal diabetes in Chinese. Sulfonylurea therapy was effective and euglycemia were reached in most of the patients with the mutations in *KCNJ11* and *ABCC8*. Patients who were diagnosed hyperglycemia before 1 year-old,or with negative antibody testing and family history of diabetes were referred for gene testing, even by targeted next-generation sequencing of all known related genes. The target therapy based on gene diagnosis is more effective and improvement of life quality.

## P316

## The timing of blood glucose monitoring or urinalysis may lead to under reporting of hyperglycaemia and the prevalence of transient diabetes in childhood acute lymphoblastic leukaemia

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**Introduction:** Hyperglycaemia is a well-documented common complication of L-Asparaginase and glucocorticoids in the treatment protocol of childhood acute lymphoblastic leukaemia (ALL). Children on the oncology unit routinely have first morning urine glucose monitoring. We report the prevalence of transient diabetes (TD), risk factors and diabetic ketoacidosis (DKA).
**Method:** Data was collected from the electronic prescribing system of patients who had received this treatment regimen and also required insulin therapy. Clinical data collected included gender, age, ethnic origin, BMI, insulin units/kg/day, fasting blood glucose (BG), urinalysis and incidence of DKA.
**Results:** Between April 2013-April 2016, 155 children received this treatment regime in a paediatric oncology centre. TD was seen in 7 cases, of which 6 were female. DKA was documented in 1 patient and ketosis seen in 2 others. Timing of BG testing or urinalysis was reviewed; 6 children with symptoms of polyuria and/or polydipsia were hyperglycaemic with morning fasting BG testing. One child was found to be hyperglycaemic with normal morning fasting glucose. Insulin requirements had a mean 1.3 units/kg/day with a range 0.6-2.2 units/kg/day. The mean age was 7.9 years with a range of 2–12 years. 2 had a BMI ≥91$^{st}$ centile. 5 were from African or Asian ethnicity.
**Conclusion:** Our data suggests that it is uncommon for children to be diagnosed with TD requiring insulin therapy and that DKA is a rare complication. Risk factors are similar to that of Type 2 diabetes including ethnicity and elevated BMI. Screening for hyperglycaemia appears to be adhoc with morning urinalysis.

We question whether the number of TD observed is a true representation of this patient group due to inadequate BG monitoring unless symptomatic and whether this figure could be higher. Prospective studies are required to look at a change in timing and sampling of BG or urinalysis in order to capture incidence of hyperglycaemia (>11.1 mmol/L).

## P317
## Two novel cases of permanent neonatal diabetes mellitus caused by homozygous mutations in the glucokinase gene

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**Background:** Permanent neonatal diabetes (PND) caused by homozygous mutations in the glucokinase gene (*GCK*) is rare and only few cases have been reported so far. Heterozygous *GCK* mutations cause maturity-onset diabetes of the young (MODY2).
**Case report:** We report two girls, first cousins, 1st in order of birth, born to consanguineous parents. Both were born full-term with intrauterine growth-retardation after an uneventful pregnancy. Both patients presented with persistent hyperglycaemia and glycosuria within the first two days of life and were treated with insulin. They both tested negative for anti-insulin and islet cell antibodies at the age of 4 months. Excluding diabetes, both are otherwise healthy children with no diabetes-related chronic complications and good glycemic control. Both fathers have non progressive, impaired fasting glucose and slightly elevated HbA1c values. The mothers were found to be mildly hyperglycaemic and both had gestational diabetes during their subsequent pregnancy. Genetic analysis using PCR and direct sequencing found a novel homozygous missense mutation, p.H50D, in exon 2 of the *GCK* gene in both patients. This C > G mutation at nucleotide 148 (c.148C > G) results in the substitution of the amino acid aspartic acid (acidic charged polar) for histidine (basic charged polar) at codon 50 (p.His50Leu). Current evidence suggests this mutation is likely to be pathogenic. The parents were heterozygous for the mutation.
**Conclusion:** We report two PND cases caused by a novel homozygous missense mutation in the *GCK* gene in two families with MODY2. Coexistence of PND, parental consanguinity and a family history of mild hyperglycaemia should always prompt testing of the *GCK* gene since heterozygous carriers have a mild phenotype (MODY2) and homozygotes present with PND. As MODY2 is usually a silent disorder, fasting blood glucose testing in the parents of every infant with PND should be a must, even if there is no family history of diabetes.

## P318
## Kearns-Sayre syndrome with co-occurring insulin-dependent diabetes mellitus in the 10-year-old girl: a case report

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Kearns-Sayre syndrome is a rare mitochondrial disease with a diabetes as one of the symptoms.

10-year-old girl was admitted to our department with symptoms of polyuria, polydipsia, weight loss of approximately 1 kg, without ketoacidosis. Insulindependent diabetes mellitus, with negative anti-GADA, IA2, ICA antibodies, was diagnosed. In addition, deficiency of body weight and height, ptosis, limitation of eye movements, decreased muscle tone, poorly expressed deep tendon reflexes and cognitive disorders were found. Girl reported also headaches. MRI of the head showed changes characteristic for spongiform group of mitochondrial diseases.

Due to the phenotypic and abnormal imaging studies karyotype was performed (result was normal). The patient during follow up develop tremors of the head and limbs, and intensified headaches.. From July 2014, seizures were observed in the form of gibberish speech, balance disorder, the prevalence of scotoma and headaches. These seizures always occurred during normoglycemia. Treatment with lamotrigne was performed due to abnormal EEG. Kearns-Sayre syndrome was suspected. Genetic testing was performed. DNA sample obtained from muscle and urine showed reduced by 40-50% level of ligation probes located in the area m.7120_m.14068 including genes MTCOX1, MTCOX2, MTATP6, MTCOX3, MTND3, MTND4 iMTND5. The heteroplasmy of these mutations in the blood and buccal epithelia were lower (<30%).

Identified deletion corresponds to the range of the so-called common deletion, which according to the literature data is responsible for about 90% of cases of KSS.

Currently, the patient receives insulin with the insulin pump, the daily insulin requirement of 0.63 units per kg and with mean HbA1c of 7.4%. Insulin dependent diabetes mellitus may be accompanied by the typical symptoms of Kearns-Sayre syndrome.

## P319
## Rare genetic conditions related to diabetes in low income country: is there a solution?

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**Introduction:** Congenital generalized lipoatrophy or Berardinelli Seip syndrome is a rare genetic disorder characterized by absence of subcutaneous fat with various lesions including severe hyperinsulinism (diabetes in advanced stage), dysmorphic features, hepatic and cardiac involvement. The prevalence is around 1/ 1 million births. Diagnosis and management of this condition is not easy in low income countries. To describe some of these difficulties and solutions approach, we report the present cases.
**Cases:** Two not related adolescents, aged 15 and 16 years old, were referred from 2 peripheral diabetes clinics for management of diabetes. They presented polyuropolydypsic syndrome associated with high blood glucose (17.6 mmol for the first and 16 mmol/l for the second). They had normal birth weight but a peculiar appearance. On physical examination they had a thin skin, hepatomegaly and delay puberty (B1P1R0). Although high insulin doses (3.8 and 3.5 UI/Kg/day), they presented persistant hyperglycemia, with increased HbA1C (14%), increased blood lipids. Diabetes, thin skin, delay puberty and disturbance of lipid profile linked to the diagnosis of congenital lipoatrophy.

The 3rd case is a 5 months old infant, brought for peculiar appearance. Borned at term, she has a voracious appetite contrasting with stunting. On physical examination she has a very thin skin, hepatomegaly. She has 535 mg/L of triglycerides. We also conclude to congenital lipoatrophy. Futher management includes a particular diet (medium chain polyunsaturated fatty acid) and a carefull follow up to early identify complications.
**Conclusion:** No molecular analysis was done and no leptin is available for the girls with diabetes. What is the future of these patients and their family? To answer some of family questions, a precised diagnosis is necessary. As for neonatal diabetes, international collaborative studies to improve understanding, management of affected patients may be helpful.

## P320
## Successful sulfonylurea treatment in three patients with neonatal diabetes mellitus associated with novel inherited ABCC8 mutations

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Neonatal diabetes is a rare genetic disorder. Intellectual disability, epilepsy and congenital abnormalities are not uncommon features. A genetic defect is detected in more than 70% of case. It concerns, 6q24 abnormalities, activating mutations in $K_{ATP}$ channel subunits (*KCNJ11* or *ABCC8*genes) and less frequently in *INS*.Several reports demonstrated that the effect of gain mutations affecting $K_{ATP}$ channel can be reversed using sulfonylurea. We report on three patients including two siblings: Serine and Ines who developed neonatal diabetes before 3 months of age. Genetic testing identified two novel mutations in *ABCC8* gene; a paternal inherited mutation for the two siblings and a maternal mosaic mutation for the third patient Ashraf. Interestingly the father that transmitted the deleterious mutation developed diabetes in adulthood.When epilepsy with congenital urinary tract defect were occurred in one patient: Ashraf. First treatment with insulin was not very effective for all patients. The introduction of Glibenclamide, a sulfonylurea molecule after the cessation of insulin, was remarkably efficient .The first dose engendered an instant increase of C-peptide. At day-7 of treatment for Serine and day-15 for Ines, and allowed the establishment of a good diabetes control for the all. These cases confirm the Glibenclamide efficiency in the treatment of neonatal diabetes by mutation of *ABCC8* gene and illustrate the benefit of a genetic investigation for the diagnostic, treatment and prognosis of this disease.

**Keywords:** neonatal diabetes mellitus, ABCC8,sulfonylurea treatment.

## P321
## Clinical characteristics and therapeutic issues in two sisters with Berardinelli-Seip syndrome

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**Aim:** To present two cases with insulin resistant diabetes and generalized lipoatrophy -Berardinelli-Seip syndrome.
**Index case 1:** A girl aged 18 years, birth weight 2600 g, normal development, first hospital admission for lymphadenomegaly at age of 11 years. Berardinelli-Seip syndrome was diagnosed with normal glucose tolerance but insulin resistance (HOMA IR 12.1). At the age of 15 years she presented non-autoimmune, insulin resistant diabetes: HbA1c - 14,03 % (4-6%), C-peptide - 1022 pmol/L (196–960), cholesterol - 9,2 mmol/L, HDL-cholesterol - 0,6 mmol/L, triglycerides - 4,9 mmol/L. Specific phenotype included: acromegaloid athletic body, phlebomagaly, triangle face with prominent chin, dry brownish coloured skin, acanthosis nigricans on the rubbing skin surfaces, generalized lipoatrophy, hypertrichosis, enlarged soft lymph nodes on the posterior neck, umbilical hernia. Height 162,5 cm, weight 49,6 kg. Treatment with insulin and metformin 1.5 to 2.4 g started. An year later poor control persisted with HbA1c 12%, highly variable triglycerides up to 46 mmol/L. Insulin was discontinued and replaced with Lipanthyl 200 mg, Pioglitazone 30 mg, Simvastatin 20 mg, Metformin 3 g. Atherogenic lipid profile and elevated HbA1c > 10% persisted all the time in spite of adding insulin again. At present she has hepatic steatosis, oligomenorrhea, arterial hypertension and initial nephropathy.
**Index case 2:** The younger sister (b.w. 2300 g) was diagnosed with Berardinelli-Seip syndrome at age of 13 years (the same phenotype and kyphoscoliosis). Under metformin she keeps subclinical diabetes up to now (15 years) and near normal lipids, but she has hepatic steatosis (ASAT 112 U/l, ALAT 197 U/l) and no menarche. Recently Pioglitazone was added to the therapy.
**Conclusion:** We present lipoatrophic insulin resistant diabetes with therapeutic issues. The prognosis of both girls is obscure. Recombinant leptin or regular plasma lipids extraction were discussed for alternative treatment.

