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INVITED ABSTRACTS

Exercise: part of diabetes treatment or only for the fittest? – JDRF?

INV1
Sports nutrition
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Nutrition is an integral part of the management of Type 1 Diabetes. For the active child and young person with T1D good nutrition is a key factor in both optimising glycaemic control during exercise and maximising sports performance. The IOC consensus statement on training the elite child athlete recommends “a strong support system to ensure a balanced lifestyle including proper nutrition, adequate sleep, academic development, psychological well-being and opportunities for socialisation”. This recommendation applies to children with Type 1 Diabetes.

Sports nutrition advice for child athletes with T1D is adapted from evidence for sports nutrition in adults and glycaemic management in children.

Rare monogenetic diabetes

INV2
Berardinelli-Seip syndrome and other lipodystrophies: diagnosis and treatment
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Berardinelli-Seip syndrome, also named Congenital Generalized Lipodystrophy (CGL), is a rare and severe monogenic syndrome of insulin resistance, transmitted as an autosomal recessive trait, mainly in consanguineous families. Inactivating mutations in four genes, causing the clinically related CGL type 1 to 4, impair the cellular pathways of adipocyte differentiation through different mechanisms, leading to the association of fat loss, insulin resistance, severe dyslipidemia and fatty liver disease, further complicated with diabetes. Early diagnosis, mainly based on clinical signs, is needed for adequate care, family screening and genetic counseling. Recombinant leptin therapy, which addresses one of the endocrine defects related to fat loss, is effective for the prevention and the treatment of metabolic complications. However, its restricted availability outside North America and Japan limits its utilization for routine care.

Beside CGL, other rare lipodystrophic syndromes, with lipoatrophy being generalized or partial, genetically-determined or acquired, cover a broad spectrum of clinical phenotypes including multisystem pediatric or adult diseases. Accelerated ageing syndromes, DNA repair abnormalities, auto-immune or inflammatory diseases can also result in limited fat storage in adipose tissue and its metabolic consequences. These recently described diseases further reveal that each aggression against differentiation, regulation and/or maintenance of adipose tissue, or dysregulation of triglyceride storage within adipocyte lipid droplets, has major consequences for whole-body metabolic homeostasis.

Obesity and Insulin resistance

INV3
Metabolic Markers of Beta Cell Failure in Youth Insulin Resistance: Do They Conform to Standards?
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Youth prediabetes and type 2 diabetes have emerged as major consequences of childhood obesity imposing a serious public health burden. The traditional and widely accepted standards to either diagnose type 2 diabetes or capture heightened risk for future type 2 diabetes, i.e. pre diabetes, are the fasting and 2-hr glucose concentrations during an oral glucose tolerance test (OGTT). Considering that insulin resistance, impaired β-cell function and impaired incretin effect constitute...
the pathophysiological mechanisms of youth prediabetes and type 2 diabetes, there is increasing interest to identify simple biomarkers that can detect impairment in β-cell function presaging type 2 diabetes. Among these are the fasting, the 1-hr, and the 2-hr glucose concentrations during the OGTT which signal impaired β-cell function, measured by the clamp-derived disposition index (β-cell function relative to insulin sensitivity), and proclaim risk of progression to type 2 diabetes. Additionally however, recent cross-sectional studies demonstrate that the shape of the OGTT-glucose response curve can differentiate type 2 diabetes risk in adults, but data are limited in pediatrics. This presentation will discuss the nontraditional metabolic biomarkers that herald β-cell failure and risk of type 2 diabetes in obese youth.

Pandemic and Potential solutions: Improving Diabetes in emerging economies

INV4
Pandemic and potential solutions: improving diabetes in emerging economies - China
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It has brought an increasing amount of attention to childhood diabetes and the impact on economic development. The cost for diabetes-related health expenditure in China is >500 billion dollars in 2015. The incidence is increasing in China, particularly in children < 15 years. We conducted a nationwide study from China’s 14 medical centers for 15 years including 4 million patients. T1DM has occurrence rate of 89.6% of all diabetes. China ranks No.4 in the number of children with T1DM (< 15 years). The overall annual incidence increase is estimated around 3% globally. But there are strong geographic differences, with 3 times higher in well developed areas in China such as Beijing, Shanghai. According to the retrospective study the mean age at diagnosis decreased significantly to 11.21 years in 2013. A steep rise in diabetes incidence was observed in the under 5 year’s age group.

China is struggling with the growing challenge of childhood diabetes and rapid increase in type 2 diabetes. The prevalence of obesity and overweight increased 3-fold in 10 years. The prevalence of overweight was 11.0% and obesity 8.9% in our multicenter study, aged 7–16 years old. The prevalence of childhood T2DM in China doubled from 4.1/100,000 in the first 5 years to 10.0/100,000 in the recent 5 years. With the growing increase in diabetes, we are trying to improve the awareness of society to childhood diabetes. Chinese professionals conducted the project MANAGEMENT PROGRAM FOR CHILDREN WITH DIABETES IN CHINA, which has established 32 pediatric diabetes centers in 26 cities in China from Nov. 2011 to Mar. 1, 2015. We organized 78 diabetes camps to deliver knowledge of diabetes care and set up a network for communication. Over 1300 children and 2600 parents benefit. Meanwhile, Spring Bud Plan-Chinese children diabetes cooperative group was initiated involving 48 pediatric diabetic centers. Outpatient management of diabetes and 3C diabetic management is seeing its advantage.

Obesity and Insulin resistance

INV5
Endocrine-metabolic consequences of low and high weight at birth
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Infants born small-for-gestational-age (SGA) are at higher risk for adult diseases, including diabetes and hypertension. Longitudinal studies have disclosed that those risks may be modulated by early nutrition, so that breast-feeding confers a relatively low risk and protein-enriched formula-feeding is followed by a relatively high risk. In early infancy, the catch-up of SGA infants is characterized by a recovery of lean versus fat mass; in late infancy, SGA-breastfed infants combine a low adiposity and a high insulin sensitivity with normal IGF-I and HMW adiponectin levels; in contrast, SGA infants fed enriched formulas normalize their body composition by gaining more fat; this normalization is accompanied by a fall in HMW adiponectinemia and by elevated IGF-I levels, and thus, by a less favorable cardio-metabolic profile. Eventually, catch-up SGA children tend to become hyperinsulinemic, and to display more hepatic fat and a thicker carotida by the age of 3–6 yr; the development of overweight amplifies these abnormalities and increases further the risk for an early and rapidly progressive puberty, and a shorter adult stature.

Breastfed, large-for-gestational-age (LGA) infants from non-diabetic mothers are more adipose as newborns, despite having lower levels of myostatin -a myokine inhibiting the differentiation of myoblasts-, and longer telomeres. By the end of early infancy, these infants become relatively lean and develop a favorable endocrine-metabolic profile including high insulin sensitivity. By age 2 years, LGA subjects become relatively “muscular” -by gaining more lean mass- and tall; this pattern of body composition may subsequently protect these individuals against metabolic complications of overweight and explain their lower risk for diabetes as adults.
INVITED ABSTRACTS

Emerging diabetes therapeutics (ADA symposium)

INV6
New approaches for islet immune-isolation and delivery
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The fibrotic reaction to implanted biomaterials is a fundamental challenge to the development of immuno-isolation devices. Here we describe our work developing new biomaterials and devices for the purposes of enabling islet transplantation. In particular we describe the development of a large library of synthetic hydrogel materials, and the characterization of their biocompatibility in vivo. Data will be presented on the nature of the immune response to these and conventional biomaterials. Several lead materials have been identified with significantly improved biocompatibility in rodents and primates. When formulated into microcapsules these materials allow for long-term islet survival and function in rodents and primates.

INV7
Neurodevelopment and KATP channels: evolution and new pharmacologic approach
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ATP-sensitive potassium (KATP) channels are cell metabolic sensors that couple cell metabolic status to electric activity, thus regulating many cellular functions. Structurally, KATP channels are four identical inwardly rectifying potassium channel subunits (Kirx) forming the pore, associated to four identical high-affinity sulphonylurea receptor subunits (SURx). In the brain, as in the pancreatic β-cells, the Kir6.2/SUR1 channel is the dominant KATP isoform. In pancreatic β-cells, KATP channels modulate insulin secretion in response to fluctuations in plasma glucose level, thus regulating glucose homeostasis. In the brain, their functions and the pathways they control are partly understood. Neonatal diabetes mellitus (NDM) is due to gain-of-function mutations in KATP channel subunits and is associated with neurodevelopmental disorders ranging from developmental delay and epilepsy (DEND) or intermediate DEND syndrome to developmental coordination disorder associated or not with hypotonia or attention deficit. Sulfonylurea treatment acts through closure of the KATP channels, which enables insulin secretion from the β-cell and modest but measureable improvements in neurodevelopmental outcomes. However, sulfonylurea drugs have limited ability to cross the blood–brain barrier in animal models. Early treatment with sulfonylureas improves visuomotor performance in patients with permanent NDM. Rapid identification of mutations and switching to sulfonylurea treatment at a younger age might provide further benefit with regard to neurodevelopmental outcomes. Our group developed a suspension of glibenclamide that is more suitable for use in pediatric patients as its dosage can be adjusted to patients needs with great precision. Pharmacokinetic studies reported it to be better absorbed than glibenclamide tablets and metabolic studies reported same efficiency as tablets in infants and young children affected with NDM (ClinicalTrial.gov NCT02375828).

Epidemiology and Economic Burden on healthcare system by childhood DM

INV8
Is the incidence of type 1 diabetes in children and adolescents really increasing?
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Type 1 diabetes (T1D) diagnosed in youth presents a substantial clinical and public health burden due to both the challenges of daily disease management and the risk for serious and chronic complications. Previous reports documented that the incidence of T1D has increased worldwide over the past three decades. Data from Australia demonstrated a 5-year cyclical variation in T1D incidence in youth from 2000–2011 in both sexes and in all age groups studied. In Finland - with the world’s highest reported incidence of T1D - analyses suggested a stabilization of the incidence of T1D from 2005–2011. Similar findings indicating a plateau in incidence were reported from Norway. On the other hand, data recently reported form the SEARCH for Diabetes in Youth study in the United States showed that a linear trend of increasing incidence of T1D from 2002–2012 was the best fit to the data, rather than a non-linear function. In this presentation, we will present data from around the world and will consider potential reasons for variable results across studies and countries on the topic of whether the incidence of T1D is increasing over time. These results are important indicators of the potential impact of T1D on the lives of young individuals, on the health care system and on society in general. Variation in incidence trends may generate new directions for research on the environmental or behavioral triggers of T1D diabetes in youth that may change over time, and that therefore may be important in eventual efforts for prevention.
Diabetes Registries: Comparing outcomes to improve care

INV9
Nordic countries / USA & Australia registries

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Objectives: There is an increasing use of benchmarking within and between countries. Resources are used to collect data and present data. Is it purely an academic exercise or do our patients benefit from benchmarking? The purpose of this lecture is to describe the Nordic and American and Australian benchmarking, to highlight results regarding improved outcome for children with diabetes and discuss why and how benchmarking works.

Methods: Literature review of studies from the Nordic National registries, America and Australia including long-time follow-up and feedback to participating center including center specific results before and after.

Results: There are numerous registers and collaborating networks worldwide with the purpose of improving outcome for children with diabetes. There are substantial differences among countries and centers not easily explained by the treatment or population characteristics. Some differences between centers may be nullified by the opposite results from other centers hiding valuable information. Several studies have shown improved HbA1c and reduction in hyperglycemic events, though some studies show limited improvement. Only items with a high accuracy and completeness can be addressed for interpretation and more soft variables such as good communications and beliefs are difficult to measure. Beneficial outcome may be due to exchange of guidelines, exchange of good clinical practice or the direct comparison of results changing our beliefs of what is possible. The mindset of the healthcare providers (or patients) may be as important as treatment including target settings.

Conclusions: Benchmarking and national registers is often associated with improved care the challenge is to translate it into specific guidance and identify factors responsible for improved outcome. Our own mindset and convictions may be challenge by the best results seen in centers comparable to our own.

The state of art on Diabetes Complications

INV10
Effects of type 1 diabetes on cognition and the brain

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The human brain undergoes dynamic changes in brain structure and metabolic demand throughout childhood. Glycemic extremes, such as hypoglycemia and hyperglycemia, occur more frequently in children and adolescents with T1DM. Thus, brain developmental trajectories are altered depending on the age and severity at which these extremes are experienced. Studies utilizing various neuroimaging techniques have shown that glycemic extremes can differentially affect the developing brain. Severe hypoglycemia has been associated with smaller gray matter volumes in superior temporal regions, whereas exposure to hyperglycemia has been associated with smaller gray matter volume in the medial parietal area, greater gray matter volume in the right prefrontal region. There are only a few of cognitive studies with large sample size that examine glycemic control variables in a reliable manner. Some studies in adults and children have documented an association between severe hypoglycemia and lower cognitive outcomes compared to controls or those without severe hypoglycemia. Moreover, cross-sectional studies of youth suggest that exposure to chronic hyperglycemia may lead to subtle differences in cognitive and academic function. Recent data suggest that this association can be detected quite early in young children and youth with recent onset diabetes. However, longitudinal prospective studies over a wide range of glycemic extremes are needed to better determine the effects of glycemic extremes in the brain.