## P322
## Glicemic control in patients with Cushing syndrome - comparison to age and BMI matched healthy controls

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**Introduction:** Patients with Cushing syndrome frequently have problems with glicemic control or even diabetes. In children this disease is very frequent and is lack of studies about glicemic control of this group. The aim of the study was to check the glicemic control and compare it with age and BMI matched control.
**Material and Methods:** We retrospectively studied data of 22 children with Cushing syndrome (mean age 13,4 +/− 3,1 lat, BMI 24,84 +/− 5,1) than surgically confirmed. Glicemic control analysis (OGTT, HbA1c) were compared with BMI and age matched health control (mean age 12,89+/− 2,2. BMI 25,63 +/− 2,1, both p = 0,5). We analyzed data from glicemic and insulinemic curve in OGTT, HbA1c, and AUC for glicemia and insulinemia. After checking normality of distribution data were analyzed t-students test in Statistica 6,0, taking as significant p value under 0,05.
**Results:** The groups were not statistically different in any glicemic parameter , AUC and HbA1c. We observed very significant differences in every time points in insulinemic curve and AUC (respectively 0' 24,04+/−9,3 vs 14,04+/−6,08 IU/ml p < 0,0001, after 30'OGTT-162,56+/−63,65 vs 101.4+/−61,78 IU/ml p < 0,003, after 60'-230,44+/−192,5vs 129,54+/− 85,3 IU/ml p < 0,03, after 90'- 286,56 +/− 289,92 vs 118,28+/−67,01 p < 0,01, after 120' -271,88 +/−242.08 vs 122,87 IU/ml p < 0,006 and AUC 1007,31+/− 772,79 vs 486,14 p < 0,003).

Groups were statistically different in height (studied group 145,86 +/− 15,5 vs 160+/− 10,8 cm, p < 0,0005) and weight (respectively 52,24+/− 13,8 vs 66,61+/− 13,33 kg).
**Conclusions:** Children with Cushing Syndrome have the same glicemic profile as overweight children, but significantly higher insulinemic curves. What was unsurprised children with Cushing Syndrome were significantly shorter.

## P323
## Neonatal insulin pump patients - diagnostic, practical and safety aspects of using insulin pumps and continous glucose monitoring in a clinical series of eight cases of neonatal diabetes

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**Objective:** Treatment of neonatal diabetes including practical and safety aspects of using insulin pumps and continous glucose monitoring (CGM) in patients with neonatal diabetes.
**Methods:** We collected data from all cases of diabetes with an onset within the first 6 months of life treated at our clinic from Jan 1998 - May 2016 in a clinical observation study.
**Results:** Eight patients were included, see Table. All patients were treated with intravenous insulin and 7 were put on subcutaneous insulin pumps. All patients could terminate insulin treatment. Until now one patient been diagnosed with diabetes again, at age 4,5 years.

| Gestatonal age (Weeks + days) | Sex | Birth Weight (gram) | Small for Gestational Age | Age at start of insulin (days) | Age at start of insulin pump (days) | Age at termination of insulin (weeks) | Mutation |
|---|---|---|---|---|---|---|---|
| 26 + 0 | F | 872 | No | 11 | / | 2 | ? |
| 30 + 0 | M | 1455 | No | 4 | 7 | 20 | ABCC8 |
| 38 + 3 | F | 2200 | Yes | 4 | 9 | 8 | 6Q24 Paternal Duplication |
| 39 + 3 | M | 2355 | Borderline value | 5 | 5 | 3,5 | 6Q24 Paternal Duplication |
| 26 + 1 | M | 777 | Yes | 12 | 54 | 7,5 | ? |
| 42 + 0 | M | 3500 | No | 41 | 43 | 15 | ABCC8 |
| 34 + 4 | F | 1881 | Borderline value | 2 | 13 | 2,5 | ABCC8 |
| 24 + 2 | M | 641 | No | 0,5 | 32 | Ongoing | Ongoing |

*[Table: Patient Characteristics]*

A mutation (monogenic diabetes) was diagnosed in 5 children (analyses in Exeter, UK). In two patients no mution was identified, and in one the analysis is ongoing.

7 patients were treated with a subcutaneous insulin pump (Medtronic Veo) using diluted insulin 10 U/ml, and the smallest patient was put on treatment with pump at a weight of 938 grams. Continous glucose montoring (MiniLink or DexCom4/DexCom5) was used. Adaptations to currents guidelines were made to ensure safety.

**Conclusions:** Prompt and safe treatment of neonatal diabetes is crucial for further growth and development of the affected child. Use of insulin pumps and CGM was very useful in these patients. A knowledge of the technical limitations of the equipment as well as a good cooperation between physicians and nurses of both departments, including adaptation of diabetes guidelines to the setting of the neonatal intensive care unit was important.

## P324
## Sodium pyruvate treatment improved endogenous insulin secretion in a patient with mitochondrial diabetes

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**Objectives:** Mitochondrial diabetes is a rare form of diabetes mellitus, and reveals progressive decline in endogenous insulin secretion. Sodium pyruvate treatment has been reported to be a potential therapeutic choice for fatigability in patients with mitochondrial diseases. However, the effect of sodium pyruvate treatment for glucose intolerance in patients with mitochondrial diabetes remains to be clarified.

**Case presentation:** Water-based sodium pyruvate solutions (0.5 g/kg/day) were administrated orally to a 32-year-old Japanese man with mitochondrial diabetes and myopathy caused by the m.14709 T > C mutation. At the age of 20, he was diagnosed with diabetes mellitus and started insulin self-injection. He did not have any kind of islet autoantibodies. To evaluate therapeutic effects, we measured urinary C-peptide, hemoglobin A1c (HbA1c) and total daily insulin dose (TDD) 6 months later. His urinary C-peptide level improved from 4.3 to 17.2 μg/day after 1 day and to 30.2 μg/day after 6 months of sodium pyruvate treatment. He experienced no adverse event such as diarrhea resulting from sodium pyruvate treatment, except episodes of mild hypoglycemia. To avoid hypoglycemia, his TDD could be reduced from 33 Units/day to 20 Units/day. Despite reduction of TDD, his HbA1c declined from 6.5% to 5.9%.

**Conclusions:** Sodium pyruvate treatment improved endogenous insulin secretion and resulted in reduced TDD in a patient with mitochondrial diabetes. Sodium pyruvate treatment may be a potential therapeutic choice for patients with mitochondrial diabetes.

## P325
## The importance of awaring monogenic diabetes in Chinese pediatric population - a case series

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**Objectives:** To estimate the period prevalence, and review the clinical presentation, genetic diagnosis and its impact on management of monogenic diabetes in the Chinese pediatric population.

**Methods:** A retrospective review of Chinese patients with monogenic diabetes aged from birth to 18 years under the care of the 2 major pediatric departments of the Hong Kong New Territories East Cluster (NTEC) of Hospital Authority from 1/1/2010 to 31/12/2015 and determination of period prevalence.

The Electronic Patient Record System was employed to retrieve the following data: age at presentation, Sex, presenting symptoms, any family history, Initial working diagnosis, body mass index at presentation, HbA1c at presentation, genetic result, Time from presentation to genetic diagnosis, any alteration in clinical management after genetic diagnosis.

**Results:** 10 Chinese patients, aged one day to 15-year-9month were identified. The period prevalence of Chinese patients with monogenic diabetes, aged below 15 years, from 1/1/2010 to 31/12/2015 in NTEC was 65.8 per 1,000,000 populations. 2/10 patients were related. Seven patients were MODY 2, two MODY 3, one with paternal uniparental disomy at 6q24 locus. The female : male ratio was 1.6. Family history positive in 8 patients. All the patients were non-obese, no acanthosis nigricans and no ketoacidosis. The mean time from presentation to genetic diagnosis ranged 1.5-52months. The presenting HbA1c ranged 5.3% to 7.7%. Anti-islet antibodies were negative in all 4 tested. The heterozygous GCK c.1132_1133delGC was the most common mutation.

**Conclusion:** Our finding highlighted the important role of pediatric endocrinologist in early detection of monogenic diabetes in Chinese pediatric patients. The period prevalence aged under 15 years was comparable to all-aged period prevalence reported in UK. The earliest time of 1.5 months from presentation to diagnosis suggested awareness was the key to early detection.

## P326
## Hyperglycaemia and metabolic syndrome: not always synonymous of T2D

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**Background:** MODY encloses a group of disorders caused by autosomal dominant mutations in genes linked to pancreatic ß-cell function. Usually it presents as a non-ketotic hyperglycaemia, in patients under 25y that miss both T1D and T2D features.
**Case report:** We report a 15y Caucasian girl, admitted for non-ketotic hyperglycaemia detected after one month of polyuria and polydipsia. There was no history of chronic medication or pancreatic insult. Apart from central obesity and severe facial acne, her examination was unremarkable.

She was born LGA and is obese since toddlerhood. Her menarche was at 9y, with irregular cycles ever since. Her sister, mother, and maternal grandfather had diabetes classified as T2D from their 20's, when all were lean.

Fasting bloods revealed HbA1c 7.4%, C-peptide 2.5 ng/dL, glucose 194 mg/dL, triglycerides 164 mg/dL, HDL 32 mg/dL, ALT 67U/L; autoimmune markers, hyperandrogenism and thyroid dysfunction were absent. Pelvic and abdominal US were normal. MODY genetic screening panel was also performed.

She was started on basal-bolus insulin and norm caloric diet. Her compliance was erratic, with progressive weight gain and HbA1c increase to 10.6%.

Nine months into diagnosis, genetic testing revealed HNF1A c.89 T > C heterozygous variant, to our knowledge not yet described in the literature. Gliclazide (30 mg/day) was then started and doubled on wk2; metformin (850 mg/day) was introduced on wk3 and doubled on wk4; in parallel, insulin was progressively withdrawn and stopped on wk5. During the first month of follow-up glycaemia has been between 90-140 mg/dL.
**Discussion:** Worldwide there is an increasing prevalence of youth obesity and T2D. However, even in the presence of metabolic syndrome and the lack of autoantibodies, an important history of diabetes in direct relatives, especially when they are lean and young at diagnosis, should put us on the track of MODY, as this is important for both treatment, prognosis and family genetic counseling.

## P327
## Novel glucokinase mutation in a boy with MODY 2 followed by continuous glucose monitoring

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Glucokinase (GCK) deficiency (MODY 2) is among the most common forms of MODY variants. It can be detected randomly in young children when glycemia is checked for other reasons such as surgical intervention or infection, or if a parent of the child has been diagnosed with MODY previously. No MODY patient has been described so far in the Republic of Macedonia.
**Case report:** A 2.5 year old lean boy (BMI = 16.8 kg/m$^2$) presented with epistaxis, polyuria and polydypsia during an upper respiratory infection. He had hyperglycemia (7.7-9.4 mmol/l), no ketonuria or glucosuria. Family history revealed diabetes type 2 in a paternal grand-father since the age of 36 years who is on metformin therapy and in a good metabolic control.

HbA1c was 5.96% (normal range 4.4-6.2%).Blood counts, glucosuria, urea and creatinin were within normal range. Pre-prandial and post-prandial insulinemia were within the normal range, e.g. 5 and 20 mU/l respectively. C-peptide had normal values 3.82-5.6 ng/ml. Continuous glucose monitoring (CGMS Guardian system, Medtronic) confirmed higher measurements of glycemia particularly in the afternoon and some overnight hypoglycemia. Islet antibodies (GAD, IA, ICA and IAA2) were negative. DNA analysis of GCK gene tested by PCR and direct sequencing confirmed heterozygocity for c.45 + 1G > A in the intron 1. The father of the boy reported higher glycemia up to 11.2 mmol/l and the same genotype was confirmed. Paternal grand-father was not available for analysis.
**Discussion:** GCK mutations cause mild hyperglycemia due to inappropriate glucose sensing by the beta cells. Usually no therapy is needed since the unfavorable progression of the hyperglycemia and diabetic complications are extremely rare.
**Conclusion:** We present a novel mutation not found neither in ExAC, nor in 1000 Genomes databases of polymorphisms. Prediction software Mutation Taster labeled this variant as disease causing. Continuous glucose monitoring in MODY might help elucidate glycemia excursions.

## P328
## Dapagliflozin lowers insulin-requirement by increasing urinary glucose excretion effectively in adolescents and young adults with type 1 diabetes

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**Objectives:** Youth with type 1 diabetes (T1D) infrequently achieve HbA1c targets. This is the first study to assess the safety, tolerability, and pharmacokinetics of a SGLT-2 inhibitor as add on to insulin in relationship to HbA1c in youth.
**Methods:** In a placebo-controlled, randomized, double blind, crossover study, the effect of a single dose of 10 mg dapagliflozin (DAPA) on the insulin dose administered i.v. during a glucose-infusion for the ensuing 24 hours with blood glucose kept between 160–220 mg/dl was studied.
**Results:** 33 participants (14 males, age: 16 (12–21) [median(range), years], diabetes duration 8 years (2–16) with n = 33 equally stratified in 3 HbA1c groups (in target: 5.5-7.5%, moderately elevated: 7.6-9.0% and clearly elevated: >9.0-12.5%) took part.

DAPA reduced mean i.v. insulin dose by 13.6% (P < 0.0001 by ANOVA). This was irrespective of baseline HbA1c (mean [CI 95%] DAPA vs. Placebo: in target: 0.87 [0.81-0.92] vs. 0.99 [0.93-1.05] U/kg/24 h; moderately elevated: 0.90 [0.81-0.92] vs. 1.02 [0.95-1.09] clearly elevated: 0.99 [0.91-1.06] vs. 1.17 [1.09-1.25]). Urinary glucose excretion was overall increased by 610% (143.12 [128.39-157.84] vs. 22.40 [7.68-37.13]; P < 0.0001). 6 independent episodes in 6 patients with plasma ß-hydroxybutyrate (BHB) levels between ≥0.6 and < 1.0 mmol/l have been observed, 5 episodes in the DAPA and 1 in the placebo group. There was no correlation between the amounts of meal intake (6 ml/kgBW, maximum of 360 ml) compared to excess of BHB.
**Conclusions:** In youth with T1D, DAPA led to a significant reduction of insulin needed to achieve target glucose by triggering glycosuria. In the present study, slightly elevated BHB levels were seen with DAPA, far below those associated with clinical diabetic ketoacidosis. The amount of standardized meal intake or baseline HbA1c had no influence on BHB levels. This study provides a proof of concept for adjunct SGLT-2 inhibitor therapy in the pediatric age group.

## P329
## Effect of metformin on endothelial function in overweight adolescents with type 1 diabetes (T1D)

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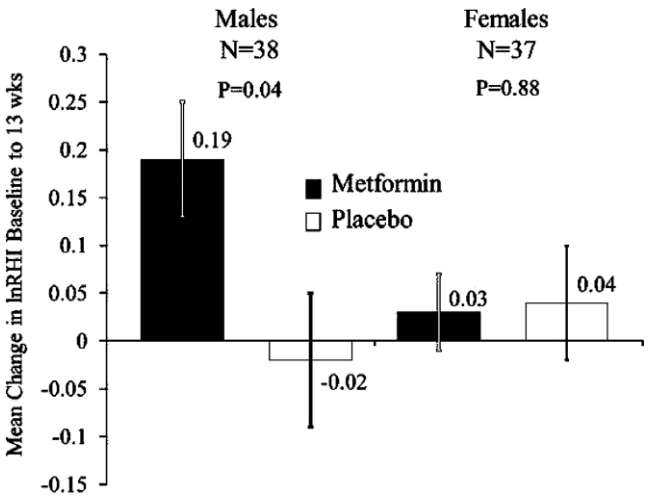
**Objectives:** Overweight youth with T1D are at greater risk for future cardiovascular disease. Metformin's impact on endothelial function in this group is unknown. The aim of this study was to assess the effect of metformin on endothelial function among overweight adolescents with T1D.

**Methods:** Seventy overweight adolescents from 10 diabetes clinics (mean age 15.8 years [range 12–19 yrs], mean T1D duration 6.7 years, 51% female, 87% non-Hispanic white) were randomly assigned to metformin (up to 2000 mg/day) or placebo. EndoPAT, a non-invasive surrogate of peripheral microvascular endothelial function, was used to measure reactive hyperemic index (RHI) scores at baseline and 13 weeks. Linear mixed models of the natural log (ln) transformation for the RHI score were used to obtain tests of significance with adjustment for clinic center and baseline score.

**Results:** Mean baseline RHI score was $1.8 \pm 0.6$ in the metformin group (N = 41) and $1.7 \pm 0.6$ in the placebo group (N = 29). At 13 weeks, there was no significant change from baseline in the ln RHI scores (+0.1 in metformin vs. -0.0 in placebo, P = 0.08). However, when stratified by gender, there was a modest improvement in endothelial function among males (Figure).

**Conclusions:** Although no treatment effect was observed amongst overweight T1D adolescents overall, metformin may improve endothelial function in overweight T1D males. Further study is needed to confirm these findings and explore mechanisms for gender specific differences.




*[Figure 1]*

## P330
## Prevalence of anemia in type I Indian diabetics

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Randomly 200 numbers of Type I subjects were selected aged below 10 years with history of diabetes more than 2 years with normal growth. Blood sample were drawn for CBC, S creatinine, TSH.

Out of 200 subjects, 60% **(n = 120)** had low level of hemoglobin **(below 10 g/dL)** remaining had normal levels of hemoglobin. And the level of Glycosylated hemoglobin varied according to individual adherence.

Further, these subjects were screened for ferritin, iron and TIBC levels which were on lower side and treated accordingly. Iron supplements were initiated for deficient subjects for a period of time till the target was achieved. (Children below 10 years 11.5 to 13.5 g/dL).

To conclude, Anemia is a prevalent finding in Type I Indian Diabetics, probably unrecognized. In our practice we make sure that each individual kid is supplied with iron supplements, before it is detected deficient.

The probable reason for this deficiency in India can be mal nutrition, poor socioeconomic background or recurrent parasitic infections.

## P331
## Medium-term effect of a process of nutritional education on metabolic control in adolescents with type 1 diabetes

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**Introduction:** Medical nutritional therapy is one of the cornerstones of diabetes care in children and adolescents with type 1 diabetes mellitus (T1DM). Carbohydrate counting, which is a more flexible nutritional method, has become popular in recent years. Imprecise carbohydrate counting as a measure to guide the treatment of diabetes may be a source of errors resulting in problems in glycemic control. Adolescence is a critical period in which glucose control is frequently deteriorated due to pubertal development and psychosocial issues. The aim of this study was to investigate the medium-term effects of a process of nutritional education on metabolic control and serum lipids levels in adolescents with T1DM.

**Methods:** A total of 48 T1DM adolescents from the Diabetes Unit - Bambino Gesù Children's Hospital (26 female and 22 male) were enrolled in the study. Exclusion criteria were duration of diabetes < 1 year, obesity, celiac disease and chronic complications. Patients were divided into Nutritional Education Group (n = 24) and Control Group (n = 24) and were observed for 1 year (T1). Demographic characteristics, body measurements, insulin requirement, HbA1c and serum lipids were evaluated at T0 and T1. In the Nutritional Education Group a structured nutritional program including basal nutritional care and CHO counting was given at 3 months intervals.

**Results:** The results are reported in the table attached. In the nutritional Education Group HbA1c(T0) 69 (mmol/m) vs HbA1c (T1) 55 (mmol/m) , IR (T0) 1.2 IU/kg/die vs IR(T1) 0.7 IU/kg/die.

BMI significantly decreased during the observation period 21(T0) vs 19(T1). No differences were observed in serum lipids levels and BP values.

**Conclusion:** Structured Nutritional Education including and CHO counting is a useful method in order to obtain a better glucose control due to improving of eating habits and an healthier lifestyle in adolescents with T1DM.

| | T0 | T1 | T0 | T1 |
|---|---|---|---|---|
| HBA1C | 69.3 | 55.8 | 68.16 | 69.33 |
| IR | 1.24 | 0.70 | 0.80 | 0.80 |
| BIR | 0.37 | 0.36 | 0.33 | 0.33 |
| BMI | 21.15 | 19.06 | 20.5 | 21.04 |
| TC(mg/dl) | 115.37 | 146.45 | 154.86 | 164.82 |
| HDL(mg/dl) | 58.45 | 63.15 | 61.6 | 59 |
| LDL(mg/dl) | 92 | 91.8 | 82.18 | 82.41 |
| TG(mg/dl) | 65.8 | 64 | 75 | 74.3 |
| BP: sis/dias mmHg | 115/65 | 109/65 | 116/61 | 117/71 |

*[NEG AND CONTROL GROUP]*

## P332
## The longitudinal relationship between parental well-being and adolescents' glycemic control

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**Objectives:** Parents are of great importance when it comes to the self-care of youth with type 1 diabetes. Research to date suggests that parental depressive symptoms, stress and diabetes specific criticism associate with worse HbA1c. Little is known about the complex relationship between parental factors and glycemic outcomes over time. Using longitudinal data we examined A) the relationship between parental well-being and glycemic control over time, and B) if this association is mediated by diabetes parental behavior and parental diabetes stress.
**Methods:** Parents of youth 8-18y with type 1 diabetes (N = 174 on T0) participating in the DINO study completed questionnaires at three points in time each with a 1 year interval. Generalized Estimating Equations (GEE) analyses were performed to examine the relationship between parents' well-being (WHO-5) and HbA1c over time, with either supportive or nonsupportive diabetes parental behavior (DFBC+ and DFBC- scales) and diabetes stress (PAID-Pr) as mediators, corrected for parents' education level, parents' gender, and adolescents' age, gender and diabetes duration.
**Results:** No relationship was found between WHO-5 and HbA1c ($\beta = -0.052$, $p = 0.656$). Neither between WHO-5 and DFBC+ ($\beta = -0.042$, $p = .36$). WHO-5 was related to DFBC-($\beta = -0.174$, $p < .01$) and PAID-Pr ($\beta = -0.669$, $p < .01$). DFBC+, DFBC- and PAID-Pr in their turn related to HbA1c ($\beta = -0.261$, $p = .01$; $\beta = 0.376$, $p = .02$; $\beta = 0.287$, $p < .01$).
**Conclusions:** Over time parental well-being was not related to adolescents' HbA1c. However, worse parental well-being was associated with increased levels of nonsupportive diabetes parental behavior and parental diabetes stress. Both variables in turn were related to less optimal glycemic control. Interventions aimed at parents should focus on reducing negative diabetes parental behaviors -such as criticism- and diabetes distress.