Motivational Interviewing to engage adolescents with Diabetes

INV11
Motivational interviewing to engage adolescents with diabetes

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For young people trying to keep diabetes under control the behaviours can appear simple e.g.; following a healthy diet, regular self-monitoring and exercise. However clinicians and parents are often frustrated by the gap between the “ideal” and ‘reality’. Young people have conflicting motivations and pressures; a change in behaviour feels too big, the rewards too distant, the personal or financial costs too high or maybe it was never their idea to change in the first place. Attention has turned to the potential of Motivational Interviewing in the paediatric setting, particularly with the adolescent age group. Motivational Interviewing is a directive person-centred therapeutic style that invites individuals to explore ambivalence and find solutions that fit for them if they identify the situation as a problem. Early trials support the use of MI in type one diabetes in adolescents, either as a stand-alone treatment or as an adjunct to other treatments where it can be a method of engaging patients in the programmes thus enabling the programmes to be more effective. The presentation describes the core principles and key skills of motivational interviewing and offers clinical examples with young people and parents living with diabetes.


Is Diabetes an Emotional Burden in adolescents and young adults with T1DM?

**INV12**

I wish they understood how much of an impact it has on everyone in the family: parents' views of living with type 1 diabetes in the family

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This presentation will share findings of the Diabetes MILES Youth Study, the first large-scale, Australian survey of parents and adolescents focused on the psychological aspects of diabetes.

Youth (aged 10 to 19 years) and their parents were invited to complete an online survey about their experiences of living with type 1 diabetes, their emotional well-being, family relationships and support. Parents completed questions about their own general emotional well-being as well as diabetes-specific measures (parental diabetes-related distress, fear of hypoglycaemia and hyperglycaemia); about their child’s diabetes management, history of hypoglycaemia and DKA, diabetes-specific self-efficacy and responsibilities.

In total, 826 parents or carers (mean age 46 ± 6 years, 88% mothers) of an adolescent with type 1 diabetes took part in the study. Overall, few parents reported severe anxiety symptoms (8%) or had impaired emotional well-being (12%). However, one in four parents experienced high levels of distress related to their child’s diabetes. Looking more closely to their concerns, it was clear that parents experienced both fear of hyperglycaemia (and its long-term consequences) as well as fear of hypoglycaemia. Parents were often concerned about their child’s diabetes management being ‘off track’ and many felt they acted as ‘diabetes police’. In general, respondents scored high on the diabetes self-efficacy scale, but they felt least confident in having the conversation with their child about the realities of long-term complications. These findings indicate that the difficulties parents face in keeping the child’s glucose levels within targets affect their psychological well-being and family relationships.

The Diabetes MILES Youth survey provided an opportunity for parents’ voices to be heard, as illustrated by this parent: ‘Thank you for providing the opportunity to detail what I experience on a daily basis.’

**INV13**

We’re all in this together - reducing the burden, an issue for the whole family and the diabetes team

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Recent advances in insulin delivery systems, as well as new and improved insulins hold great promise for improved outcomes for youth with T1DM. Yet the emotional burden of the disease remains stubbornly high and there is evidence that human behaviour continues to undermine the translation of treatment advances into better outcomes for patients. Media driven reports of an imminent “cure” create uncertainty and disappointment for families, while the demands of implementing promising new technologies may exceed the financial, cognitive and emotional resources of many individuals and actually increase stress and a sense of failure. As Acerini (2016) points out, evidence that “high tech” = “high quality” = better metabolic outcomes is lacking. Hope is essential, but misguided hope will engender resentment and undermine trust. Most clinicians are acutely aware of the important role that emotional factors play in diabetes management, but the desire for a prescriptive template for reducing stress and promoting psychological wellbeing in their patients, while understandable, may be unrealistic. It is most unlikely that “one size will ever fit all”. This presentation will review what we currently know and what we still need to learn about the psychology of diabetes management. Pitfalls, predicaments and cautionary tales will be noted, and some suggestions for a way forward will be offered.

Acerini C. The rise of new technology in diabetes care. Not all that is new is necessarily better. *Pediatric Diabetes* 2016; doi:10.1111/pedi.12366
Conclusions: Normoglycemia in children aged 2-8 years as monitored (m. Only 6.2% (range 1-27%, 1-11%, and 0-3%) were > 9 mmol/l, and 0.077% (range −0.85; range 2.1-7.9) years, BMI-SDS 0.06 (±0.85; range −1.5-1.6), HbA1c IFCC 32 (±2.7) mmol/mol, and HbA1c NGSP 5.1% (±0.24%). Their fasting p-glucose was 5.0 (±0.40) mmol/l and two-hour postprandial p-glucose was 5.9 (±0.74) mmol/l. They provided 1895 (±107; range 1637-1985) glucose values each.

Mean glucose value was 5.3 (±0.33) mmol/l. Mean glucose variability expressed as SD was 1.0 (±0.21). Altogether 84% (±6.8; range 72-94%) of values were in the range 4-7 mmol/l, while 10% (±7.9%) of values were < 4.0 mmol/l, 3.3% (±3.6%) were < 3.5 mmol/l and 0.77% (±1.2%) were < 3.0 mmol/l. The median frequency of values below 4.0, 3.5, and 3.0 mmol/l was 7%, 2%, and 0%, respectively (range 1-27%, 1-11%, and 0-3%). Nadir glucose 4.5 (±0.31) mmol/l was at 5 a.m. and the highest value was 5.9 (±0.59) mmol/l at 9 p.m. Only 6.2% (±4.4%) of values were > 7.0 mmol/l, while 0.62% (±1.2%) were > 9 mmol/l, and 0.077% (±0.28%) were > 11 mmol/l.

Conclusions: Normoglycemia in children aged 2-8 years as monitored with CGM was 4.6-6.0 mmol/l, with a diurnal pattern of lower plasma glucose values below 3.3 mmol/l was low in both groups (3 vs 1 in OL). In the VO2max 55/80% exercise protocol, the proportion of time with glucose values within target range (3.9-10 mmol/l) was significantly higher in the CL (85.9% (IQR:76.1-91.2%) compared to OL (67.8% (IQR:52.2-79.9%, P=0.0488)). Subjects did not spend any time in hyperglycemia above 13.9 mmol/l (0,0% (IRQ:0,0-0,0%) in CL compared to 6.3% (IQR:0,0-16,3%) P=0.0469) in OL). In the VO2max 55% protocol these differences did not reach statistical significance.

Conclusions: CL insulin delivery during and overnight after physical activity was safe and effective in maintaining glucose values in desired range without increased risk of hypoglycemia in the hospital environment.

Trial registration: ClinicalTrials.gov NCT02657083

Disclosure: M.M. received funding from 2015 ISPAD Research Fellowship Grant.

OO2

Overnight glucose control during and after physical activity with closed-loop system GlucoSitter™ in youth with type 1 diabetes

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Objective: To describe glycemic patterns monitored with CGM in healthy children aged 2-8 years.

Methods: Participants were healthy siblings, aged 2-7.9 years, of children with diabetes using CGM. Height and weight were measured by staff at the hospital. HbA1c was measured with DCA Vantage, with reference value 27-42 mmol/mol. Fasting plasma glucose and two-hour postprandial glucose value after a defined meal was measured with Hemocue prior to inclusion. Each child used one Dexcom G4 sensor placed on the arm or the buttock and calibrated according to the manufacturer’s instructions. Data were downloaded to the DiAsend system and analyzed with SPSS.

Results: 13 healthy children (9 girls) participated, with mean age 5.5 (±1.7; range 4.4-) years, BMI-SDS 0.06 (±0.33) mmol/l. Mean glucose variability expressed as SD was 1.0 (±0.21). Altogether 84% (±6.8; range 72-94%) of values were in the range 4-7 mmol/l, while 10% (±7.9%) of values were < 4.0 mmol/l, 3.3% (±3.6%) were < 3.5 mmol/l and 0.77% (±1.2%) were < 3.0 mmol/l. The median frequency of values below 4.0, 3.5, and 3.0 mmol/l was 7%, 2%, and 0%, respectively (range 1-27%, 1-11%, and 0-3%). Nadir glucose 4.5 (±0.31) mmol/l was at 5 a.m. and the highest value was 5.9 (±0.59) mmol/l at 9 p.m. Only 6.2% (±4.4%) of values were > 7.0 mmol/l, while 0.62% (±1.2%) were > 9 mmol/l, and 0.077% (±0.28%) were > 11 mmol/l.

Conclusions: Normoglycemia in children aged 2-8 years as monitored with CGM was 4.6-6.0 mmol/l, with a diurnal pattern of lower plasma glucose in the morning (3.7-5.1 mmol/l) and higher in the evening (4.7-7.1 mmol/l). Glucose values < 4.0 mmol/l were uncommon and values < 3.5 mmol/l were rare.

OO3

At-home and hotel use of a hybrid closed-loop (HCL) system in a pivotal trial

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Objective: The aim of this clinical study was to investigate the safety and efficacy of closed-loop (CL) insulin delivery during physical activity and the night after in children and adolescents with type 1 diabetes (T1D).

Methods: This study is a two-arm, open-label, randomized, in-hospital, crossover, ongoing clinical trial of 20 children and adolescents with T1D. They performed two exercise protocols: moderate (55% of maximal oxygen uptake-VO2max) physical activity, and a combination of moderate activity with incorporated high intensity sprints (55/80% VO2max) either on CL (DreaMed GlucoSitter™) or open-loop (OL) in random order. In OL group pump was disconnected during the exercise and basal insulin dose was reduced by 20% for 4 hours after the exercise.

Results: This interim analysis included 10 subjects (5 girls), median age was 15.73 years (IQR:13.43-15.91 years) and median was HbA1c 7.8% (IQR:7.4-8.05%). There was no statistical difference in percentage of time in hypoglycemia below 3.9 mmol/l (1.3% (IQR:0.0-4.65%) for CL and 0.0% (IQR:0.0-0.4%) for OL). Event rate of hypoglycemia below 3.3 mmol/l was low in both groups (3 vs 1 in OL). In the VO2max 55/80% exercise protocol, the proportion of time with glucose values within target range (3.9-10 mmol/l) was significantly higher in the CL (85.9% (IQR:76.1-91.2%) compared to OL (67.8% (IQR:52.2-79.9%, P=0.0488)). Subjects did not spend any time in hyperglycemia above 13.9 mmol/l (0,0% (IRQ:0,0-0,0%) in CL compared to 6.3% (IQR:0,0-16,3%) P=0.0469) in OL). In the VO2max 55% protocol these differences did not reach statistical significance.

Conclusions: CL insulin delivery during and overnight after physical activity was safe and effective in maintaining glucose values in desired range without increased risk of hypoglycemia in the hospital environment.

Trial registration: ClinicalTrials.gov NCT02657083

Disclosure: M.M. received funding from 2015 ISPAD Research Fellowship Grant.
Plus-minus values are means ± standard deviations.

**Objectives:** A hybrid closed-loop (HCL) insulin delivery system was evaluated to establish its safety in adults and adolescents during unsupervised (home) and supervised (hotel) use.

**Methods:** Participants with type 1 diabetes for ≥2 years, ≥6 months’ insulin pump use, and no recent severe hypoglycemia or DKA used the Medtronic HCL system, consisting of an investigational glucose sensor and transmitter, and a new pump platform with a control algorithm. After a 2-week run-in phase, all subjects were assigned to a 3-month study phase conducted at home, with a 6-day, 5-night hotel stay that included frequent reference (i-STAT) venous glucose measurements. Endpoints included the% of glucose values below, within, and above the target range of 71-180 mg/dL.

**Results:** There were no episodes of severe hypoglycemia or DKA. The Table summarizes sensor glucose (SG) values throughout the study and i-STAT values during the hotel stay. There% of in-target SG values (all subjects) increased from 66.7% in the run-in to 72.2% in the study phase, and increased from 60.4% to 67.2% among the 30 adolescents age 14-21, with corresponding decreases in SG values above and below the target range (p< 0.001 for each). SG and i-STAT glucose distributions were in good agreement (Table). The MARD for the sensors compared to i-STAT reference values was 10.3 ± 9.0% (median, 8.2%).

**Conclusions:** The HCL system was safe and was associated with reductions in the percentage of above- and below-target glucose values. Reference glucose measurements confirmed the results derived from the fourth-generation sensors.

[Distributions of glucose concentrations]

### ORAL SESSIONS 11

**O05 Assessing the impact of insulin pump therapy on behaviour, mood, cognition and glycaemia in youth with type 1 diabetes - a randomised controlled trial**

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**Objectives:** In response to parental reports of benefit, we have previously shown improved behaviour, mood & cognition following CSII initiation in a pilot study. This study aimed to re-examine these factors in a randomised controlled trial (RCT).

**Methods:** RCT at two Australian tertiary centres. Youth with T1D for >1y, aged 7-15y were randomised to intervention (‘immediate CSII start, n=56) or control (‘ongoing use of intermittent injections n=45) groups. Baseline assessments of behaviour & mood (BASC-2), cognition (standardised tests of intelligence, attention, memory & executive function) & HbA1c were conducted pre-randomisation and after 4 months (mo). Primary outcome was difference in parent-reported behaviour at 4mo; differences in self-reported behaviour, mood, cognition & HbA1c were secondary outcomes. T-tests & linear mixed model analyses were used.

**Results:** Mean baseline age & HbA1c were similar (11.2 vs 11.0y; 7.9% vs 7.8% in I & C grps respectively). Parent-reported behaviour problems (Cohen’s d 0.41; p< .05) and HbA1c (7.4% vs 8.0%; p<.001) were significantly lower in the intervention grp at 4mo. Mood (parent report) & some aspects of cognition (perceptual reasoning, attention, cognitive flexibility) improved in both groups over the study period but were not different between groups at 4mo (p>0.05). Self-reported behaviour & mood did not differ.