## P333
## Illness identity in youth with type 1 diabetes: a person-centered approach

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**Objectives:** An important task for adolescents and emerging adults with type 1 diabetes is integrating diabetes into one's identity. Four so-called illness identity dimensions have been identified: engulfment, rejection, acceptance, and enrichment. To examine individual differences in these illness identity dimensions, the present study focuses on configurations of these four illness identity dimensions and how they relate to diabetes-specific and psychological functioning.
**Methods:** A sample of 575 patients (14–25 years of age) with type 1 diabetes completed questionnaires on illness identity, psychological functioning, and treatment adherence. $HbA_{1c}$-values were collected from patients' medical records. Cluster analysis was used to identify different configurations. Analyses of variances were used to identify differences among the clusters in diabetes-specific and psychological functioning.
**Results:** Five clusters were retained and this solution was rather stable across sex (Cohen's kappa = 0.77): Engulfment-Rejection (13.0% of the sample), Rejection (17.8%), Engulfment-Enrichment (18.7%), Acceptance (25.0%), and Acceptance-Enrichment (25.5%). No differences in age, illness duration, or sex were found among the clusters. The Engulfment-Rejection showed the least optimal profile (i.e., high on depressive symptoms, low on satisfaction with life, low on treatment adherence, and high $HbA_{1c}$-values). Acceptance and Acceptance-Enrichment showed the most optimal profile (i.e., low on depressive symptoms, high on satisfaction with life, high on treatment adherence, and low $HbA_{1c}$-values).
**Conclusions:** Five clusters were identified, each characterized by their own unique profile scores on the illness identity dimensions. These clusters were differentiated on diabetes-specific and psychological functioning. Hence, these clusters provide clinically meaningful profiles.

## P334
## High prevalence of disordered eating behavior in adolescents with type 1 diabetes in a central region of Italy

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**Objectives:** To assess the prevalence of disordered eating behaviours (DEB) in adolescents with type 1 diabetes (T1D) living in the Marche region of Italy.
**Methods:** Basing on the regional registry for T1D, a total of 163 subjects with diabetes duration ≥ 1 year, aged 11–20 years, were recruited during November 2015-May 2016 (response rate 74,5%). All subjects completed the revised Diabetes Eating Problem Survey (DEPS-R) and the mSCOFF questionnaire. Clinical, metabolic, socioeconomic and familial data were also collected. Positive screening for DEB was defined as total score ≥20 on DEPS-R or ≥2 on mSCOFF. DEB prevalence was evaluated as punctual and 95%CI estimates. Fisher exact test and Wilcoxon rank sum test were used for comparisons between subjects with or without DEB.
**Results:** 56 out of 163 adolescents (34.4%; 95%IC: 27.1%-42.2%) had a positive screening for DEB. 41.7% [95%CI 31.0-52.9] of females and 26.6% [95%CI 17.3-37.7] of males scored ≥20 on DEPS-R; 57.1% [95%CI 45.9-67.9] of females and 51.3% [95%CI 39.7-62.8] of males scored ≥2 on mSCOFF. 46.4% of subjects reported using not enough insulin and 9.8% reported skipping the insulin dose completely after overeating, at least occasionally (DEPS-R items 2, 8); 29.6% were identified as "insulin restrictors" on the mSCOFF (question 5). DEB was significantly associated with higher zBMI, HbA1c, total cholesterol, triglycerides, insulin doses and more sedentary lifestyle. No significant association was found between DEB and parental education, socioeconomic status, family structure, and type of insulin treatment.
**Conclusions:** A high prevalence of DEB and insulin restriction, related to higher HbA1c and BMI, was found among T1D adolescents of both genders in the Marche region. DEB diagnosis is difficult, and insulin purging could hide the weight gain of binge eating disorders. Further validation of disease-specific screening tools and early detection of DEB are needed to provide appropriate intervention.

## P335
## Health related quality of life and glycaemic control of children with type 1 diabetes mellitus in Ireland

E. Hennessy[1,2,3], C. Cronin[1], A. Bradfield[1], M. Bradley[1], O. Neylon[4], A. Khan[5], D. Bux[6], P. Leahy[2], S. O'Connell[1], S. O'Riordan[1]

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**Background:** In type 1 diabetes mellitus (T1D) monitoring quality of life (QoL) of children and adolescents in clinical practice is important.
**Objectives:** To assess the clinical utility of available generic and diabetes specific QoL questionnaires suitable for use in an Irish cohort of children and adolescents with T1D.
**Methods:** The Paediatrics QoL Inventory (PedsQL; Varni, 1999) measures health-related quality of life in children and adolescents with acute and chronic health conditions. The PedsQoL Measurement Model integrates both generic core (physical, emotional, social and school functioning) scales and disease-specific modules (physical symptoms relating to diabetes, treatment concerns, worries about diabetes and communication problems) into one measurement system.
**Results:** As a part of 2 year prospective longitudinal study 80 children with T1D (37 males) aged 4–18.5 years (mean 12.5 ± 3.3) were analysed. Child Generic PaedsQoL total score was lower in the group of patients with poor glycaemic control (HbA1c > 75 mmol/mol) vs group with suboptimal control (HbA1c 58–75), p = 0.03, and vs group of children with optimal control (HbA1c < 58), p = 0.053. Physical and social functioning as a part of Child Generic PaedsQoL module had lower score in patients with poor glycaemic control vs patients with suboptimal control (p < 0.05), while emotional well-being was scored lower in children with HbA1c > 75 vs HbA1c < 75 (p < 0.03). Child Diabetes PaedsQoL revealed lower score for treatment barriers and adherence in group of children with poor control vs HbA1c < 75 (p < 0.01). Treatment adherence score as a part of Parent Diabetes PaedsQoL module was higher in patients with optimal and suboptimal control vs patients with poor control (p < 0.02).
**Conclusions:** QoL is a useful adjuvant in routine diabetes care. The mean QoL score agrees with main HbA1c categories of glycaemic control levels (optimal, suboptimal and poor/high risk) according to ISPAD guidelines.

## P336
## Quality of life, psychological functioning and positive affect in children and adolescents with type 1 diabetes

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**Objectives:** Type 1 diabetes (T1D) is a chronic disease that significantly affects the life of children and their parents. Literature shows inconsistent results regarding the impact of T1D on quality of life (QoL) and psychological functioning. Identifying protective factors such as positive affect are important to understand why some children and adolescents adapt more easily to the challenges associated with diabetes than others.

The objectives of this study were: A) to evaluate QoL and psychological functioning in pediatric patients with T1D, as reported by patients and their parents (proxy-report), and B) to examine the association between positive affect and QoL and psychological functioning.
**Methods:** Fifty-nine youngsters with T1D between 8 and 18 years old and 44 parents participated in this study (mean age: 12.2 yrs; 58.3% boys; mean HbA1c: 7.6%). Children and their parents completed questionnaires regarding general QoL (PedsQL™ 4.0), diabetes-specific QoL (PedsQL™ 3.0 Diabetes Module), psychological symptoms (SDQ) and positive/negative affect (PANAS).
**Results:** Children with T1D reported similar general QoL compared to a matched sample of healthy children. No correlation was found between self and proxy-report for general as well as diabetes-specific QoL. Parents reported more psychological difficulties (proxy-report) than their children ($t$ = −2.2, $p$ = 0.03).

Positive affect (measured by positivity ratio) was significantly associated with better self-reported child functioning. Positive affect explained 28% of variance in general QoL, 40% of diabetes-specific QoL and 28% of psychological problems.
**Conclusions:** Children and adolescents with T1D have comparable overall QoL than healthy children. As parents report more psychological problems, multi-informant information seems important. Positive affect seems a promising protective factor for resilient outcomes, suggesting novel targets for intervention in this population.

## P337
## Maternal anxiety, stress, worries and depression in the context of their child' s type 1 diabetes (T1D): association with child outcomes and the moderating role of maternal emotion regulation

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**Objectives:** Previous research has shown that parents of children with T1D experience high levels of stress, anxiety and depression, which contribute to maladaptive child outcomes. To date, little is known about mechanisms that may buffer the adverse impact of these parental variables. The current study had two objectives. First, we examined the contribution of maternal anxiety, depression, stress and worries in explaining child anxiety, depression and functional disability. Secondly, we investigated whether maternal emotion regulation moderated the relationships between maternal and child variables.
**Methods:** Participants consisted of a sample of 43 children with type 1 diabetes between 8–15 years and their mothers, recruited through Ghent University Hospital.
**Results:** Linear regression analyses, controlling for child age and gender, indicated that mothers evidencing higher levels of maternal worries had children with more fear and functional disability. Further, a significantly positive association was observed between maternal fear and child depression scores. The positive association between maternal depression and child fear was found to be marginally significant. Finally, maternal emotion regulation (i.e., positive reappraisal) was found to significantly moderate the relationship between maternal depression and child anxiety, such that the relationship was less strong when mothers reported high levels of positive reappraisal. A similar, yet marginally significant, moderating effect of maternal refocus on planning was observed for the relationship between maternal worries and child anxiety.
**Conclusions:** In line with previous research, the current findings indicated that higher levels of maternal worries, fear and depression were associated with adverse child outcomes in the context of T1D. However, maternal emotion regulation strategies may buffer some of these negative relations, attesting to the critical role of targeting parental emotion within treatment.

## P338
## Sexual behaviors and knowledge in Greek teenagers with type 1 diabetes mellitus (T1DM)

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**Background:** Adolescents with type 1 diabetes mellitus (T1DM) may differ from their healthy peers in respect to sexual behaviors.

**Aims:** We aimed to explore the sexual behaviors of T1DM adolescents in comparison with healthy peers.
**Materials and Methods:** Fifty eight T1DM adolescents (mean ± SD age 16.3 ± 2.0 years, disease duration 6.7 ± 3.5 years and HbA1c:8.0 ± 1.3%) were compared to 116 healthy controls (matching 1:2 for school, class and gender). Anonymous, self-reported questionnaires were used to evaluate sexual education and behaviors.
**Results:** T1DM adolescents tended to believe that they were more adequately informed on sexual education and contraceptive use compared to controls (77.4% vs 64.0%). For both groups the primary sources of information on contraceptives were parents and friends. Both groups had the same knowledge regarding the reason of requiring contraception during sexual intercourse. T1DM teenagers knew that HIV is a sexually transmitted disease (STD) in significantly lower percentage compared to controls (82.4% vs 95.4%, p = 0.013), with no difference regarding the knowledge of other STDs. T1DM adolescents had a sexual experience in a significantly lower percentage than healthy peers (74.1% vs 87.4%, p = 0.033).