**Conclusions:** Parent-reported behaviour problems & HbA1c decreased significantly with CSII vs intermittent injections over 4mo. As externalizing behaviour scores have been shown to predict mental health & glycaemic outcomes, this may have long-term benefits;
however effect size here was modest. Improvement in mood and cognition appear to reflect Hawthorn and practise effects respec-
tively rather than any beneficial impact of CSII. This study highlights issues germane to parental attribution of cause and effect in respect to diabetes therapies and reiterates the value of RCT when evaluat-
ing such modalities.

O06 Flash glucose monitoring in type 1 and type 2 diabetes patients - the first Indian experience of libre pro

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Objectives: FreeStyle Libre Pro Flash Glucose Monitoring (FGM) technology, a novel automated ambulatory glucose profile (AGP) reporting system has recently been introduced.

Methods: The utility and usability of FGM glucose monitoring system was evaluated in clinically discrete situations including vulnerability to hypoglycaemia and persistent hyperglycemia.

Results: We evaluated the complete data (sensor AGP and clinical profile) of 35 type 2 (n=31) or type 1 (n=4) diabetics. FIRST study. Mean age was 49.3 yrs (T2DM mean 53.3 yrs min 23 max 80 yrs, T1DM mean 20.25 yrs min 10 yrs - max 37 yrs), 19 males, 16 females.

Most compelling reasons for flash monitoring were fluctuations in blood glucose with reported episodes of hypoglycaemia (n=22, T2DM=20, T1DM=2) followed by consistent hyperglycemia despite advanced therapeutic care (n=13, T2DM=12, T1DM=1). Mean change in HbA1c (mean -0.19 ± 1.5, 95% CI -0.7- 0.3) after three months was not statistically significant (baseline mean 8.3 Vs 3 months mean 8.1; 95% CI -0.905 to 0.5108, p= 0.98). The change in HbA1c in T2DM (mean ± SEM = 0.16 ± 0.27, n=31) Vs T1DM (mean ± SEM = -0.42 ± 1.11, n=4) was not statistically significant (95% CI -0.8 to 2.5, p=0.06). Change in HbA1c in < 60 years (Mean ± SEM 0.20 ± 0.38, n=23) Vs > 60 years (Mean ± SEM -0.18 ± 0.26, n=12) was statistically significant (95% CI -1.14 to 1.18, p=0.01).

Conclusions: The comprehensive data provided complete glycemc profile within short time span of 14 days with actionable snapshot insights into the ‘Diabetic Pentad’ comprising fasting, post prandial glucose, HbA1c, glycemic variability and hypoglycaemia, to customise the diabetes care approach to address hypoglycaemia and glycemic variability. The flash technology is a convenient, discreet and user friendly innovation in the advancement of ambulatory monitoring to enable physicians’ make more informed treatment decisions. This can help personalize diabetes treatment plans, allowing better management of diabetes.

O07 Behavioral supports for parents of very young children with type 1 diabetes (T1D) using continuous glucose monitoring (CGM)

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Objectives: Diabetes management presents unique challenges for parents of very young children with T1D. Diabetes-related distress and hypoglycemia worries are common. Despite increasing use of CGM in this age group, many children do not reach glycemic goals. We tested 4 behavioral interventions designed to reduce distress and hypoglycemia worry and improve glycemic control.

Methods: Parents of 19 children under age 6 (mean age 4.2 ± 1.3) with T1D for an average of 2.3 ± 1.0 years using CGM were enrolled from 3 pediatric diabetes centers across the U.S. Behavioral interven-
tions were assigned based on baseline glucose control or CGM use. Parents received either 4 sessions on managing fear of hypoglycemia and optimizing insulin treatment, or 4 sessions on distress reduction and age-specific developmental demands.

Parents completed the Hypoglycemia Fear Survey, the Glucose Monitoring Satisfaction Scale, and the parent version of the Diabetes Distress Scale before and after the intervention. CGM data (14-day download, before and after) were used to calculate time in target (70-180 mg/dL).

Results: Sixteen families completed 3 or more sessions. Hypoglycemia worries decreased while CGM satisfaction increased; both changes were significant with medium effect sizes (Table 1). Time in target increased from 47% to 54%.

Conclusions: Integrating behavioral supports with CGM use has promise for reducing burden and promoting glycemic target achieve-
ment in very young children with T1D.

[Table 1. Change from pre to post]

O08 Introduction of personal insulin pump 640G therapy with SmartGuard technology reduces the negative impact of diabetes on life comfort of patients with type 1 diabetes

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Objectives: The aim of a study was to assess the quality of life(QoL) of the patients suffering from type 1 diabetes(DM1) after introducing personal insulin pump 640G with SmartGuard technology.

Material and methodology: 10 girls and 14 boys (the caregivers in younger children) with well-controlled DM1 (mean HbA1C was 6.7%; 5.8%-8.75%) were examined , age between 2 and 15, mean 8 years. The mean time from diagnosis was 3.7 years. Patient were previously treated with insulin pumps with or without hypoblocade(Medtronic MiniMed EAL-TIME/ Veo). 2-11 months after introducing 640G pump therapy two surveys were conducted: standardized PedsQLTM 3.0 Diabetes which measured the QoL in diabetic patients (Survey I) and the authorial questionnaire (Survey II) which measured the satisfaction of 640G therapy, it consisted of 11 questions, 2 closed and 9 -semi-closed-ended.

Results: The mean scores of QoL in Survey I regarding communica-
tion (79%), concerns (60%), treatment (76%) and diabetes (69%) which according to our scale (0-19% very low, 20-39%low, 40-59% moderate, 60-79% high, 80-100% very high) which means patients
perceived their QoL high in all categories. The results of Survey II showed gladness and assurance of the patients with 640G pump therapy. Over a half of participants (17 people) certified a serious reduction of both hypo- and hyperglycemia episodes. 8 patients/caregivers highlighted a better coherence between blood glucose (BG) measured by sensor and glucose meter (GM) which enabled them to decrease the frequency of pricking fingers with GM to measure BG and improve quality of life. 11 caregivers noticed greater involvement of children in controlling the disease and also better cooperation with 640G pump itself.

Conclusions: Patients with DM 1 using 640G pump with SmartGuard technology are satisfied with the effects of the therapy and their QoL measured by PedsQL is relatively high regarding this group of patients.
O09
Maternal obesity as a risk factor for early childhood type 1 diabetes - a nationwide prospective population based study

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Objective: To investigate the possible effects of maternal body mass index (BMI) and gestational weight gain on the subsequent risk of childhood type 1 diabetes.

Methods: Children in the Swedish pediatric diabetes quality register were matched with four controls from the Swedish Medical Birth Register. The children, of whom data on their mother’s BMI in early pregnancy and gestational weight gain were available, were included, total 16 179 individuals, 3231 children with type 1 diabetes and 12 948 control children.

Results: Mothers to children with type 1 diabetes were more likely to be obese (p<0.02) and to have diabetes themselves (p<0.001) as compared to mothers to control children. The gestational weight gain did not differ significantly. In mothers without diabetes maternal obesity was a significant risk factor for type 1 diabetes in the offspring (p<0.05) but this was not found in mothers with diabetes. Among the children with type 1 diabetes there were a greater proportion of children in the youngest age group (age 0-4) the higher the maternal BMI was. In the oldest age group, 15-19 years of age, the pattern was reversed. These findings were the same both for boys and girls. However, further analysis showed that the observed differences were only seen for non-diabetic mother whereas there was no significant difference if the mother had diabetes. Furthermore, the proportion of obese mothers was highest in the youngest age group, 18.2% compared to 7 % in age group 5-9 years of age 4.6% in age group 10-14 years and 10.3% in the oldest age group.

Conclusions: Maternal obesity, in absence of maternal diabetes, is a risk factor for type 1 diabetes in the offspring, and also influence the age of onset of type 1 diabetes. This emphasizes the importance of a normal maternal BMI to potentially decrease the incidence of type 1 diabetes.

O10
Incidence trends for childhood type 1 diabetes during 1989-2013 in 24 European registries participating in the EURODIAB study


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Objectives: To describe twenty-five year incidence trends for childhood type 1 diabetes in 24 European registries participating in the EURODIAB study.

Methods: All registries operate in geographically defined regions and are based on a clinical diagnosis of type 1 diabetes. Completeness of registration is assessed by capture-recapture methodology and exceeded 90% in most registries. Statistical analysis employed the Joinpoint program to model incidence trends in individual registries by fitting the most appropriate number of line segments connected at join points. Mixed effects Poisson regression was used for pooled analyses with registries defining the random effects.

Results: Twenty four registries in 20 countries registered more than 70,000 new cases diagnosed before the 15th birthday during the period 1989-2013. Joinpoint fitted simple log-linear increasing trends in incidence in 14 registries with a further 7 registries showing different trends in two periods but with a predominant increase. Two registries showed significantly faster rates of increase in boys than girls while eight found differences in rates of increase by age-group with the higher rates of increase in the 0-4yr and 5-9yr age-groups and lowest in the 10-14yr age group. Poisson regression estimated pooled rates of increase across all registries of 3.9%, 3.8% and 3.1% per annum in the three age-groups, respectively. Rates of increase also varied when each five-year period was analysed separately with the lowest rate of increase in the 2004-2008 period.

Conclusions: Rates of type 1 diabetes in European children continue to increase in all age-groups although the rate of increase may have reduced in more recent periods. The extent to which birth cohort effects can explain these apparent differences will be assessed.

O11
Risk factors for premature mortality in subjects with childhood-onset type 1 diabetes: data from the population-based Brecon Cohort in Wales, UK between 1979 & 2015

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Objectives: The aim of this study was to examine mortality rates and causes of death among patients diagnosed with type 1 diabetes before their 15th birthday in Wales.

Methods: The BRECON childhood onset type 1 diabetes registry (n=3288), with diagnosis from 1979 to 2013 (capturing >97% of all new cases from 1995), was used to investigate patterns in cause-specific mortality. 43,141 patient-years of diabetes were analysed and 31 deaths were identified. The observed number of deaths was
compared with number of deaths seen among different age groups in Wales, as reported by NHS Wales. Associations of socio-demographic factors with mortality were assessed using Cox proportional hazard models. The proposed risk factors included socioeconomic status, the size of centre involved in diabetic care, diabetes duration and gender.

**Results:** The overall standardised mortality ratio (SMR) was 2.3 (95%CI 1.59-3.23), being highest in the age group 15-20 years, at 3.76 (95%CI 1.54-5.09). Increase in the overall SMR has been observed in the age groups 10-20 years. The commonest cause of death was ketoacidosis (n=9), followed by accidents some of which might be attributed to hypoglycaemia (n=5), and suicide (n=4). All deaths occurred among individuals diagnosed during and after puberty (after the age of 10) regardless of diabetes duration, the log-rank statistics is 31.55,83 (p-value < 0.001). Higher mortality rates among male subjects have been observed, with hazard ratio of 0.54 (95% CI 0.21-0.99; P=0.048). No statistically significant relationship has been found between the risk of death and diabetes duration, socio-economic status, size of centre involved in diabetic care and family history of diabetes.

**Conclusions:** Despite advances in diabetic treatment, type 1 diabetes is still associated with higher mortality rates, particularly in the age during transition from paediatric to adult care facilities.

**O12 Excess mortality in young persons with type 1 diabetes in Sweden**

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**Objectives:** To study mortality rates and their relation to metabolic control during childhood in young persons (≤ 29 years) with type 1 diabetes (T1D) diagnosed <18 years of age.  

**Methods:** Data on all 12046 subjects registered in the Swedish pediatric diabetes quality registry, SWEDIABKIDS, from 2006 to 2014 were used. To investigate if any of these subjects had died and the causes of death, data were merged with the Swedish Register for Cause-Specific Mortality. The incidence of death was compared with the incidence in the general population (GP). Last registered Hba1c in SWEDIABKIDS was used.  

**Results:** In total 99 persons ≤ 29 years of age with T1D were deceased, incidence 0.84/1000, 3.2 times higher than in the GP. Of these 51 had died of a documented diabetes-related cause. Among boys, the excess mortality was 2.1 times higher than in the GP, in girls 4.9 times higher. The highest mortality rate was found in age group 25-29 years and 10-14 years, 5.8 times higher than in the GP. Subjects deceased from diabetes related causes had a mean Hba1c 80 ± 30 mmol/mol (9.5 ± 2.7%). Subjects deceased from other causes had a mean Hba1c 65 ± 19 mmol/mol (8.1 ± 1.8%) and those still alive 63 ± 16 mmol/mol (7.9 ± 1.5%) (p < 0.001). Corresponding figures for boys were 81 ± 27 (9.5 ± 2.5), 66 ± 19 (8.2 ± 1.7) and 62 ± 15 (7.9 ± 1.4), for girls 80 ± 33 (9.5 ± 3.0), 64 ± 21 (8.0 ± 1.9) and 64 ± 16 (8.0 ± 1.5). The relation between high Hba1c and excess mortality was most obvious in the highest age group (25-29 years), especially in girls, 110 ± 34 (12.2 ± 3.1), vs 80 ± 25 (9.5 ± 2.3) in boys.  

**Conclusions:** In this cohort of young subjects with type 1 diabetes, there was a high mortality rate compared to the GP. Hba1c was higher in those who died due to the diabetes disease, compared to death by other causes or to subjects still alive. Good metabolic control during childhood seems essential to decrease mortality rates in young adults.

**O13 Prediction of type 1 diabetes using a genetic risk model in the diabetes autoimmunity study in the young (DAISY)**

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2Heinrich Zentrum München, Institute of Computational Biology, Munich, Germany,  
3German Center for Diabetes Research (DZD), Munich-Neuherberg, Germany,  
4University of Colorado Denver, Epidemiology, Aurora, United States,  
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6Technische Universität München, Forscherguppe Diabetes, Klinikum rechts der Isar, Munich-Neuherberg, Germany,  
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**Objectives:** Our objective was to evaluate a previously-reported 10-factor weighted genetic model to predict development of type 1 diabetes (T1D) in the Diabetes Autoimmunity Study in the Young (DAISY) cohort. Performance of the 10-factor model (HLA plus nine SNPs) was compared to a more limited model (HLA plus two SNPs) and to HLA alone. We evaluated whether a model derived from first-degree relatives of T1D patients (FDR) would be effective in DAISY participants recruited from the general population (GP) as well as FDR subjects.

**Methods:** DAISY follows children prospectively for development of islet autoimmunity (IA) and T1D. The 10-factor model included HLA genotype plus nine SNPs from PTPN22, INS, IL2RA, ERBB3, ORMDL3, BACH2, IL27, GLIS3 and RNLS genes. The 3-factor model was restricted to HLA genotype plus PTPN22 and INS. These were applied to the DAISY cohort with complete SNP data (n=1941).

**Results:** Stratification of participants by 10-factor risk score showed significant differences in risk of T1D over time by Kaplan-Meier analysis: DAISY GP (p=0.00006), DAISY FDR (p=0.0022). The 10-factor and 3-factor models had improved discrimination of T1D outcome over HLA type alone in DAISY GP (p=0.03 and 0.03), but there was no difference in discrimination between these two models. In DAISY FDR, the 10-factor model showed improved performance over HLA (p=0.01) and the 3-factor model (p=0.02).

**Conclusions:** We have shown that a 10-factor risk model, previously validated in FDR of T1D patients, is able to predict development of T1D in children from the DAISY cohort. A more minimal 3-factor model showed similar performance in predicting development of T1D in GP; however, the 10-factor model had superior performance to both the 3-factor model and HLA alone in FDR. Differences in model performance in children with or without family history of T1D may lead to important insights into risk factors specific to these groups.

**O14 Epidemiological trends of youth-onset type 2 diabetes in British Columbia, Canada**

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**Objective:** To describe the trends in incidence and prevalence of youth-onset type 2 diabetes (T2D) in British Columbia (BC), Canada.

**Methods:** Children < 20 years of age living in BC between April 1st, 2002 to March 30th, 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 that differentiates T1D and T2D were applied to the linked data. Annual age-standardized incidence (IR) and prevalence rates (PR) were calculated overall, and by sex over the 10-year period. Linear regression was used to test for temporal trends.
Results: In 2002/03, 37 (62% female [F]) new cases of T2D were identified in individuals < 20 years, increasing to 53 (68% F) cases in 2012/13. The overall age-standardized IR (95% CI) per 100,000 was 5.0 (4.49-5.51), while for males and females it was 3.77 (3.15-4.39) and 6.27 (5.16-7.38), respectively. The age-standardized IR (95% CI) of T2D increased from 3.45 (2.43-4.80) in 2002/03 to 5.16 (3.86-6.78) in 2012/13 while in males it increased from 2.53 (1.39-4.36) to 3.23 (1.88-5.24), and in females from 4.43 (2.80-6.73) to 7.21 (5.05-10.05). The sex differences in T2D incidence widened from 2010 onwards. The number of prevalent cases increased from 97 (63% F) in 2002/03 to 219 (63% F) in 2012/13 while the age-standardized prevalence rate (%) increased from 0.009 (0.007-0.011) to 0.021 (0.018-0.023) increasing the overall age-standardized prevalence by 130%. Females had consistently higher prevalence of T2D than males over this period.

Conclusions: The incidence and prevalence of youth-onset T2D is increasing in BC with significant gender differences. Higher rates of T2D in female youth poses a significant risk to future offspring via exposure to hyperglycemia in utero. These data are necessary to guide health service delivery and disease prevention initiatives for youth-onset T2D.

### O15
**Premature deaths from ischaemic heart disease in childhood and young adult onset type 1 diabetes**

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#### Objectives:
Ischaemic heart disease (IHD) is a major cause of death for individuals with type 1 diabetes (T1D). Age at onset of T1D and risk of IHD death was assessed.

#### Methods:
The Yorkshire Register of Diabetes in Children and Young Adults includes under 15s (early onset) diagnosed with T1D in Yorkshire from 1978, and 15 to 29 year olds (late onset) diagnosed in West Yorkshire from 1991. Personal identifiers were linked to Office for National Statistics (ONS) death certification data. Underlying cause of death was validated by a specialist clinician. Standardised mortality ratios (SMRs) were calculated using England and Wales population and IHD death rates between 1978 to 2014 by 5-year age group and sex.

#### Results:
The cohort included 6,209 individuals, with 107,492 person-years of follow-up. Out of 233 deaths, 16 were due to T1D. Fourteen deaths had early onset (median age at death was 35.1). There were 2 deaths with late onset (median age of death was 43.2). Overall SMR for IHD deaths was 8.5 (95% CI 5.2 - 13.9). SMR for early onset (13.8 (95% CI 8.2 - 23.3)) was non-significantly higher than the SMR for late onset (2.3 (95% CI 0.6 - 9.3)).

#### SMRs by onset and age at death

**Conclusions:** Death from IHD begin to appear from 20 years old in the early onset group and mortality is non-significantly higher compared with the late onset group. This suggests that childhood T1D may result in unexpectedly early vascular death.

### O16
**End-stage renal disease in patients with childhood-onset type 1 diabetes diagnosed during 1973-2012**

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#### Objectives:
To estimate the cumulative incidence of end-stage renal disease (ESRD) by sex, age at diagnosis and year of diagnosis in a nationwide, population-based cohort with childhood-onset type 1 diabetes (T1D) in Norway.

#### Methods:
Data are based on the nationwide, population-based Norwegian Childhood Diabetes Registry and includes all new-onset cases (age < 15 years) diagnosed with T1D during 1973-82 (n=1,888) and 1989-2012 (n=5,983). The follow-up period was from diagnosis of diabetes to development of ESRD, death, emigration or to September 30, 2012. We estimated the cumulative incidence of ESRD by years since diagnosis of diabetes by linking the nationwide Norwegian Renal Registry and mortality by linking to the National Population Registry. We assessed cumulative mortality among patients with ESRD.

#### Results:
The cohort was followed for maximum 40 years (mean 16.8 years). During 132,143 person-years, 95 (1.2%) individuals developed ESRD, 58 men and 37 women. Mean years from diagnosis of diabetes to ESRD was 24.7 years (range 12.1-37.8). The cumulative incidence of ESRD was 0.82% (95% CI 0.56-1.21) at 20 years, 3.21% (2.54-4.05) at 30 years and 5.3% (4.22-6.65) at 40 years. There was an increasing trend in cumulative incidence of ESRD over the three age groups at diagnosis (0-4, 5-9 and 10-14 years at diagnosis), p=0.01. No difference in cumulative incidence of ESRD was identified between men and women, p=0.13, nor between the two diagnosis cohorts (1973-82 and 1989-2012), p=0.96. The probability of death 10 years after diagnosis of ESRD was 39.4% (28.4-52.9).

**Conclusion:** We report relatively low incidence of ESRD among children diagnosed with type 1 diabetes in childhood. Individuals diagnosed at younger age seem to have more favorable outcome.

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<th>Age at death (years)</th>
<th>Early onset Observed</th>
<th>Expected</th>
<th>SMR (95% CI)</th>
<th>Late onset Observed</th>
<th>Expected</th>
<th>SMR (95% CI)</th>
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O17

Empowering children and young people (CYP) with diabetes - SEREN, a new structured education programme in Wales, UK. 

Structured Education: Reassuring Empowering Nurturing

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Education in diabetes is a fundamental component of self-management. Health care systems that have structured education from diagnosis have demonstrated improving trends in HbA1c. Within Wales, education for CYPs was delivered in an informal way and this deficiency was highlighted in the National Paediatric Diabetes Audit year on year. While structured education is being delivered across some parts of the UK, there is no overarching programme covering the entire age range of CYPs with diabetes, from diagnosis to transition to adulthood.

Objectives: Following basic training in the principles of structured education, a working group that consisted of Health Care Professionals (HCPs) and parent representatives was set up in 2013, to develop such a programme. The philosophy of the programme has been to “Empower the CYP and family to manage diabetes from diagnosis right through and including transition to adult services”.

Methods: Work commenced based on education materials that were already being used within Wales. It draws on shared interactive and age appropriate resources and is aligned to the education key stages for the UK (1, 2, 3+4). The resources include an interactive story board, age based workbooks and activities. The detailed curriculum for the educators which is accompanied by an education/assessment record will enable standardisation of diabetes education across Wales. The programme is accompanied by a quality assurance process with formal evaluation being planned.

The first module “Diabetes at Diagnosis” for age 11 years+, piloted in September 2015 helped to refine these resources.

Conclusion: The first phase of the programme was launched in March 2016 after training of HCPs. The other key stages (with a Welsh translation) will follow and additional modules such as sport, pumps, annual updates and transition to comprehensive school and adulthood are planned.

We would like to take the opportunity to share our journey with you.

O18

How is diabetes training for persons taking care of children with type 1 diabetes in kindergarten and school delivered and funded? Results from a survey in Germany


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Objective: After onset of type 1 diabetes support for integration in kindergarten, day care and school is crucial. A structured, but also individualised, diabetes training for all persons caring for the child should be performed by the local diabetes team. In close cooperation with the parents diabetes specific knowledge should be addressed to avoid fears and to secure reintegration. Lacking a statutory rule diabetes education is provided in different ways in different regions of Germany.

Methods: The working group “inclusion” within the German association for pediatric diabetology has conducted a nationwide survey. A questionnaire of 16 items with categorized answers regarding conduct and financial coverage (most frequently, in second line, rarely) was sent to 91 pediatric diabetes treatment centers.

Results: 66 pediatric diabetes centers (treating about 9700 children with diabetes) all over Germany (representing all 16 federal states) answered the questionnaire completely. Most frequently (90%) qualified members of a pediatric diabetes team conduct the training locally at the school, kindergarten or day care centre. This initial diabetes education is financed for about 80% in kindergarten or day care centers and about 70% in schools either by funding, honorary commitment, or is subsidized from hospital sources. In summary a diabetes training is particularly ensured by personal or private initiative or has to be covered by support of the local clinic with all the problems that occur in consultations with the hospital administration.

Conclusion: The working group inclusion therefore calls for a mandatory financial regulation for diabetes training of persons that care for children in school, kindergarten and day care in Germany. This training is required for integration and care of children with diabetes outside of their usual home care.

O19

Individual quality of life in parents of youth with type 1-diabetes: exploration of life domains in a context of Chilean rural area

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Introduction: Parental involvement are very important in the management of type1-diabetes (T1D) during the childhood. It may cause parental distress and contribute to diminish parent quality of life (QoL). The aim of this study is to investigating the individual, as oposed to predetermined, QoL in parents of children with T1D, in the specific and unexplored context of rural Chilean area.

Materials and Methods: We conducted an exploratory study with a methodological mixed design, during 2014-2015, composed by two phases: (1) The first phase consisted on the exploration of the most important domains of parents QoL through 12 interviews. (2) The second phase investigated the QoL of 21 parents through an evaluation questionnaire of 16 Items with categorized answers regarding conduct and financial coverage (respectively ranked in order of satisfaction, domains were “family”, “health”, “psychological well-being” and “access to physician trained in diabetes care” respectively, ranked in terms of importance, domains were “family”, “child health”, “social network”, “psychological well-being”, and “access to physician trained in diabetes care”; ranked in order of satisfaction, domains were “family”, “social network”, “psychological well-being”, “beliefs” and “finances”. Total QoL scores ranged from 43.1 – 97.7 M= 72.0, SD=14.3.
Conclusions: Parents nominated many life domains not identified by WHO definition or classic Parent QoL questionnaire related to the child T1D. These findings are underscoring that parent QoL is multidimensional, with domains which can depend of the geographic place, like public health system characteristics. These findings should be replicated with larger sample to be able to associate theses findings to demographic and diabetes characteristics.

O20
New finding-PSEUDOHYPOGLYCEMIA
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India leads in the prevalence of Type I Diabetics according to latest statistics. A large chunk of these people lies below the poverty line to whom affordability and accessibility is a huge issue. They do not have access to a comprehensive Diabetic team.

We have created our own Diabetes At Ur Doorstep (DAUD) team consisting of diabetic educators who visit the rural remote areas and provide diabetic education, insulin and check random blood sugar by creating a checklist.

The most peculiar finding was sub-optimal insulin dosage due to a fear of hypoglycemia (Pseudo-hypoglycemia). It appeared as if the Type I kids have adapted to constant hyperglycemia state of RBS more than 200 mg/dl. The moment there is normoglycemia the patient starts developing hunger, weakness, perspiration at RBS less than 140 mg/dl.

This could be attributed to lack of availability of strips (cost issue) for SMBG, illiteracy, diabetic Education and lack of untrained Health Professionals to deal with this. Or else a child may be anemic or suffering from nutritional deficiency etc. On mental aspect it can be anxiety, personality disorder, hysteria where a patient reports relief of symptoms after eating. In such cases glucose level is within reference range while patient is symptomatic.

The end result of this is missed insulin shots, avoidable shock & weight gain. Education of patient and family, training of HCP can play a major role in improving this situation. Monitoring & making strips & glucometer available at affordable rates along with proper guidance on diet & exercise through project like DAUD can make a revolutionary change.

O21
Association between hypothalamus-pituitary adrenal axis activity and anxiety in prepubertal children with type 1 diabetes
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Background: Animal models of insulin-dependent diabetes show hyperactivity of hypothalamus-pituitary adrenal (HPA) axis, independently of hypoglycemia. Few data exists regarding type 1 diabetes (T1D) in children.