The average age of first sexual intercourse was similar for both groups (15.2 ± 1.5 years vs 15.9 ± 1.5 years for T1DM and controls respectively). Intoxication by alcohol prior to sexual contact was reported in relatively fewer cases in T1DM adolescents. (4.3% vs. 20%, p = 0,046). The number of sexual partners was similar for the two groups, while 52.4% of T1DM teenagers vs 58.7% of controls used condoms in every sexual contact.
**Conclusion:** T1DM adolescents showed no appreciable differences, regarding sexual experience. Furthermore, they presented similar level of knowledge concerning sexual issues and also presented almost similar proportions of risky sexual behaviors in comparison with healthy controls.

## P339
## Health related quality of life and psychosocial risk in children with type 1 diabetes in Ireland

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**Background:** Psychosocial factors may be essential in explaining poor glycaemic control in children with Type 1 diabetes (T1D). Monitoring quality of life (QoL) of children and adolescents with T1D is important in clinical practice.
**Objectives:** To examine the association of scores on two screening tools measuring psychosocial risk and emotional distress with quality of life in an Irish cohort of children with T1D.
**Methods:** The Risk Index for Poor Glycaemic Control (RI-PCG) is the screening tool to assess psychosocial risk (low risk score 0–1, moderate =2, high risk ≥3). The Paediatric Index of Emotional Distress (PI-ED) was used for emotional distress assessment. The Paediatrics QoL Inventory (PaedsQoL) contains generic (physical, emotional, social and school functioning) scales and disease-specific modules (physical symptoms relating to diabetes, treatment concerns, worries about diabetes and communication problems).
**Results:** As a part of 2 year longitudinal study 103 children with T1D (53 males) aged 3–18 years

(mean 12.3 ± 3.4) were analysed. 63.5% of patients had a low score (0–1) on the RI-PGC, 15.7% had a moderate score (=2), 20.8% had high scores (≥3). 8.7% of patients were at high risk for emotional distress (PI-ED > 20).

The group of patients with RIPCG ≥ 3 (high risk) compare to children at low and moderate risk showed lower PaedsQoL scores for parents and for children (p < 0.05) in Generic and Diabetes module.

Patients at high risk for emotional distress (PIED > 20) had lower PaedsQoL total score vs low risk: Generic questionnaire (parent p < 0.01; child p < 0.01), Diabetes questionnaire

(parent p < 0.01; child p < 0.01).
**Conclusions:** PaedsQoL is significantly lower in T1D children with high psychosocial risk and risk for emotional distress. Routine QoL assessment may be helpful in guiding mental health referral.

## P340
## Diabetes strengths profiles: a characterization of what is going well for adolescents with type 1 diabetes (T1D)

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**Objectives:** To enhance T1D outcomes, new strategies are needed that build on teens' and families' capacities and successes. In a strengths-based pilot intervention, diabetes providers gave brief, supportive feedback during routine care visits based on "diabetes strengths profiles" derived from teen and parent reports of positive T1D-related behaviors and attitudes. Adolescents' baseline strengths profiles are described.
**Methods:** 62 youth (age 14–18, M = 15.3 ± 1.8; 44% male; M A1C = 8.5% ± 1.6) completed the Diabetes Strengths and Resilience measure (DSTAR) and parents completed the Diabetes Self-Management Profile Parent-Report (DSMP). Strengths profiles were created using algorithms created by endocrinologists and psychologists to highlight ≥6 of each family's highest rated positive diabetes-related behaviors and attitudes.
**Results:** Profiles had a mean of 6.1 ± 2.3 youth-reported strengths and 4.1 ± 1.6 parent-reported youth adherence behaviors. All 12 DSTAR items and 10 of 24 DSMP items appeared on profiles. The most frequent strengths and adherence behaviors are summarized in the Table.
**Conclusions:** Adolescents with T1D had unique patterns of diabetes-related strengths, which commonly reflected feeling supported, having confidence about self-management, and engaging frequently in both routine and urgent management tasks. Strengths-based interventions based on profiles tailored to teens' and families' unique capacities may benefit outcomes during this challenging developmental stage.

| Rank | Youth-reported strengths (DSTAR items) | n, % | Parent-reported youth adherence behaviors (DSMP items) | n, % |
|---|---|---|---|---|
| 1 | There is someone I can always ask for help with my diabetes. | 44, 71% | In the last 3 months, teen completed most boluses or shots (missed once a week or less). | 55, 89% |
| 2 | Tie: My parent(s) help me take care of my diabetes. I can ask for help with my diabetes management when I need to. | 38,61% | Teen keeps something handy in case of low blood sugar. | 52, 84% |
| 3 | I am able to take care of my diabetes pretty well. | 37, 60% | Teen checks blood sugar 4 or more times daily. | 39, 63% |
| 4 | Tie: I am good at responding to high or low blood sugars. If I try hard to do everything I need to do for my diabetes, it makes a difference. | 35, 58% | Teen usually or always does ketone test when sick, once or more times per day. | 26, 42% |
| 5 | I am good at figuring out what to do for my diabetes when problems come up. | 32, 52% | Teen or parent treats low blood sugars with prescribed amount of carbs, with or without recheck 15 minutes later. | 16, 26% |

*[Top 5 youth- and parent-reported T1D strengths]*

## P341
## Understanding the relationship between anxiety and blood glucose management in children with type 1 diabetes

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**Objectives:** Children with Type 1 Diabetes (T1D) experience anxiety at much higher rates than their non-T1D counterparts. This elevated anxiety is also known to interfere with optimal management of blood glucose. Attentional biases that favour the processing of negative information have been shown to causally underpin anxiety. In the present study we sought to determine

1) whether anxiety in children with T1D is associated with biased attentional processing of negative information and

2) whether these biases in attentional processing also contribute to control of blood glucose levels.

**Methods:** 62 children (33 female) with T1D who attended the Diabetes Clinic at Princess Margaret Hospital participated in the study. Mean age was 15.62 (SD = 1.63). Participants completed the Trait Anxiety Inventory and the dot-probe task to assess patterns of attentional processing of negative information. HbA1c measurements were extracted from standard clinic data collection. Correlational analyses were employed to determine whether or not anxiety was related to poorer control of blood glucose and whether attentional processing of negative information contributed to this association.

**Results:** Trait anxiety was positively correlated with HbA1c levels. Importantly, measures of attentional processing of negative information were negatively correlated with trait anxiety levels, suggesting that higher levels of anxiety are associated with a pattern of attentional avoidance of these types of information. When controlling for attentional processing, the correlation between anxiety and HbA1c becomes non-significant.

**Conclusions:** These findings suggest that attentional processing of negative information makes a critical contribution to the relationship between anxiety and control of blood glucose levels. Future research will focus on developing attentional training procedures to concomitantly reduce anxiety and increase control over blood glucose levels.

## P342
## Evaluating the impact of the diagnosis and management of a child with type 1 diabetes on parents

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**Objectives:** Glycaemic control can be adversely affected by family conflict derived from regular parental input in the management of diabetes and the negative psychological impact of the disease upon parents. Our objective is to identify potential parental psychological stressors and thus interventions deemed useful to provide additional support to parents with an overall objective of improved patient metabolic control.

**Methods:** 252 children were identified from outpatient diabetic records. Two copies of the Paediatric Inventory Questionnaire for Parents were sent to each household. The questionnaire is designed to identify stressors among parents of children with chronic disease. The questionnaire consists of 43 questions divided into four categories: communication, medical care, emotional distance and role function. Each question is rated across a 5 point scale to assess frequency and difficulty. Two parent focus groups were then held to identify key parental concerns and possible interventions.

**Results:** 123 questionnaires were returned. 1 questionnaire was discounted as it was incorrectly completed with blank spaces. The category emotional distance scored the largest numbers of high scores with 70% and 69% of parents scoring greater than 50% of the possible total maximum score for that category across the two domains of frequency and difficulty respectively. Role function had the least number of high scores with 37% and 39% of parents scoring greater than 50% of the possible total maximum score for that category across frequency and difficulty respectively. Themes emerging from the focus groups included parental concerns regarding the relentless ´24´ hour care of caring for a child with diabetes and impact upon their own social life, relationship with partner and other children.

**Conclusion:** Caring for a child with diabetes has a significant psychological impact upon parents and further psychological support and interventions are necessary.

## P343
## Psychological status of urban T1DM adolescents (Delhi, India)

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**Objective:** To assess psychological status in urban T1DM adolescents using MY-Q (Mind Youth Questionnaire for self-evaluation on general QOL, social/ emotional life, and diabetes management).

**Methods:** We administered MY-Q to 16 M, 29 F adolescents in Delhi. 28 come to a private clinic; 17 go to government hospitals, and are part of a Group which meets weekly, also offers financial support and Yoga. 23 answered English version; 22 version translated into Hindi (which also reflects lower SES).

**Results:** All clinic families know of the Group, but only those needing financial support attend meetings regularly. In answering MY-Q, 42 (93%) expressed overall optimism (ladder question), but on specific questions, often had scores indicating distress in the following areas.

| | Total n = 45(%) | Boys n = 16 | Girls n = 29 | English (upper SES) n = 23 | Hindi (lowerSES)n = 22 | No Group Support n = 22 | Group Support n = 23 |
|---|---|---|---|---|---|---|---|
| Family | 36(80) | 14(87) | 22(76) | 21(91) | 15(68) | 18(82) | 18(78) |
| Self | 26(58) | 7(44) | 19(66) | 15(65) | 11(50) | 12(55) | 16(70) |
| Leisure | 12(27) | 6(38) | 6(21) | 8(35) | 4(18) | 6(27) | 5(22) |
| Diabetes Related | 12(27) | 6(38) | 6(21) | 9(39) | 3(14) | 8(36) | 4(17) |
| School | 9(20) | 5(31) | 4(14) | 5(22) | 4(18) | 7(32) | 2(9) |
| Friends | 5(11) | 2(13) | 3(10) | 3(13) | 2(9) | 3(14) | 2(9) |

*[Table 1]*

Family issues were common; boys and girls were equally affected. Self image problems were more in girls; leisure and diabetes related issues were more in boys. In spite of poverty, those with Group support had distress levels comparable to well off families. Specific problem areas included handling hyperglycemia (15/45), deciding what to eat (15), handling hypoglycemia (12), injecting insulin (12) and self-testing (10/45).

**Conclusions:** Specific questions are needed to elicit areas where psychological distress exists. Family issues predominate in our cohort. Group support (psychological and financial) can help reduce distress. Well off families resist participating in such activities, and may need different forms of incentives.

## P344

## Family caregivers of pediatric patients with type 1 diabetes mellitus: keys for their well-being

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**Objectives:** Our objective was to study, in main family caregivers of pediatric patients with DM1, their main psychological, family and adjustment to illness features.