Objective: To describe HPA axis activity according to the anxiety levels in prepubertal T1D children.

Method: Prepubertal T1D children and siblings of T1D children (controls) were included. State-Trait Anxiety Inventory (STAI) test was performed at inclusion. Glucocorticoids metabolites (LCMS)/creatinine ratio on nocturnal urines and morning salivary cortisol (SC) were measured at home during 5 consecutive days without identified nocturnal hypoglycemia. Expressed results were mean of the five samples for each child. Tetrahydrocortisol (THF) + allo-THF/tetrahydrocortisone (THe) ratio (le THFs/THe ratio) was considered as an estimate of type 1 11β-hydroxysteroid dehydrogenase (11β-HSD1) activity.

Results: Forty-nine T1D children (mean age 9.0+/−1.7 yrs) and 26 controls (9.3+/−1.4 yrs) were recruited. STAI scores were not different between T1D children (29.7+/−6.6) and controls (33.0+/−7.8). Total glucocorticoid metabolites/creatinine were decreased in T1D children vs controls (552+/−170 vs 673+/−170 µg/mmol, p=0.01). THFs/THe was increased in T1D children vs controls (0.46+/−0.10 vs 0.41+/−0.09, p=0.02). Salivary cortisol at awakening and 30 minutes after awakening (SC+30) were not different between groups. In both groups, STAI scores were associated with SC+30 when adjusted for BMI (controls b=−1.1, p=0.05; T1D children b=−1.0, p=0.04). STAI score was associated with THFs when adjusted for BMI in T1D children (b=−0.05, p=0.03) but not in controls.

Conclusion: Subtle changes of HPA axis activity, independently of recognized hypoglycemia, are present in prepubertal children with T1D, particularly for nocturnal glucocorticoid synthesis, 11β-HSD1 activity and its associations with anxiety.

O22
Does sleep matter? Associations between child sleep, glycemic control and parental wellbeing in the T1D Exchange Clinic Registry
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Objective: Sleep is a modifiable risk factor that may have physiological and behavioral impacts on diabetes outcomes, yet little is known about the impact of sleep disturbance in children with type 1 diabetes (T1D). The current study sought to describe sleep patterns in children with T1D and their parents and to examine associations between sleep quality (SQ), diabetes outcomes, and parental wellbeing.

Methods: Parents of children 2-12yo (n=515, mean age 9yrs, 47% female, 86% non-Hispanic white, mean age at diagnosis 4yo, mean A1c 7.8±0.9%, frequency of blood glucose monitoring (BGM) 7.4±2.4 times/day) from the T1D Exchange clinic registry (50 sites) completed internet-based surveys on their child’s sleep patterns (Children’s Sleep Habits Questionnaire (CSHQ)), their own sleep patterns (Pittsburgh Sleep Quality Inventory (PSQI)), fear of their child having a hypoglycemic event, their emotional wellbeing, and nocturnal monitoring habit. Clinical and demographic information were collected. Data were analyzed using general linear regression models.

Results: Mean sleep duration was below the recommended amount for all age groups (10.9 hrs/night in 2-4yo, 9.5 in 5-12yo, 6.5 in parents). Further, 67% of children and 53% of parents met the criteria for poor SQ (CSHQ=41;PSQI=5). Children with poor SQ had higher A1c (7.9% vs 7.6%; P=0.001). Frequency of BGM (overall and nocturnal) was not associated with child SQ (mean 7.6 times/day vs. 7.4 in poor/good quality;P=0.56). Children’s poor SQ was also associated with worse parental wellbeing and parental SQ (P=0.001 for both). Child and parental SQ were worse when parents exhibited more fear of hypoglycemia (P<0.001 for both), but were not associated with frequency of nocturnal BGM (P=0.66 and P=0.33, respectively).

Conclusion: Sleep disturbances may negatively impact glycemic control in T1D, and may offer a potential target for interventions to improve outcomes in children with T1D and to reduce parental stress.
O23
Psychological flexibility in adolescents with type 1 diabetes

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Objectives: Type 1 diabetes (T1D) is challenging to manage, requiring a complex set of diabetes-related behaviors. Adolescents with T1D are at increased risk of deteriorating diabetes management, metabolic control and quality of life (QoL). Moreover, during adolescence, parental-controlled care gradually shifts to self-management. Therefore, the identification of protective factors specific for this developmental stage becomes particularly relevant. Psychological flexibility (PF), a construct derived from Acceptance and Commitment Therapy (ACT), refers to an individual’s ability to act in alignment with life values and long-term goals (e.g. health, good family relations) in the presence of interfering (negative) thoughts, emotions and bodily sensations.

The aim of the study was to examine the association between PF and diabetes management, metabolic control and emotional functioning in adolescents with T1D.

Methods: A total of 104 adolescents with T1D (age range: 12-18, mean: 14.83 years, 53% male) and their parents completed questionnaires online and at home, measuring PF (diabetes-related PF, general cognitive and emotional fusion, general experiential avoidance), adherence and general QoL. The analyses controlled for HbA1c levels (mean HbA1c = 7.7%).

Results: After controlling for gender and age, hierarchical regression analyses revealed a significant contribution of diabetes-specific PF in explaining adherence (Adj.R²=15, p<.002) and QoL (Adj.R²=.20, p<.001), but not metabolic control (HbA1c). General PF significantly contributed to the explanation of metabolic control (Adj.R²=.07, p=.008) and QoL (Adj.R²=.15, p=.001), but not adherence.

Conclusions: Our findings demonstrate that being able to act in line with personal values and long-term goals is associated with better diabetes management and control and better QoL. Overall, PF shows promise as a potentially protective characteristic against the burden of self-management in adolescents with T1D.

O24
The challenge of transition: adolescent and parent attitudes towards transition and adolescent diabetes services

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Objectives: Healthcare professionals often make decisions about how adolescents engage with adolescent diabetes services (e.g. if seen alone, when to transition, etc.) by consulting with parents rather than adolescents. This study assessed and compared the attitudes of adolescents and their parents on different aspects of adolescent diabetes services.

Methods: 82 adolescents aged >12 years (41 males), and their parents (n=82) separately completed an anonymous questionnaire examining attitudes towards aspects of adolescent diabetes services. Comparison of attitudes was undertaken using chi-squared/logistic regression for categorical variables and t-tests/ANOVA for continuous variables.

Results: Significant differences were found between adolescents’ and parents’ attitudes towards readiness for transition (p<.001) and age of transition (p<.001). Adolescents preferred an earlier age of transition compared to parents. Significant differences were also found between both groups in their attitudes towards the age when adolescents:

a. should first be seen by the doctor on their own (p<.01), and when to discuss
b. alcohol (p<.01) and
c. sexual health (p<.001).

Adolescents preferred to discuss these issues individually, while parents preferred to be present in the room (p<.001, p<.01 respectively). Optimal diabetes clinic frequency was every three-months for both groups but adolescents with poorer control (HbA1c>8%) preferred to be seen every six-weeks (p<.05). Older adolescents (>15yrs) preferred to begin the process of transition later (i.e. after completion of second level education) compared to younger adolescents (p<.001).

Conclusions: Adolescents and their parents differ significantly in their attitudes towards a number of different aspects of adolescent diabetes services. When making decisions about adolescents’ diabetes care it is important that adolescents, as well as their parents, are included in the decision making process.
Oral Session IV - Diabetes Chronic Complications and Associated Diseases

O25
Fas and Fas ligand expression in children and adolescents with type 1 diabetes mellitus

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Background: Early identification of risk factors and prevention of diabetes complications are of paramount importance in children and adolescents. Fas and its ligand are typical members of the tumor necrosis factor (TNF) receptor superfamily. Fas/Fas ligand (Fas/Fasl) interactions may be related to augmentation of proliferation and inflammatory response. The role of soluble forms, sFas and sFasl in diabetes remains to be fully elucidated.

Aim: To determine the levels of sFas and sFasl in children and adolescents with type 1 diabetic patients and their relation to inflammation, glycemic control and microvascular complications.

Methods: Eighty children and adolescents with type 1 diabetes were divided into 2 groups according to the presence of microvascular complications and compared with 40 age- and sex-matched healthy controls. High sensitivity C-reactive protein (hs-CRP), HbA1c, urinary albumin creatinine ratio (UACR) as well as soluble Fas (sFas) and sFasl levels were measured.

Results: sFas and sFasl levels as well as Fas/Fasl ratio were significantly higher among patients with and without complications compared healthy controls and the highest levels were found among patients with complications. sFas/sFasl ratio was significantly increased in relation to nephropathy (microalbuminuria), peripheral neuropathy or retinopathy. Significant positive correlations were found between both sFas and sFasl levels and each of disease duration, systolic and diastolic blood pressure, fasting blood glucose, HbA1c, triglycerides, total cholesterol, UACR and hs-CRP (p<0.05). The cutoff value of sFas/sFasl ratio at 7.27 pg/mL could differentiate patients with and without microvascular complications with a sensitivity of 85% and specificity of 90%.

Conclusions: Elevated sFas/sFasl ratio in type 1 diabetic patients with micro-vascular complications suggests that inflammation and apoptosis are involved in the pathogenesis of these complications.

O26
Circulating angiopoietin-2 levels in young patients with type 1 diabetes mellitus: a link between inflammation, micro-vascular complications and subclinical atherosclerosis

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Background: Angiopoietin-2 is a growth factor involved in the pathophysiology of different vascular and inflammatory diseases such as arteriosclerosis. Carotid or aortic scans provide non-invasive screening tools for assessment of preclinical atherosclerosis in high-risk children.

Aim: We assessed serum angiopoietin-2 in children and adolescents with type 1 diabetes mellitus as a potential marker for diabetic vascular complications in relation to glycemic control, inflammation and vascular structure.

Methods: Sixty patients with type 1 diabetes were divided into 2 groups according to the presence of micro-vascular complications and compared with 30 healthy controls. High-sensitivity C-reactive protein (hs-CRP), hemoglobin A1c (HbA1c), urinary albumin creatinine ratio, serum angiopoietin-2 levels, carotid and aortic intima media thickness (CIMT and AIMT) were measured.

Results: CIMT and AIMT and serum angiopoietin-2 levels were significantly increased in patients with and without micro-vascular complications compared with controls and the highest levels were in patients with complications (p<0.001). Serum angiopoietin-2 was higher in patients with microalbuminuria than normoalbuminuric group (p<0.001). The cutoff value of serum angiopoietin-2 at 900 pg/mL could differentiate patients with and without micro-vascular complications with a sensitivity of 92.3% and specificity of 100%. The cutoff values for CIMT and AIMT to detect micro-vascular complications were determined. Multiple regression analysis showed that fasting blood glucose, HbA1c, hs-CRP, CIMT and AIMT were independently related to angiopoietin-2.

Conclusion: The relation between angiopoietin-2 and assessed parameters of vascular structure in type 1 diabetes reflects a state of subclinical atherosclerosis and highlights the role of disturbed angiogenesis and vascular inflammation in the occurrence of diabetic complications.

O27
Achieving clinical guideline goals is associated with better insulin sensitivity (IS) and cardiopulmonary health in youth with type 1 diabetes (T1D)

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Objective: Most youth with T1D do not meet the American Diabetes Association (ADA) and International Society for Pediatric and Adolescent Diabetes (ISPAD) targets for HbA1c, blood pressure (BP), lipids, and BMI. We hypothesized that ISPAD/ADA goal achievement would be associated with better IS and cardiopulmonary health in youth with T1D.

Methods: We assessed the cross-sectional relationship between ISPAD/ADA goal achievement, IS and cardiopulmonary health in youth with T1D from the RESISTANT (n=60) and EMERALD (n=41) studies (n=127; age 15.7±2.2 years, 52% girls). IS was measured by glucose infusion rate during a hyperinsulinemic-euglycemic clamp. Cardiopulmonary fitness was measured as peak oxygen consumption (VO2peak/kg) during cycle ergometry. EMERALD and RESISTANT had different cycle ergometry protocols, thus VO2peak analyses were stratified by cohort. Goal achievement was defined as HbA1c<7.5%, BP<90th percentile, LDL-C<100mg/dL, HDL-C>35mg/dL, TG<150mg/dL and BMI<85th percentile. Participants were stratified into 3 groups: achieving 1-3 goals (n=52), 4 goals (n=48) and 5-6 goals (n=27). Differences between groups were examined with generalized linear models.

Results: IS was lower in participants who met 1-3 goals (5.24±3.40 mg/kg/min) vs. those who met 4 goals (7.41±4.13 mg/kg/min, p=0.04) and those who met 5-6 goals (8.45±4.28 mg/kg/min, p=0.003), and remained significant after adjustments for sex and Tanner stage. The difference in IS between participants who met 1-3 goals and 5-6 goals remained significant after adjusting for BMI (p=0.03). VO2peak was lower in participants in RESISTANT who met 1-3 goals (25.84±4.63 mL/kg/min) vs. those who met 4 goals (33.01±7.81 mL/kg/min, p=0.01) and those who met 6 goals...
Prevalence of subclinical entheseal involvement in children and adolescents with type 1 diabetes: a case-control study

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Objective: At the best of our knowledge, no data about enthesis ultrasonographic evaluation in young patients with type 1 diabetes (T1D) have been reported. The prevalence of subclinical entheseal involvement in children and adolescents with T1D was studied using a high frequency ultrasound probe.

Methods: We evaluated 23 children and adolescents (12 M), with T1D, ages 9-18 years (mean±SD: 13.9±2.5 years), disease duration 1-10 years, without any clinical sign or symptom of musculoskeletal involvement. A control group consisting of 28, sex (12 M) and age-matched (14.2±2.8 years), was also evaluated. Both patients and controls underwent an ultrasound examination (ESAOTE MyLAB 70 6-18 MHz linear array transducer). Brachial triceps, femoral quadriceps, Achilles, plantar fascia, and proximal and distal patellar entheses were all scored using the 0-136 Madrid Sonographic Enthesis Index (MASEI).

Results: None of the patients had a MASEI score suggesting early spondyloarthritits involvement but their average score was significantly higher than controls (4.65 ± 4.4 vs 3.04 ± 1.9, p=0.009). No difference has been observed about enthesis with power Doppler score higher than controls (4.64 ± 4.4 vs 3.0 vs 0.48, adjusted p< 0.001). Stratified by ethnicity, A1C was comparable in T1D+CD vs T1D and A1C, therapy and growth, adjusting for sex, age, ethnicity and T1D duration.

Conclusions: Differences in CD rates and T1D duration at CD diagnosis may reassert international variation in screening/diagnostic practices, and/or CD risk. Although fewer patients with CD are non-white, the association between CD and A1C or diabetes therapy reassuringly does not appear to be related to ethnicity. [Characteristics of youth overall and by registry]

Celiac disease screening in asymptomatic type 1 diabetes mellitus patients across North America and Europe

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Objective: Medical associations recommend screening for celiac disease (CD) in at-risk groups, as type 1 diabetes mellitus (T1DM). There is a lack of consensus among guidelines on who and how to screen. We aim to evaluate current practices and factors influencing and limiting the screening of CD in asymptomatic T1DM patients across North America and Europe.

Methods: A web-based survey was sent to paediatric endocrinologists and paediatricians with an expertise in T1DM in Canada, United States and Europe. Physicians were contacted through the following associations: Pediatric Endocrine Society (PES), International Society for Pediatric and Adolescent Diabetes (ISPAD), Canadian Pediatric Endocrine Group (CPEG) and European Society of Pediatric Endocrinology (ESPE).

Results: A total of 381 participants responded to our survey. Two hundred and twenty nine (60.1%) were from the United States, 90 (23.6%) from Europe, 48 (12.6%) from Canada and 14 (3.7%) from others countries. Almost 21% of Canadians claimed never screen asymptomatic T1DM patients for CD, compared to 0.4% of Americans (p< 0.001) and 0.0% of Europeans (p< 0.001). When asked about the possible consequences of not treating asymptomatic CD patients, 22.2% of Canadians reported no possible consequence compared to 5.7% of Americans (p< 0.001) and 5.6% of Europeans (p<0.01). A proportion of 37.5% of Canadians don’t agree that screening for CD in asymptomatic patients with T1DM would reduce their morbidity, compared to 12.0% of Americans (p< 0.001) and 14.4% of Europeans (p=0.06). A proportion of 56.3% of Canadians think that the recommendations from their endocrine associations are unclear regarding screening for CD in asymptomatic T1DM patients, compared to 34.5% of Americans (p<0.01) and 19.8% of Europeans (p< 0.001).

Conclusion: We noted a clear difference in practices, mostly between Canadians and others responders. A unification of guidelines would be needed.

O32 Liver stiffness by transient elastography as a non-invasive tool for detection of hepatopathy-induced fibrosis in pediatric patients with type 1 diabetes
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Aim: To identify the effect induced by hepatopathies of different etiologies among children and adolescents with T1DM using transient elastography (TE) and its relation to glycemic control.

Methods: One hundred patients with T1DM (at least 5 years disease duration) were studied assessing on liver function tests, fasting lipid profile, HbA1c, hepatitis C virus (HCV)-RNA using PCR, serum immunoglobulins, autoimmune antibodies; Anti-nuclear antibody (ANA), Anti-smooth muscle Antibody (ASMA), and Anti-Liver Kidney microsomal antibody (anti-LKM) using indirect immunofluorescence methods. Pelvi-abdominal ultrasound was performed and TE was done for patients with elevated ALT, HCV, positive autoimmune antibody and/or abnormal ultrasound findings. Liver biopsy was done when indicated after parental consent.

Results: 31% of patients were found to have one or more abnormalities; clinical hepatomegaly in 8%, elevated ALT in 10%, HCV in 6%, autoimmune hepatitis (AIH) in 11% (10 were positive for ASMA and 2 were positive for ANA while anti-LKM antibodies were negative) and abnormal hepatic ultrasound in 20% (5 AIH, 2 HCV, 1 Maujic Syndrome, 9 non-alcoholic fatty liver disease and 3 non-alcoholic steatohepatitis). Mean liver stiffness in those 31 patients was 7.0 ± 2.1 kPa (range, 3.1- 11.8 kPa); 24 were Metavir F0-F1, 7 were F2-F3 while none were F4. Type 1 diabetic patients with abnormal ultrasound had significantly higher FBG, HbA1c and total cholesterol than those with normal liver (p<0.05).

Patients with AIH had higher HbA1c than those with negative autoimmune antibodies (p=0.012). Liver stiffness was significantly higher in patients with abnormal ultrasound compared with normal liver (p=0.039). Significant positive correlations were found between liver stiffness and HbA1c and ALT.

Conclusions: Hepatic abnormalities are prevalent in young patients with T1DM and related to poor metabolic control. TE provides a reliable method for detection of hepatopathy-induced fibrosis.
Oral Session V: Diabetes Genetics, Immunology and Environmental and Monogenic diabetes

O33 DIAGONODE: autoantigen (GAD-alum) given into lymph-nodes together with oral vitamin D to preserve beta cell function in Type 1 diabetes. A pilot trial

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Residual beta cell function in Type 1 diabetes (T1D) is clinically very important, but no intervention without too serious risks/adverse events has so far been efficacious. GAD-alum sc has been promising but not enough effective. Vitamin D might help to gain additional efficacy. Furthermore, in allergy allergen administration into lymph-nodes seems more effective than sc administrations. For the first time this administration route is tried in an autoimmune disease, T1D.

Objectives: To evaluate the safety as well as clinical and immunological response of giving GAD-Alum (DiAmyl) directly into lymph nodes in combination with oral vitamin D (2 000 IE/day).

Patients and Methods: DIAGONODE-1 is a single-center open-label pilot Phase I trial designed to enroll approximately 9 subjects between 12-30 years of age, T1D duration < 6 months, positive for GAD65- antibodies (GADA) and a fasting C-peptide ≥0.12 nmol/L. They get Vitamin D 2000 U/d Day 0-120 and 4 μg GAD-alum into an intracutaneous lymph-node Day 30, 60 and 90. So far 7 patients have been recruited and 4 have been followed for 6 months. The immune response has been evaluated by measurement of GADA, and the effect of GADAla stimulation on cytokines in cell supernatants, cell proliferation and T cell phenotypes, and beta cell function has been evaluated by Mixed Meal Tolerance Tests.

Results: The treatment has been feasible and well tolerated, without any concern regarding safety during the first 6 months follow-up. From baseline to 6 months the C-peptide AUC (nmol/l) decreased 2% first 6 months follow-up. From baseline to 6 months the C-peptide AUC (nmol/l) decreased 2% and 29 % respectively in two patients, and increased 32% and 6% respectively in two patients, with a pronounced Th2-deviation of the immune system.

Conclusion: A low dose GAD-alum given into lymph-node in recent onset T1D is feasible, tolerable, seems to be safe, and gives a strong Th2-deviation of the immune response which together with Vitamin D might preserve beta cell function.

O34 Detection of a viral footprint in the pancreatic islets of newly diagnosed T1D patients: results from the DIVID study

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Objectives: The Diabetes Virus Detection (DIVID) study has suggested the presence of chronic enteroviral infection in pancreatic tissue collected from 6 of 6 live adult patients with newly diagnosed T1D. The aim of the present study was to compare the gene and protein expression of selected virus-induced pathogen recognition receptors and interferon stimulated genes in DIVID islets vs age-matched non-diabetic (ND) controls.

Methods: RNA was extracted from laser captured islets and Affymetrix Human Gene 2.0 ST arrays used to obtain expression profiles.

The presence and localisation of viral response proteins were examined by triple immunofluorescent labelling in 4um sections of pancreatic tissue.

Results: PKR expression did not differ between T1D and ND islets at the level of total RNA but a subset of β-cells displayed markedly increased PKR protein levels. These cells corresponded to those previously shown to contain the viral protein, VP1. RNA encoding MDA5 was increased significantly in T1D islets. At the protein level, Mda5 staining was seen in α- and certain β-cells in both T1D and ND islets. In addition, an uncharacterized subset of islet cells expressed intense MDA5 staining and these were more prevalent in DIVID cases. STAT1 RNA was elevated in T1D islets vs ND and was exclusively increased in β-cells at the protein level. Both classical and non-classical HLA Class I molecules were also increased at the RNA and protein levels in T1D islets. MxA RNA was upregulated in T1D vs ND islets and was detected exclusively in T1D β-cells at the protein level.

Conclusion: The increases in PKR, MxA, HLA-I and STAT1 seen in β-cells in T1D provide clear evidence of the activation of IFN signaling pathways. As such, these data strengthen the hypothesis that chronic enteroviral infection contributes to the development of islet autoimmunity in T1D.

O35 Increased prevalence of type 1 diabetes among patients with 18q deletion syndrome may be associated with a deficit in T regulatory cells

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Objectives: Several patients with the chromosome 18q del syndrome (MIM#601808) are reported to suffer from autoimmune disorders and immunoglobulin deficiency (mainly IgA deficiency). The aim of the study was to evaluate the prevalence of type 1 diabetes (T1DM) among patients with 18q del syndrome of Caucasian origin.

Methods: Medical registries and social media were used to recruit the patients. Microarray oligonucleotide comparative genomic hybridization (aCGH) (Agilent, USA) was used to confirm initial diagnosis. Lymphocyte phenotyping for the assessment of CD127low/CD25+ CD4+CD3 T regulatory cells using a FACScanto II flow cytometer (BD Bioscience, USA) was performed. Foxp3 expression was confirmed using nuclear factor Foxp3 staining kit supplied by ebioscience (USA).

Results: Twenty three patients aged 3-31 years (median 13 years) were included in the study, 18q aberrations varied from small interstitial deletions of about 8 Mbp (18q22.3-q23) to large deletions of about 55 Mbp encompassing 18q11.2-q23. Of the patients 3/23 had early onset T1DM (diagnosed at 7 months, 3.5 and 4 years, respectively) with OR(95%CI)=40.9(9.5-175.8) comparing the prevalence of type 1 diabetes among pediatric patients in the region of Lodz district (142/100 000 individuals < 18 years). In 9 of 23 patients hypothyroidism/autimmune thyroiditis was present. Immunological studies, performed in 16 out of 23 patients, revealed complex serum immunoglobulin deficiency in 4/16 patients. In general, IgA deficiency was detected in 3/16, IgE def in 2/16, IgM def in 4/16, IgG def in 4/16, IgG1 def in 1/16, IgG3 def in 1/16 and IgG4 def in 6 out of
16 patients. Interestingly, all recruited patients had Treg deficiency with low intracellular expression of crucial transcription factor FoxP3 in this subset (<15%).

Conclusions: Relatively high prevalence of type 1 diabetes among patients with 18q deletion syndrome may be associated with a deficit in T regulatory cells.

O36 The microbiome in children with islet autoimmunity: bacteriome profiling and virome sequencing in stool samples from Finnish DIPP study

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Objectives: We set out to explore the stool bacteriome profiles in the context of early-onset islet autoimmunity, taking into account the interactions with the virus component of the microbiome.

Methods: Stool samples were longitudinally collected from 18 infants and toddlers with islet autoimmunity that started at the median age of 17.4 months, and from 18 tightly matched controls from the Finnish Diabetes Prediction and Prevention (DIPP) birth cohort. Three stool samples taken 3, 6 and 9 months before the first detection of autoantibodies in serum of the case child were analysed by bacteriome profiling, and virome sequencing. The risk of islet autoimmunity was evaluated in relation to bacteriome diversity, composition of the bacteriome profiles at various taxonomic levels, correlations between abundances of bacteriophages and bacteria, and prominent unknown motifs in the virome.

Results: The abundance of five bacterial operational taxonomic units (OTUs) was significantly decreased in children with islet autoimmunity as compared to controls, with the most prominent distortion observable in OTUs belonging to Bacteroides vulgatus, B. thetaiotaomicron (corrected P values < 0.001) and Bifidobacterium bifidum (P=0.0014). The diversity, or the composition at taxonomic levels of bacterial phyla, classes or genera, showed no differences between cases and controls. One of the bacteriophage signals, the CrAssphage, showed a tendency towards an association with islet autoimmunity, and correlated with Bacteroides dorei and B. thetaiotaomicron.

Conclusions: The results confirm previous findings that an imbalance within the prevalent Bacteroides genus is associated with islet autoimmunity. The detected quantitative relation of the novel "orphan" bacteriophage CrAssphage with two prevalent species of the Bacteroides genus serve as an example of the bacteriome-virome interactions whose complex nature we are only beginning to appreciate.

O37 Early childhood infections precede development of β-cell autoimmunity and T1D in children with HLA-conferred disease risk

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Objective: To assess the relationship between early childhood infections and islet autoimmunity in children with HLA-conferred susceptibility to T1D (51.4% males) from Finland (n=387), Estonia (n=324) and Russian Karelia (n=86) were followed from birth up to the age of 3 years. Children attended clinical visits at the age of 3, 6, 12, 18, 24, and 36 months. Serum samples for analyzing five T1D-associated autoimmunity markers (IAA, GADA, IA-2A, ZnT8A, and ICA) were collected and health data, including data on past and ongoing infections, were recorded during the visits.