**Methods:** 44 main family caregivers of 44 pediatric patients with type 1 DM, were assessed in a single moment of evaluation. Patients were between 8–15 years old (Mean age 12.41 SD: 1.64). The time of diagnosis of the disease ranges from 3 months to 14.83 years. At least, 50% of patients had been diagnosed 5 or more years before.

For the evaluation of psychological variables, the following questionnaires were used:

- Hospital Anxiety and Depression Questionnaire (HADS)
- Questionnaire of Stress produced by Pediatric disease Situations (PIP)
- Family Cohesion and Adaptation Scale (CAF)
- Adult Attachment Questionnaire (CAA)

Descriptive statistical analyses were conducted using IBM SPSS v20.

**Results:** In our sample of family caregivers we found mainly mothers (82%). A significant percentage of caregivers reported a clinical problem of emotional distress (77%), with high rates of anxiety (55%) and depression (25%). They also had a difficulty adjustment to the illness of their children, showing moderately high levels of stress produced by situations of caretaking. There is a positive relationship between emotional distress (anxiety and depression) and stress.

Almost 30% of caregivers had low self-esteem, showing a tendency to get angry easily, being more reserved and displayed no communication (aspects related to an insecure attachment style). In our sample we found predominantly families struggling to feel connected emotionally in a healthy way (68%) although most families have shown some flexibility to respond adequately to the problems (66%).

**Conclusions:** Our study highlights the importance of considering the family system as a whole unit of attention and care in the presence of a chronic condition in one of its members.

## P345

## Prevalence of disturbed eating behavior in Dutch adolescents with type 1 diabetes: 1 year follow up

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**Objectives:** The prevalence of disturbed eating behaviors (DEB) in youth with type 1 diabetes peaks at age 17–19: 49% of girls and 15% of boys report DEB. Previously we examined the prevalence of DEB in Dutch 11-16yo adolescents: 45.6% was at risk for DEB and 7.8% scored above cut-off, indicating DEB. No gender differences were found. Using 1 year follow-up data we examined if the prevalence of DEB changes and if gender differences become visible.

**Methods:** Using a stepwise approach DEB were assessed in adolescents (11-17yo) participating in the DINO study: only those who reported dieting activities or body dissatisfaction (step 1) completed the Diabetes Eating Problems Scale-Revised (DEPS-R) (step 2). Four sub-groups were identified: 'No DEPS-R'; 'Low'; 'Medium'; 'Above cut-off'. Prevalence of DEB on T0 and T1 were compared descriptively. Gender differences were examined using $\chi^2$test.

**Results:** Of the 103 participating on T0, 82 enrolled in follow-up. Mean DEPS score on T0 was higher for drop outs (T = 2.8, p = 0.008). Gender was not associated with DEB ($\chi^2$ = 0.31, p = 0.86). As presented in Table 1, for 22% DEPS scores increased, 60% remained stable and for 18% scores decreased.

**Conclusions:** In this sample female gender was no predictor for DEB and for the majority DEB proved to be stable. However, more DEB on T0 were found in the dropout group suggesting an under estimation. Screening for DEB risks using a stepped approach is feasible.

| | T1 NO DEPS | T1 Low | T1 Medium | T1 Above cut-off | T0 Total |
|---|---|---|---|---|---|
| T0 NO DEPS | 33<br>70,2% | 8<br>17,0% | 4<br>8,5% | 2<br>4,3% | 47<br>(100%) |
| T0 Low | 9<br>47,4% | 8<br>42,1% | 2<br>10,5% | 0<br>0,0% | 19<br>(100%) |
| T0 Medium | 2<br>18,2% | 1<br>9,1% | 6<br>54,5% | 2<br>18,2% | 11<br>(100%) |
| T0 Above cut-off | 1<br>20,0% | 0<br>0,0% | 2<br>40,0% | 2<br>40,0% | 5<br>(100%) |
| T1 Total | 45 | 17 | 14 | 6 | 82 |

*[Table 1: Prevalence of DEB at T0 and T1]*

## P346

## Chronicity of type1 diabetes mellitus in youths and quality of life and psychopathology: an interplay?

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**Objectives:** Type1 diabetes (T1D) is a chronic illness and the most common metabolic disease in childhood. We aimed to examine the relationship between glycemic control through HbA1c, age of onset of diabetes, gender and psychological distress, overall well-being of quality of life among a sample of Greek adolescent outpatients with T1D.

**Methods:** Forty-eight adolescents outpatients with T1D aged 13–18 years were enrolled. Glycemic control was evaluated through HbA1c at study enrollment. Good control considered with HbA1c levels < 7.5%. To assess psychosocial factors, the following questionnaires were used: Pediatric Quality of life Questionnaire 4.0 Generic Core Scales(PedsQL4.0 GCS), Ego Identity Scale(EIS), Beck Depression Inventory(BDI II),Beck Anxiety Inventory(BAI). One-wayANOVA and independent samples t-test have been applied to examine differences between groups.

**Results:** Patients have been divided according their age of onset of T1D into 3 groups: < 6 yrs (25.0%), 6-12 yrs (58.3%) and >12 yrs (16.7%). Mean HbA1c level was 7.94%. The mean Generic Score was 80.5, functioning: Physical 85.9/Emotional 74.4/Social 87.1/School 74.7 and Psychosocial health 236.1, but none of these factors is correlated with age of onset and glycemic control. Statistically significant difference has been found for the 'Competence vs Inferiority' domain of the EIS between the groups 6–12 and >12 ($p = 0.034$). Statistically significant differences were found between groups regarding depression ($p = 0.019$) and anxiety ($p = 0.010$). The age group of onset < 6 has greatest average of depression symptoms ($15.18 \pm 13.12$) and anxiety ($18.08 \pm 10.50$).
**Conclusions:** Youths with onset disease at age >12 have more feelings of inferiority and worst competence. A service for adolescent outpatients should offer a multidisciplinary approach aimed to decrease diabetes related stress, increase self-efficacy and support the family as a whole.

## P347
## The implementation of a specific validated semi-structured questionnaire assessing self-care in children and adolescents with type 1 diabetes

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**Objectives:** Knowledge of the characteristics that affect self-management in patients with Type 1 Diabetes Mellitus (T1DM) is valuable for achieving better glycemic control, avoiding complications and having a high quality of life. Aim of the present study was to investigate the parameters that may have an effect, positive or negative, on the self-management in children and adolescents with T1DM.
**Methods:** A specific validated semi-structured questionnaire, the Diabetes Self-Management Questionnaire (DSMQ), was administered to 93 children and adolescents with T1DM, aged 2.5-18 years-old (52.7% were boys, 83.9% used a multiple injection regimen). The questionnaire was composed of 16 items, subdivided into 4 subscales: glucose management (GM) (5 items), dietary control (DC) (4 items), physical activity (PA) (3 items) and health-care use (HCU)' (3 items), whereas one item referred to an overall evaluation of self-care.
**Results:** The mean item-total-correlation was 0.38 (>0.3 for most items) and the total internal consistency was acceptable (Cronbach's alpha 0.773, which is >0.7). Similar findings were obtained when analysis was performed separately for each subscale, except HCU (Cronbach's alpha 0.22). Each subscale score was found to be significantly negatively correlated with age (except for HCU), diabetes duration (except for PA and HCU), and treatment type (except for HCU), but not with sex or HbA1c ($p > 0.05$ in all cases). No differences in subscale scores between groups of different glycemic control were noticed as well ($p > 0.05$).
**Conclusions:** This study suggests that younger children and those with short diabetes duration have higher scores of self-care, possibly due to stricter parental supervision. Adolescence and long disease duration seem to result in poorer self-care, attributed to the revolutionary nature of that age. However, patients with better glycemic control do not present higher scores of self-care. These findings remain to be confirmed by larger studies.

## P348
## Psychosocial profile, glycemic control and well being in poverty associated type 1 diabetes mellitus [T1DM] adolescents in India

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**Objectives:** To analyse psychosocial determinants of glycemic control in economically underprivileged T1DM adolescents in India.
**Methods**
**DISHA:** Since **1987,** 3000 children provided free insulin, syringes, health counseling, 24 h helplines. Since **2006**, BG meters, **5–10 strips**/month added. Basal bolus insulin 100%.
**DISHA + CDiC/LFAC: 2011-ongoing: [Changing Diabetes in Children and Life for a Child with Diabetes]** 292 children receiving enhanced support −**100 BG strips/ month,** quarterly HbA1c, annual urine albumin: creatinine ratio, TSH].
**Psychosocial evaluation:** 84 adolescents (age 10-18y; mean age 15.4y ; age onset 9.83y; duration 5.5y; 37% boys; 52% urban/semi-urban). Tools: HADS 1983; Self Care Inventory-R SCI-R 2001; PAID 2006; KIDSCREEN-272004; Multidimensional Scale of Perceived Social Support 1991; Self-Esteem 1965; Emotional Regulation 2003; General Health Questionnaire-28; ACOPE 2001; FAD 1983.
**Results:**

| Glycemic Control | HbA1c % Range | N | HbA1c % Mean | Anxiety Score | Depression Score |
|---|---|---|---|---|---|
| Better | <9.1 | 22 | 8.04 | 6.59 | 6.64 |
| Intermediate | 9.1-11 | 33 | 10.13 | 6.97 | 6.39 |
| Poor | >11 | 29 | 12.60 | 7.38 | 5.62 |

*[HbA1c Anxiety Depression]*
Better control (A1c < 9.1) was associated with lower anxiety, lower hypochondriasis, higher adherence, and lower family dysfunctional behavior. Poor control (A1c >11) was associated higher anxiety, higher hypochondriasis, lower adherence, and higher family dysfunctional behavior. Depression scores were highest in "Better" control group, compared with "Poor" control group.
In subgroup analysis, adolescents with "Good" control (A1c < 8.1) had lowest anxiety scores (5.56); whereas those with "Worst" control (A1c >12) had lowest depression scores (5.05) ? "careless, and happy-go-lucky" attitude.
In the "Better" control group, there was relative preponderance of girls and urban/semi urban adolescents.
**Conclusion:** Optimal psychosocial environment and support are important determinants of better glycemic control and well-being in T1DM, even in resource limited settings.