Results: Children who seroconverted to autoantibody positivity during the follow-up (n=47, 5.9%) had their first infection at a younger age than children with no signs of islet autoimmunity (median 4.0 vs. 5.0 months; P=0.007). They had also more infections during the first year of life (3.5 vs. 3.0; P<0.001). By May 2016, seven children (0.9%; one from Estonia, one from Russia, and five from Finland) had been diagnosed with T1D. Their median age at diagnosis was 3.7 years (range 2.4-6.4 years). Compared to their non-diabetic peers, children who progressed to T1D were younger at their first infection (2.2 vs. 4.9 months; P=0.004) and had more infections during the first 2 years of life (both years 6.0 vs. 3.0; P=0.001 and P=0.027, respectively). By the age of 3 years, children progressing to T1D had double the cumulative number of infections when compared to their non-affected peers (17.5 vs. 9.0; P=0.007). These findings were not explained by the HLA genotype or the country of origin.

Conclusions: Early childhood infections may play an important role in the pathogenesis of T1D. On the other hand, the current findings may reflect early immunological aberrancies in children developing T1D at a young age.

O38 Early successful hematopoietic cell transplantation (HSCT) in a boy with IPEX syndrome caused by novel c.721T>C (S241P) mutation

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Objective: IPEX (MIM #304790) is a rare and fatal, X-linked immune dysregulatory disorder caused by mutation in transcription factor FOXP3 that result in either quantitative or functional deficiencies of Tregs causing autoimmune disease and allergic inflammation. HSCT is the only curative therapy available for IPEX patients.

Case presentation: Presented boy was born at 38th GW with birth weight 3380 g and birth length 50 cm. Three maternal brothers died in early infancy due to malabsorption. At six weeks patient presented with hyperglycaemia (38 mmol/L) and severe ketoacidosis at onset of type 1 diabetes (T1D), GAD antibodies were highly positive (>120 kIU/L). Subsequently he developed atopic dermatitis and progressive type 1 diabetes (T1D). GAD antibodies were highly positive (>120 kIU/L). Subsequently he developed atopic dermatitis and progressive
Binational Swiss-Lithuanian study "genetic diabetes in Lithuania"

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Objectives: To examine markers of β-cell autoimmunity in a cohort of young (0-25 years) patients with type 1 diabetes (T1D). To perform genetic testing in islet autoantibody negative diabetes cohort.

Methods: Study subjects were investigated for autoimmune markers of T1D (GAD65, IA-2, IAAs, ICA), coexistence of other autoimmune diseases (thyroid, celiac disease). Diabetes control was assessed by levels of HbA1C, clinical examination, lipid profile, presence of diabetic complications. Patients with negative pancreatic antibodies (Ab's) were selected for genetic investigation. Genetic analysis was performed in Switzerland by high throughput sequencing from DNA selected for all coding and splicing regions of 483 genes involved in diabetes, glucose homeostasis or pancreas development, captured by bait using Haloplex technology.

Results: Our cohort consisted of 1211 subjects covering all pediatric diabetes patients (<18 years, n=861), and 70% of adult patients younger than 25 years at diabetes diagnosis (n=350). All positive Ab's were found in 25.4%, 1 or 2 positive Ab's in 66.5%, and all negative Ab's - in 8.1% of cases. 147 cases of non-autoimmune diabetes were identified during the overall project. We included probands positive for insulin autoantibodies, because Ab's were tested after introduction of insulin therapy. 25.9% of genetic tests of 147 subjects (3% of 1211) revealed polymorphisms and mutations. 36.7% variants in potential diabetes genes with high predicted pathogenicity (would increase monogenic diabetes to 7.5% of the entire cohort). GCK mutation was found in 13.6%, HNF1A in 4.8%, other known genes (HNF4A, KLF11, INS, KCNJ11, ABCC8) in 7.5%, and negative in 37.4% of the entire cohort. 10% of the 147 subjects had actionable results. This led to optimization of treatment and further follow-up of such patients.

Glucokinase mutations in pediatric patients with impaired fasting glucose

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Aims: We aimed to detect the Glucokinase frequency in two cohorts describing clinical manifestations and identified variants. We also intent to predict the effect of the novel mutations to correlate molecular defects and clinical manifestations.

Methods: Totally 100 unrelated Italian families with incidental hyperglycaemia were enrolled and subdivided in two cohort applying strict and mild criteria of Maturity Onset Diabetes of the Young selection. Genetic testing was performing by Sanger Sequencing GCK gene of all participants.

Results: 53 Italian families with 41 different mutations affecting the GCK gene and co-segregating with the clinical phenotype of GCK/MODY were identified. All mutations were found in heterozygous state. In cohort 1 we detected GCK defects in 32/36 subjects (88.9%) selected with full stringent MODY criteria of diagnosis while in cohort 2 GCK defects were found in 21/64 subjects (32.8%) with no fully stringent MODY criteria of diagnosis.

Conclusion: Our study enlarge the wide spectrum of GCK defects adding 23 novel variants. The application of strict recruitment criteria resulted in a higher GCK/MODY prevalence (88.9%) never previously reported for the Italian population. In order to reduce the proportion of missed cases it could be useful to perform genetic test even if one or more clinical parameters for MODY clinical diagnosis are missing. Computational analysis could be useful to understand the effect of the change on protein functionality, especially when the novel identified variants is a missense change and/or parents’ DNA is not available.
O41 Long-term improvement and sustainability of HbA1c outcome in children and youth with type 1 diabetes: the diabetes experience

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Diabetes is a comprehensive care model that has established healthcare management for Type 1 diabetes (T1D) children and adolescents characterized by a strong focus on personalized care and usage of technology. Central in this approach is Vcare, a disease management system that monitors >200 outcome parameters. Upon every upload of glucosemeter or insulinpump data, Vcare generates personalized care management for Type 1 diabetes (T1D) children and adolescents characterized by a strong focus on personalized care and usage of technology. In the year prior to study enrollment, participants completed 2.5±1.2 in person clinic visits. With access to home telemedicine, participants completed significantly more T1D clinic visits (M±S=3±1.1; t=-3.563; p<0.001) compared to the number of T1D visits attended in the prior year. The proportion of participants who completed ≥4 T1D visits/year, as recommended by ADA, significantly improved from 22% to 67%; McNemar c2 (p< 0.001).

Conclusions: Providing young adults with T1D care visits via home telemedicine increases visit frequency. Additionally, data needed for quality T1D care was successfully obtained for the majority of home telemedicine visits. Offering home telemedicine for young adults may be a successful way to increase clinical care engagement during this transitional stage.

Adherence to T1D Care Components via Telemedicine

O43 New challenges in pediatric diabetes care: frequency and medical treatment of type 1 diabetes among current refugees in Germany and Austria

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Objectives: To determine adherence to essential components of T1D care: visit attendance, device downloads and A1C measurement in young adults with T1D enrolled in a home telemedicine trial (CoYoT1).

Methods: Visits occurred every 3 months for 1 year with 3 home telemedicine visits and 1 in-person clinic visit. Prior to each visit, participants were instructed to download their T1D devices from home and obtain A1C at a local laboratory.

Results: 45 young adults (M±S=19.8±1.6 years; 56% female) with T1D (M±S=duration=8.6±4.6 yrs.) participated. At least 72% of participants downloaded their T1D devices and >80% completed A1C (Table 1). In the year prior to study enrollment, participants completed 2.5±1.2 in person clinic visits. With access to home telemedicine, participants completed significantly more T1D clinic visits (M±S=3±1.1; t=-3.563; p<0.001) compared to the number of T1D visits attended in the prior year. The proportion of participants who completed ≥4 T1D visits/year, as recommended by ADA, significantly improved from 22% to 67%; McNemar c2 (p< 0.001).

Conclusions: Providing young adults with T1D care visits via home telemedicine increases visit frequency. Additionally, data needed for quality T1D care was successfully obtained for the majority of home telemedicine visits. Offering home telemedicine for young adults may be a successful way to increase clinical care engagement during this transitional stage.

Adherence to T1D Care Components via Telemedicine

O42 Home telemedicine increases the number of type 1 diabetes care visits attended by young adults

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Objectives: To determine adherence to essential components of T1D care: visit attendance, device downloads and A1C measurement in young adults with T1D enrolled in a home telemedicine trial (CoYoT1).

Methods: Visits occurred every 3 months for 1 year with 3 home telemedicine visits and 1 in-person clinic visit. Prior to each visit, participants were instructed to download their T1D devices from home and obtain A1C at a local laboratory.

Results: 45 young adults (M±S=19.8±1.6 years; 56% female) with T1D (M±S=duration=8.6±4.6 yrs.) participated. At least 72% of participants downloaded their T1D devices and >80% completed A1C (Table 1). In the year prior to study enrollment, participants completed 2.5±1.2 in person clinic visits. With access to home telemedicine, participants completed significantly more T1D clinic visits (M±S=3±1.1; t=-3.563; p<0.001) compared to the number of T1D visits attended in the prior year. The proportion of participants who completed ≥4 T1D visits/year, as recommended by ADA, significantly improved from 22% to 67%; McNemar c2 (p< 0.001).

Conclusions: Providing young adults with T1D care visits via home telemedicine increases visit frequency. Additionally, data needed for quality T1D care was successfully obtained for the majority of home telemedicine visits. Offering home telemedicine for young adults may be a successful way to increase clinical care engagement during this transitional stage.

Adherence to T1D Care Components via Telemedicine
The SCI-R measures adherence to diabetes care and is composed of 15 items, assessing diet, glucose monitoring, medication administration, exercise, low glucose level, and preventive/routine aspects of self-care. A stepwise regression procedure was used to evaluate the association between each PRO score and the main variables related to T1DM, including HbA1c levels, number of hypoglycemic episodes, puberty status, and sociodemographic factors.

**Methods:** The study included 2 patient-reported outcomes (PROs): the Diabetes Module of the Pediatric Quality of Life Inventory (PedsQL) and the Self Care Inventory-Revised (SCI-R). The PedsQL was to evaluate the association between diabetes-specific health-related quality of life (HRQoL) adherence to diabetes care, demographics, and diabetes-related factors. The study included 275 patients participated in the study. The main factors significantly affecting PedsQL total scores were the number of severe hypoglycemic events in the last 12 months (β = -3.997, p=0.046) and age of the child (β = 0.471, p=0.031). Age was also associated with the SCI-R total score (β = -1.174, p< 0.001).

**Conclusions:** For children and adolescents with T1DM in Spain, severe hypoglycemic events and lower age were significantly related to lower overall self-reported HRQoL. Higher age was associated with lower adherence to diabetes care. Health care providers should consider these interactions as part of their regular practice of managing diabetes in order to address specific patients’ needs.

**O44 Factors affecting health-related quality of life and adherence to diabetes care in paediatric patients with type 1 diabetes mellitus in Spain: results from the CHRYSTAL study**


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**Objectives:** CHRYSTAL (Costs and Health Related quality of Life Study for Type 1 diAbetes meLlitus paediatric patients in Spain) was an observational study conducted in 2014 in patients ages 1-17 years with type 1 diabetes mellitus (T1DM). The objective of this analysis was to evaluate the association between diabetes-specific health-related quality of life (HRQoL), adherence to diabetes care, demographics, and diabetes-related factors.

**Methods:** The study included 2 patient-reported outcomes (PROs): the Diabetes Module of the Pediatric Quality of Life Inventory (PedsQL) and the Self Care Inventory-Revised (SCI-R). The PedsQL measures HRQoL and is composed of 28 items, assessing diabetes symptoms, treatment barriers, treatment adherence, worry, and communication. The SCI-R measures adherence to diabetes care and is composed of 15 items, assessing diet, glucose monitoring, medication administration, exercise, low glucose level, and preventive/routine aspects of self-care. A stepwise regression procedure was used to evaluate the association between each PRO score and the main variables related to T1DM, including HbA1c levels, number of hypoglycemic episodes, puberty status, and sociodemographic factors.

**Results:** A total of 275 patients participated in the study. The main factors significantly affecting PedsQL total scores were the number of severe hypoglycemic events in the last 12 months (β = -3.997, p=0.046) and age of the child (β = 0.471, p=0.031). Age was also associated with the SCI-R total score (β = -1.174, p< 0.001).

**Conclusions:** For children and adolescents with T1DM in Spain, severe hypoglycemic events and lower age were significantly related to lower overall self-reported HRQoL. Higher age was associated with lower adherence to diabetes care. Health care providers should consider these interactions as part of their regular practice of managing diabetes in order to address specific patients’ needs.

**O45 Correlation between hypoglycemia, glycemic variability and C-peptide preservation after alefacept therapy in patients with type 1 diabetes: analysis of data from the ITN T1DAL trial**

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**Objective:** In natural history studies, maintenance of higher levels of C-peptide (C-pep) secretion correlates with a lower incidence of major hypoglycemic events in patients with type 1 diabetes (T1D), but it is unclear whether this is true for drug-induced C-pep preservation.

**Methods:** We analyzed hypoglycemic events & glycemic control data from the T1DAL study (alefacept in new-onset T1D) which demonstrated significant C-pep preservation at 1 & 2 years. We performed a post hoc analysis using mixed models of the relationship between the meal-stimulated 4-hour C-pep area under the curve (4-hr AUC) & rates of major hypoglycemia, measures of glycemic control and variability, & an index of partial remission.