## P349
## Family Factors and metabolic control in ethnic minority youth with type 1 diabetes

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**Objectives:** Ethnic minority youth with type 1 diabetes (T1D) are at increased risk for poor metabolic control. The aim of this study was to identify family factors associated with metabolic control and regimen adherence (RA) in minority youth with T1D.
**Methods:** The sample included 91 youth (24% White, non-Hispanic, 46% Hispanic, 30% Black) (mean age = 13.6 years, duration = 5.4 years, 64% girls) and their parents. Participants completed standardized measures of general life stress, family cohesion and conflict; diabetes-related supportive, non-supportive behaviors, and family responsibilities; and RA. A1c and DKA were recorded from the

medical record. Multiple regressions identified predictors of A1c, DKA, and RA with demographic (age, gender, SES, marital status), general family (parent life stress, cohesion and conflict), and diabetes-related (supportive and non-supportive family behavior, responsibilities for diabetes management) family variables.
**Results:** Higher A1c was predicted by single-parent status (p = .05), older age (p = .01), and more life stress (p = .02). DKA was predicted by lower SES (p = .01), more life stress (p = .02), lower family cohesion (p = .01), and more diabetes tasks that no one had responsibility for (p = .001). Lower youth-rated RA was predicted by older age (p = .01), more life stress (p = .05), less cohesion (p = .01), more tasks with no responsibility (p = .03), and less supportive family behavior (p = .02). Lower parent-rated RA was predicted by older age (p = .04), less cohesion (p = .001), and more non-supportive (p = .03) and less supportive family behavior (p = .001). ANOVAs indicated that Black and Hispanic parents reported more life stress than White parents (p = .01); Black youth reported less family cohesion than White youth (p = .04); Hispanic youth had fewer diabetes responsibilities than White or Black youth (p = .01).
**Conclusions:** Poor metabolic control and RA in ethnic minority youth is associated with greater parental life stress and less family cohesion.

## P350
## Screening for depression in adolescents with diabetes by medical social workers: a quality improvement initiative

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**Objectives:** Screen adolescents with diabetes to identify their risk for depression and compare depression risk with glycemic control.
**Methods:** Youth completed the Patient Health Questionnaire - 9 (PHQ-9). Social workers scored the PHQ-9 and made referrals as needed. Referrals were made to Nationwide Children's Hospital (NCH) for counseling or the patient´s local mental health agency. Data on A1C was collected when the PHQ-9 was scored initially, and at 3 month-intervals for a year. Data was also collected for adolescents who were referred (NCH/ non-NCH) and whether the adolescents followed through with counseling (three visits or more).
**Results:** 449 adolescents with diabetes were seen in scheduled social work appointments during that time period. Among that population the mean A1C was 8.9% with the range of 6.2 to >14%. Out of the 449 potential patients who were seen at social work visits during that time, 367 patients actually completed the PHQ-9 (82%). 58% (19/33) who met criteria for depression were referred to counseling, 18% (6) declined, and 24% (8) were already linked. 78% improved in glycemic control who received a referral and followed through (Intervention). 31% improved in glycemic control who either did not follow through with a referral or declined (Did not receive Intervention). 50% improved in glycemic control who were already linked with counseling prior to the screening.
**Summary:** Adolescents who met criteria for moderate to high risk (≥10) depression had higher A1C compared to those who met criteria for low risk (≤9) of depression. This indicates that early identification of depression symptoms is important.

There was a significant improvement in A1C among adolescents who met criteria for moderate to high risk (≥10) for depression and followed through on counseling referral compared to those who did not follow through, indicating psychotherapy has the potential to impact A1C.Adolescents with diabetes are at higher risk for depressive symptoms.

## P351
## Type 1 diabetes mellitus in pediatric patients: keys to their well-being and adjustment to disease

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**Objectives:** The main objective was to study, in a group of children and adolescents with type 1 diabetes mellitus, their main psychological, family and adjustment to disease characteristics.
**Methods:** 44 pediatric patients(43.2% girls) from 8–15 years old (mean age 12.41, SD 1.64) of three different hospitals, were assessed in a single moment of evaluation.The time of diagnosis of the disease ranges from 3 months to 14.83 years. At least, 50% of patients were diagnosed 5 or more years before the study.

For the evaluation of psychological variables, the following questionnaires were used:

- Self-Esteem Questionnaire of Rosenberg (CSR)
- Qualities and Difficulties Questionnaire (SDQ)
- Scale for assessing educational style of parents of teenagers (EP)
- Scale of Psychological Well-Being (BIEPS-J)
- Hospital Anxiety and Depression Questionnaire (HADS)

All descriptive and statistical analyses were conducted using IBM SPSS 20.00.
**Results:** Data showed that 73% of our patients have a non-adaptive response to DM1.

Diabetic children highlighted by the presence of anxiety symptoms in 16% of cases. Remarkable levels of difficulty in motor activity (23%), emotional symptoms (11%) and behavioural problems (9%) were also observed. In our sample, depression levels were not clinically relevant.

Regarding psychological well-being, 9.1% of patients had major difficulties in areas such as: ability to find a meaning to his/her life, sense of control and self-competence.Related to the perception that adolescents have about the parenting style of their parents, our data showed that parents of our sample mostly have healthy educational styles and high behavioural control. These parental features are usually beneficial in diseases like DM1 with a demanding regimen treatment.
**Conclusions:** Our study highlights the need for psychological counselling in these patients, given the important relationship between their emotional and behavioural discomfort and worse adaptation to DM1.

## P352
## Experience of pressure in informal caregiving in parent(s)/caregiver(s) of a child with T1DM. It takes a village to raise a child'

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**Aim:** Diabetes mellitus T1 in a child touches all family members. Children and their parents have to deal with a disease which requests attentiveness, specific knowledge and skills, and this care is hard to hand over (Almeida, 2012; Butler, 2008). T1DM in children leads in >40% to overstressed parents, dysfunctioning families (Piazza-Waggoner, 2008; Rohan, 2015) and worse long term outcome of T1DM. An intervention might prevent predictable pressure in families (Beck, 2012). Is it possible to avoid predictable stress, and how?
**Method:** Systematic literature review; semi structured interviews with professionals; questionnaire Experience of Pressure in Informal Caregiving (EDIZ, Pot, 1995; n = 51); systematic implementing

diagnosis (van Linge, 2004). Options for intervention analysed in the PRECEDE-PROCEED Model (Green, 1974).
**Results:** There's a correlation between the overloaded parents and T1DM in their child. Parent(s)/caregiver(s) accept the situation and by overoptimistic beliefs (Freckleton, 2014) they cannot foresee impact on social life (Landolt, 2005; Lewin, 2006; Rintala, 2013; Roth, 2014) and childs' health perspective (Tsiouli, 2013; Missotten, 2013). Professionals see the need (Werkgroep Kind & Diabetes, 2016).
**Conclusion:** Although the impact of T1DM in a child is predictable, diabetes teams cannot solve the gap between formal and informal care. The lack of breather threatens all family members (Chapell, Reid en Dow, 2001). Current services for family support lack the competencies, capacity, continuum and access to keep up families functioning (Eilander et al, 2015; Movisie, 2015).
**Recommendation:** There is a broad support for a collaborational innovation for diabetes support that seamlessly connects to diabetes care (medical axis) and a healthy neighbourhood approach (Alles is Gezondheid, 2016). Though the need for informal support this innovation deserves a careful implementation to remain the status of a trustworthy supplement of integrative diabetes care.

## P353
## The mental health of adolescents with type1 diabetes: associations with HbA1c

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**Background:** Young people with Type1 Diabetes are at heightened risk for poor mental health and this can be associated with diabetes-related variables, such as HbA1c and history of severe hypoglycaemia. In the current study we investigated the mental health of adolescents with Type1 and associations with their diabetes history.
**Methodology:** 62 adolescents with Type1 (52.4% female) aged 12–18 years participated in the study. They all completed the well-validated self-report measures of general psychopathology (Achenbach Youth Self-Report, YSR), anxiety and depressive symptoms, perceived stress and fear of hypoglycaemia. Average HbA1c over the last year was used as an index of metabolic control. Severe hypoglycaemia was defined as any convulsion or hospitalisation for hypoglycaemia.
**Results:** The mean age of participants was 15.62 (SD 1.93), with 16.7% reporting depressive symptoms in the elevated range. A notably high proportion of participants reported somatic complaints and thought difficulties (on YSR) in the clinical range. Of the group 9.7% reported deliberately trying to hurt or kill themselves and 14.5% thinking about killing themselves.

All symptom scores were positively correlated with average HbA1c in the past year. There were no significant associations between mental health and history of severe hypoglycaemia, age of diabetes onset or fear of hypoglycaemia.
**Conclusions:** Adolescents with Type1 experience significant rates of mental health problems and these are associated with metabolic control. Care for mental health is likely to improve metabolic control.

## P354
## Provider attitudes: the impact of the implementation of a pediatric T1DM transition program

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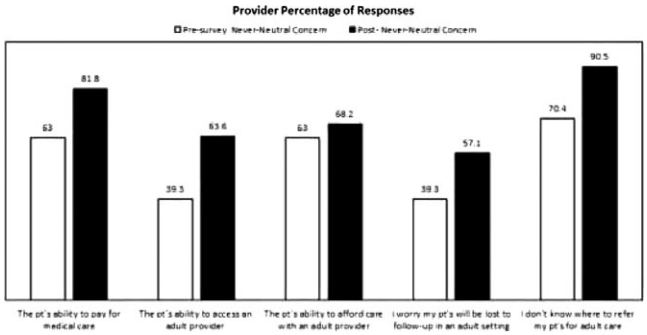
**Objectives:** To identify the impact of a recently established Type 1 diabetes mellitus transition program (T1DM-TP), with an adult endocrinologist in a pediatric endocrinology setting, on a pediatric provider team's attitudes regarding the transition process. The provider team studied was comprised of Registered Dietitians (RD), Endocrinologists (MD), Advanced Nurse Practitioners and Physician Assistant (APN/PA-C), and Social Workers (SW).
**Methods:** A 19 item cross-sectional survey using a 5-point Likert scale was developed based upon prior transition literature to evaluate provider attitudes and barriers with regard to transition from pediatric to adult care among diabetes patients. The survey was distributed to providers prior to implementation of the T1DM-TP and then repeated 12 months later.
**Results:** Factor analysis revealed a positive change in provider attitudes toward the transition process. The results from the pre-survey (N = 28; 13 MD, 4 APN/PA-C, 3 RD, 5 DNE, 3 SW) and post- survey (N = 22, 9 MD, 3 APN/PA-C, 2 RD, 4 DNE,

4 SW) revealed changes in provider attitudes toward the transition process. Among several notable findings, there was an increased frequency of discussion with patients regarding transition and a decreased concern in several areas of the transition process, including access to care and affordability of care.




***[Provider survey]***

## P355
## Assessment of the efficacy of a psychological intervention aiming at improving the quality of life in patients with diabetes mellitus type 1 and their families

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**Objectives:** To assess the efficacy of a psychological intervention at disease onset in pediatric patients with T1DM and their families.
**Methods:** Two groups of 14 patients matched for age and gender were compared: A (newly diagnosed patients) and B (one year of disease duration). The patients and their families were assessed through questionnaire (CBCL) at the time of the diagnosis (T1) in group A and after one year of disease (T2) in both groups. Since the beginning of disease and the whole first year group A received a psychological support treatment. The distribution of anxiety, somatic and internalization scales of CBCL were compared in groupA at disease onset and after one year and between the two groups at one year of disease duration. Kruskal-Wallis test was used for statistical analysis.

**Results:** GroupA showed a significant improvement of the anxiety, somatic and internalization scales during the first year of disease. After one year of disease Group A compared to group B showed non statically significant lower anxiety, somatic and internalization score (see table).
**Conclusions:** The study showed that, at the time of the diagnosis and during the first weeks, patients and their families have a lower adjustment due to the traumatic experience of the diagnosis. Over time they seem to better adjust to the situation. The study was however not able to demonstrate a clear effectiveness of the psychological support intervention started at the onset of the disease.

| | CBCL Components (Scales) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Anxiety | | | Somatic | | | Internalization | | |
| Group/Time | N | BL | C | N | BL | C | N | BL | C |
| A/T1 | 1(7%) | 7(50%) | 6(43%) | 6(43%) | 7(50%) | 1(7%) | 4(28%) | 5(36%) | 5(36%) |
| A/T2 | 8(57%) | 6(43%) | 0(0%) | 12(85%) | 2(15%) | 0(0%) | 10(72%) | 3(21%) | 1(7%) |
| | $\chi2 = 11.52$; $p < .01$ | | | $\chi2 = 5.8$; $p < .05$ | | | $\chi2 = 5.7$; $p < .05$ | | |
| B/T2 | 5(36%) | 8(57%) | 1(7%) | 8(57%) | 6(43%) | 0(0%) | 7(50%) | 6(43%) | 1(7%) |
| | $\chi2 = 1.02$; p NS | | | $\chi2 = 2.8$; p NS | | | $\chi2 = 1.5$; p NS | | |

[1] N = normal; BL = borderline; C = clinical

*[Results]*

## P356
## Hypergonadotropic hypogonadism in 2 siblings with DIDMOAD (Wolfram Syndrome - WFS) syndrome and its associations

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**Objective:** To describe hypergonadotropic hypogonadism in the rare genetic autosomal recessive **WFS** syndrome in 2 sisters.
**Classic presentation:** Insulin-dependent diabetes [non-autoimmune], optic atrophy, central diabetes insipidus, sensorineural deafness.
**Rare:** Neurological/ psychiatric; delayed puberty, central hypogonadism, anterior pituitary dysfunctions; urodynamic abnormalities, limited joint motility, cardiovascular/ gastrointestinal autonomic neuropathy; heart malformations].
**Methods: A. Sibling 1:** Full term normal delivery; Age 8: Diabetes insulin dependent; Age 13: Optic Atrophy; Age 18: Diabetes insipidus; Age 16: Menarche; Age 17: Secondary amenorrhea, Serum FSH 87.5 mIU/ml, LH 29.9 mIU/ml, Testosterone 6.9 ng/dl, US Abdomen: small sized uterus, bilateral ovaries hypoplastic /agenesis; Age 17: Bilateral minimal high frequency sloping hearing loss [Right ear PTA 25db, Left ear 23.3 db]. Short Stature: Height cm: 146; %ile: 0%, Z-score: −2.64; Weight kgs: 39.4; %ile: 0%, Z-score: −3.13; BMI-for-age: 18.5; %ile: 13%; Z-score: −1.11; Serum Growth Hormone post clonidine: 6.9 ng/ml.

**B. Sibling 2:** Full term normal delivery; Age 4: Diabetes insulin dependent; Age 15: Optic Atrophy; Age 17: Diabetes insipidus; Age 15: Menarche; Age 16: Secondary amenorrhea, Serum FSH 87.8mIU/ml, LH 31.7mIU/ml, Testosterone 16.3 ng/dl, US Abdomen: small sized uterus, bilateral ovaries hypoplastic /agenesis, left hydronephrosis; Age 16: Left minimal hearing loss, Right normal hearing [Right ear PTA 10db, Left ear 16db]. Short Stature: Height cm: 151; %ile: 3%; Z-score: −1.87; Weight kgs: 40.2; %ile: 0%; Z-score: −2.89; BMI-for-age:17.6; %ile: 5%; Z-score: −1.61; Serum Growth Hormone post clonidine: 7.9 mg/ml.
**Conclusion:** Hypogonadism may be hypogonadotropic or hypergonadotropic [more reports in males]. Genetic and biologic basis for the diversity in clinical manifestations [including hypogonadism] in **WFS** needs better elucidation. Short stature is common feature.

## P357
## Psychosocial need survey - adolescent outpatient diabetes clinic

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**Aim:** To explore patient and carer needs in regards to psychosocial services in Diabetes Services at Monash Medical Centre for ages 13–18 and to increase involvement and/or support in management and further understanding of Type 1 diabetes.
**Methods:** A paper and pen questionnaire based on Likert scaling and short comments, was given to both carers and adolescents whilst attending outpatient clinics for Type 1 Diabetes, during a four month period.
**Results:** One hundred and thirty three patients were scheduled for this time and 27% failed to attend. Of the 95 parent surveys returned, 60% indicated that they would attend workshops on managing diabetes, parenting strategies, stress reduction and promoting teen independence. 50% indicated an interest in attending support groups and 40% were interested in their adolescent children attending groups. 78% of carers reported that they would attend groups at Monash Medical Centre, Clayton.Of the 93 adolescents who returned their questionnaires, one third failed to answer the majority of the questions. Of those who did complete their questionnaires, 60% responded that they would like to "manage their diabetes and still have a life". For workshops 45% responded that they would not attend if offered, 33% were undecided . Over half of the adolescents did not answer questions relating to support groups and the 47% who answered indicated that they would attend fortnightly or monthly support groups at Monash Medical Centre.
**Conclusion:** The survey indicated satisfaction with psychosocial services in DACS, there were mixed results for whether the adolescent group and their carers would attend or utilise support groups or workshops, with half of the adolescents not responding. Although those who did respond, answered positively. There is potenital for further investigation as to whether there would be future success in utilising technology for online support groups or workshops as an alternative to groups at the hospital.

## P358
## Health related quality of life of Egyptian children and adolescents with type 1 diabetes

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**Objectives:** In Egypt, limited evidence exists on HRQoL among children and adolescents with T1DM. Therefore, the present study aimed to evaluate the HRQoL among Egyptian children and adolescents with T1DM and their parents taking into account the gender and age group of the patient.
**Methods:** This is a cross-sectional study enrolled 102 children and adolescents with T1DM (54 female/48 male) aged (8 to 18 years old), had T1DM for at least 12 months. We used Pediatric Quality of Life Inventory 3.0 (PedsQL™ 3.0) which is a multi-dimensional instrument of 28 items encompasses 5 scales: diabetes symptoms (2) treatment barriers (3) treatment adherence (4) worry (5) communication. We followed the methodology commonly used in the translation and validation of HRQoL instruments. Internal consistency was checked by Cronbach´s alpha coefficient.
**Results:** There was significant increase of the mean values of the total score of HRQoL of diabetic patients compared to their parents. There was no significant difference between male and female patients in total QoL scores. Female sex was associated with better total QoL scores and also did better regarding diabetic symptoms, treatment adherence, treatment barriers, worry dimensions scores. Male patients were more significantly feel hungry and thirsty than females ($p = 0.009$, $p = 0.021$) respectively. Older children (12–18 years) have significant thirst feelings and frequent urination than younger group (8–12 years) ($p = 0.021$, $p = 0.016$) respectively.
**Conclusion:** The results of this study indicate that Parents of diabetic children have poor QoL than their children. There is no effect of gender, age group, or duration of T1DM, on HRQoL. Understanding the effect of diabetes on quality of life of patients and their parents; male and female; children and adolescence, is being of great help in clinical management and to design a public health policy in order to improve the quality of life and health outcomes of those with T1DM.

## P359
## STAND-support through art and networking for diabetes parent support group. The opinions of the parents pre and post group

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**Intro:** The Diabetes MDT in The National Children's Hospital Tallaght set up a 6 week psychology/art therapy led psychotherapy adolescent group for teenagers 16–19 years old who attend our service. Alongside this the Medical Social Worker (MSW) facilitated a support group for the parents.The purpose of the parent support group was to provide a supportive space for the parents to meet others who have shared experiences and to provide a safe space for them to open up and share advice. The MSW also provided information and facilitated discussions in relation to important and relevant topics related to parenting a young person with Type 1 Diabetes, such as transitioning to independence, parent–child relationship and stress.
**Methodology:** Each of the group participants completed a pre and post group satisfaction survey. 12 participants completed the pre group survey and as there were 3 drop outs of the group 9 participants completed the post group survey. The surveys were qualitative and asked the parents about their expectations for the group, their current struggles, what they gained from the group, whether they found it improved their input into their teenagers' diabetes care and their relationship.
**Findings:** The outcomes of the surveys were that the participants of the group gained informal supports that they didn't previously have. They felt reassured that other families have similar struggle in relation to Diabetes care. They enjoyed the discussions and sharing aspect of the group. Some of the participants used the learned stress management techniques taught within the group. Many of the participants reported that they have started to allow their adolescents some independence around their diabetes.
**Recommendations:** The parents suggested that the group run for a longer period of time.They noted that they would benefit from a psychoeducational aspect to the group. Overall they felt that the Diabetes team facilitating a group for both parents and patients was beneficial.

## P360
## Applying the ecological model to understand factors contributing to psychosocial wellbeing and health care of children and adolescents with diabetes mellitus

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**Objective:** The bioecological model has been shown to be a robust model for understanding developmental needs of children. To date, this model has not been applied to specific need for pediatric children with diabetes mellitus. Therefore, the objective of this study is to discuss the bioecological model of Urie Bronfenbrenner and its application on diabetes care and psychosocial wellbeing of children with diabetes in Sub Saharan Africa.
**Methods:** This is a discussion paper that draws its arguments from empirical literature to demonstrate how the bioecological model can contribute to our understanding of psychosocial issues and health care of children and adolescents with diabetes mellitus.
**Results:** Using empirical evidence, this paper demonstrates that the bioecological model is a robust theory that can be applied in diabetes care and psychosocial wellbeing intervention of children. The paper also discusses clinical and research implications.
**Conclusions:** The advantage of the bioecological model in diabetes is that it targets large-scale public health interventions unlike medical intervention that focus on a single individual.

## P361
## Whose diabetes is it anyway? Exploring the transfer of diabetes care responsibility from parents to children with type 1 diabetes: a study protocol

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**Objectives:** The transference of diabetes care responsibility from parents to
children with type 1 diabetes (T1D) is often experienced as stressful by families and clinicians. However, factors that may facilitate or impede the transference of diabetes care responsibilities from parents to children in different developmental stages or the right timing and extent of transference for specific families, are yet understudied. Therefore, the aims of this research project are

a. to identify which factors enhance or impede the transfer of diabetes care responsibilities,
b. to define the right extent of transference in different developmental stages and
c. to develop an explanatory framework (mediation/moderation) that describes the relation between facilitating and impeding characteristics, the extent of transference of treatment responsibilities and health outcomes.

**Methods:** First, a qualitative focus group study will be conducted to
a. examine which factors facilitate or impede a smooth transfer of diabetes responsibilities and
b. to identify the right extent of transference.

Based on Belsky's Process Model (Belsky, 1984), the identified facilitating and impeding factors will then be categorized into parent, contextual and child domains. Next, a large-scale cross-sectional study (N ~ 200) will be conducted to test the explanatory framework linking parent/child/contextual factors to diabetes care transference and health outcomes.

**Results:** It is expected that the results of this project will disentangle associations between child/parent/context characteristics, the extent of care transference and diabetes-outcomes in different developmental stages.

**Conclusion:** The previously outlined project aims to help families to optimize blood glucose control and quality of life by providing them with family-tailored advice about the right extent and timing of the transference of treatment responsibilities.