**Results:** Data from 49 participants (33 in the alefacept group, 16 in the placebo group) were analyzed at baseline & 12 & 24 months. The 4-hr AUC at baseline & at 1 year was a significant predictor of the number of hypoglycemic events during the ensuing 12-month interval (p=0.030). There was a strong relationship between the 4-hr AUC & glucometer SDs (p< 0.001), highest readings (p< 0.001), & lowest readings (p=0.03), all measures of glycemic variability. There was a strong inverse correlation between the 4-hr AUC & two measures of glycemic control: HbA1c & average glucometer readings (both p< 0.001); & between the 4-hr AUC & IDAA1C values (p< 0.001), as well as a strong correlation between IDAA1C values & glucometer SDs (p< 0.001), suggesting that reduced glycemic variability is associated with a trend toward partial remission.
Conclusions: Measures of glycemic variability & control, including rates of hypoglycemia, are significantly correlated with preservation of C-pep regardless of whether this is achieved by immune intervention with alefacept or natural variability in patients with new-onset T1D. Preservation of endogenous insulin production by an immunomodulatory drug may confer clinical benefits similar to those seen in patients with higher C-pep secretion.

O46 Change in prevalence of impaired awareness of hypoglycemia in a population-based clinic cohort of youth with type 1 diabetes

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Objectives: Impaired awareness of hypoglycemia (IAH) is a serious complication of insulin therapy associated with an increased risk for severe hypoglycemia (SH). IAH prevalence has been documented in youth with Type 1 diabetes (T1D) however improvement in management and reduced rates of SH raise the question as to whether there has been a change in the prevalence of IAH. The aim of this study was to determine the change in prevalence of IAH in a population-based cohort of adolescents with T1D on contemporary therapy.

Methods: Children > 12 years of age with T1D documented their responses to hypoglycemia based on the modified Clarke questionnaire. The prevalence of IAH was also analysed in a similar population-based cohort using the same questionnaire in 2002. The clinical details of the participants and the number of SH events in the year preceding the survey were determined from the Western Australian diabetes database.

Results: The modified Clarke questionnaire was administered to 413 children in 2002 and to 444 children in 2015 with similar baseline demographic characteristics. The prevalence of IAH was 33% in 2002 and 21% in 2015 (z = 3.703, p < 0.001). A lower HbA1c, younger age at diagnosis and longer duration of diabetes correlated with IAH in the 2002 cohort but not in the 2015 cohort. There was a significant decline in the rates of SH in 2015 compared to 2002 (p < 0.001) despite a reduced HbA1c in 2015. IAH increased the risk of SH 3 to 4 fold in both cohorts (IAH vs aware: 52 vs 16 events/100pt years in 2002 and 8 vs 2 events/100pt years in 2015).

Conclusions: The study demonstrated a reduction in IAH across a similar population using the same questionnaire in 2002 and 2015. The associated risk profile for IAH has also changed. Although IAH has reduced, IAH is still prevalent in a substantial minority of adolescents with T1D and is associated with an increased risk of SH. Identification of these individuals is an important component of T1D management.

O47 The SWEET Initiative: targeting harmonized diabetes care through high quality data registry from 48 centers worldwide

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Objective: SWEET (“Better control in Pediatric and Adolescent diabetes Working to CReAt CEaNers of Reference (CoR)”) is a non-profit entity endorsed by ISPAD aiming to create an extensive network of certified CoRs for childhood diabetes in order to ensure high quality care.

Methods: Electronic documentation of at least 150 pediatric patients with diabetes annually, with subsequent upload of anonymized data to a common database is a main prerequisite. The SWEET dataset consists of 37 clearly definable items that reflect adherence to ISPAD’s guidelines. Data can be uploaded either through the DPV software that is adapted for a multilingual group or in other electronic formats. The results of data analysis are conveyed to members through biannual benchmarking reports. In collaboration with NHS Diabetes, peer review visits to applying centers are organized so as to assess compliance with the SWEET quality criteria. Smaller or partly compliant as yet centers can participate as collaborative ones (CC).

Results: To date, 48 centers (CoRs & CCs) from 33 countries in 5 continents have contributed data for 28,667 patients. In 2015, 19,131 patients (51.6% males, median age 14.2 y, T1D: 96.0%, T2D: 1.1%, other forms: 2.9%) with 69,028 visits were recorded. Median HbA1c was 7.8% with 39.1%, 41.4%, and 19.4% of patients having HbA1c < 7.5%, 7.5-9% and >9%, respectively. One third of all centers achieve a median HbA1c < 7.5%. Regarding treatment modality, 41.2% of all patients were pump users. Severe hypoglycemia and DKA rates were low in all centers. Data completeness rates have significantly increased over time.

Conclusions: SWEET aims at an improved and more uniform care for people with diabetes through comparing processes and outcomes among participating members. Benchmarking has highlighted the importance of complete and accurate data to achieve meaningful interpretation. Annual meetings further enhance collaboration on scientific projects, exchange of experience and innovation.

O48 Characteristics of young adults with type 1 diabetes (T1D) who attain HbA1c target in the global TEENS study

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Objective: Increasing evidence documents that many young adults with T1D are vulnerable to poor glycaemic control, mental health problems, loss to medical follow up and acute complications. Little is known about those young adults who reach an A1c of < 7% (ADA).

Methods: Data were collected from 219 centres, 20 countries. A1c was measured uniformly using A1cNow® (Bayer). Demographic, family and treatment factors were collected by interview, survey, and record review. Participants completed 2 psychosocial measures—the PedsQLTM 3.0 Diabetes Module and the PAID (Problem Areas in Diabetes). The cohort was split into 3 A1c groupings: < 7% (<53 mmol/mol) (N=299, 18.1%); 7-< 9% [53-74 mmol/mol] (N=850, 51.6%); ≥ 9% (≥75 mmol/mol) (N=499, 30.3%). 299 young adults with A1c< 7% were compared with the other 2 A1c groups. Significant (p < 0.001) predictive characteristics of the 299 young adults with A1c< 7% were identified using multivariate logistic regression adjusted for region.
Results: Young adults with A1c < 7% were more likely to have a university degree and to be working. Regarding treatment characteristics, they were more likely to use carbohydrate counting, exercise more days per week, check BG more frequently per day, use pump therapy, and miss fewer insulin doses per week. Young adults at target had less diabetes family conflict and reported lower diabetes emotional burden and higher diabetes-related quality of life.

Conclusions: In the TEENs sample, young adults at target A1c < 7% used contemporary diabetes management methods—approaches that can potentially be used by those above target. Associations between target A1c and lower family conflict, as well as better psychosocial functioning, are likely bi-directional relationships.

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O49 Pharmacokinetic (PK) and pharmacodynamic (PD) profile of the SGLT2 inhibitor empagliflozin (Empa) in pediatric patients with type 2 diabetes (T2D)

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Objectives: The newest class of oral hypoglycemic agents, SGLT2 inhibitors, offers promise for treatment of pediatric patients with T2D. Prior to pivotal safety and efficacy trials, data on pediatric PK/PD are needed.

Methods: In a single dose study, 27 children and adolescents, aged 10-17 years, with T2D were randomly assigned to receive either 5 mg, 10 mg, or 25 mg of Empa. Eligibility criteria included HbA1c ≤10.5% (91 mmol/mol), treatment with diet and exercise and/or stable dose of metformin and/or stable basal or MDI insulin. Primary endpoints included PK data (area under the curve [AUC], maximum plasma concentration [Cmax], time to Cmax [tmax], and half-life [t1/2]). Secondary endpoints were changes in urinary glucose excretion [UGE] and fasting plasma glucose [FPG] at 24 h postdose.

Results: Of the 39 patients screened for participation, 27 (67% female, 44% White) were randomized and completed the study; mean (± SD) age was 14.1 ± 2.0 years, body weight 96.7 ± 23.5 kg, BMI 35.5 ± 6.7 kg/m², eGFR 165.8 ± 23.8 ml/min/1.73m². HbA1c 7.0 ± 1.2%, UGE 8.8 ± 22.1 grams/24 h, and FPG 139 ± 56 mg/dL. For PK results, tmax occurred within 1-2 hours and t1/2 was on average 7-8 hours; Cmax and AUC increased with higher doses. For PD results, baseline and FPG adjusted mean decrease in UGE was 53, 73, and 87 grams/24 h and baseline adjusted mean decrease in FPG was 15.5, 16.6, and 20.4 mg/dL for the 5, 10, and 25 mg doses, respectively. There were no severe adverse events and 1 investigator-reported drug-related event (dehydration).

Conclusions: Exposure (AUC and Cmax) and t1/2 were comparable in pediatric and adult patients with T2D. There were dose-dependent increases in UGE and comparable decreases in FPG. A single dose of Empa in pediatric patients with T2D was well tolerated, with PK/PD and safety results similar to adult studies.

O50 A phase IIb, randomised, double-blind, placebo-controlled study of the DPP-4 inhibitor linagliptin (Lina) in pediatric patients with type 2 diabetes (T2D)


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Objectives: To study efficacy, safety, pharmacokinetics (PK) and pharmacodynamics (PD) of Lina in youth with T2D.

Study design: Double-blind, randomised controlled parallel group study comparing Lina 1 and 5 mg with placebo in patients with T2D aged 10-17 years. Primary efficacy endpoint was change from baseline in HbA1c after 12 weeks of treatment and key PD endpoint was DPP-4 inhibition at trough at steady-state.

Results: Baseline characteristics by treatment group are shown in Table. Compared to placebo, there was a dose-dependent reduction in mean HbA1c levels of 0.48% and 0.63% with Lina 1 mg and 5 mg, respectively, associated with corresponding falls in mean FPG of 5.6 mg/dL and 34.2 mg/dL. The% of median DPP-4 inhibition was 38% with Lina 1 mg and 79% with Lina 5 mg. Geometric mean trough levels of Lina were 3.80 nmol/mL and 7.42 nmol/mL in the 1 mg and 5 mg groups. These values were slightly higher than in adult patients and further PK analysis suggests that the higher exposure is mainly caused by higher plasma DPP-4 concentrations in the study population. There were no drug-related adverse events during treatment with either dose of Lina.

Conclusions: Lina was well tolerated and induced dose-dependent DPP-4 inhibitions that were accompanied by corresponding reductions in HbA1c and FPG in youth with T2D. The results are consistent with the clinical efficacy and safety profile that has been reported for Lina in adult patients with T2D, favoring Lina 5 mg over 1 mg.

[Baseline characteristics (mean ± SD)]

<table>
<thead>
<tr>
<th>Lina 1 mg/day</th>
<th>Lina 5 mg/day</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Age (years)</td>
<td>14.0 ± 1.8</td>
<td>14.3 ± 2.1</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>75.3 ± 19.3</td>
<td>84.8 ± 25.1</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>28.0 ± 5.2</td>
<td>33.0 ± 8.0</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>8.22 ± 0.93</td>
<td>7.87 ± 0.98</td>
</tr>
<tr>
<td>FPG* (mg/dL)</td>
<td>160.5 ± 53.6</td>
<td>150.8 ± 48.0</td>
</tr>
</tbody>
</table>

*Fasting Plasma Glucose

ORAL SESSIONS

Oral Session VII: DM2 & DM in Developing Countries
Children with T2D can present with both DKA and HHS, depending on baseline HbA1c, sex, transfer age, race/ethnicity, and whether parents reported transfer to adult care vs. no care at follow up.

**Conclusions:** Most youth with T2D transfer from pediatric to adult care between 18-25 years; however some report no care at this point. Worsening glycemic control in childhood is associated with increased likelihood of leaving pediatric care, and leaving pediatric care is associated with poor glycemic control in young adulthood regardless of baseline control. Our findings highlight a need for better preparation and support surrounding transition from pediatric to adult care for youth with T2D.

**O52**

"Flatbush diabetes": ketosis prone type 2 diabetes presenting with hyperglycaemic hyperosmolar state, ketoacidosis and severe hypernatraemia

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**Introduction:** Type 2 diabetes (T2D) affects 1.5% of UK children with diabetes. The case of a child presenting with severe diabetic ketoacidosis (DKA) and hyperglycaemic hyperosmolar state (HHS) at first presentation of T2D is described.

**Case description:** A 12-year-old Afro-Caribbean boy presented with collapse, preceded by polyuria, polydipsia, enuresis and aggression. He had been drinking >3L of sports drinks daily but had vomited 24h before presentation. Examination signs: Kussmaul breathing; tachycardia; 4 sec capillary refill; C/CS 11. He was obese with acanthosis nigricans.

Investigations showed severe hyperglycaemia and hypernatraemia (glucose 95 mmol/L, ketones 6.4 mmol/L, HbA1c 122 mmol/mol, corrected sodium 179 mmol/L). Blood gas confirmed severe DKA.

Management: Fluid resuscitation was commenced, followed by 8% rehydration volume over 48h with 0.05 units/kg/h IV insulin. Ketoacidosis resolved in 24h and the patient was in an BS positive fluid balance after 48h of rehydration.

Following this, isotonic fluid (0.9% NaCl) was gradually reduced to 0.45% NaCl when serum sodium failed to fall. When possible, sodium-free oral fluids were introduced to titrate with IV fluids. Sodium and fluid balance reviewed 4 hourly prevented rapid sodium fall.

CT head at presentation showed no cerebral oedema. Agitation and confusion improved only with correction of hypernatraemia at 24h.

**Discussion:** Due to signs of insulin resistance and known paternal ketosis prone T2D, metformin was commenced in parallel with subcutaneous insulin. Anti-IA2 and anti-GAD antibodies were negative. Insulin was stopped at week 10, when HbA1c was 45 mmol/mol.

**Conclusion:** Children with T2D can present with both DKA and HHS, and may precipitate HHS due to signs of insulin resistance and known paternal ketosis prone T2D. Metformin was commenced in parallel with subcutaneous insulin. Anti-IA2 and anti-GAD antibodies were negative. Insulin was stopped at week 10, when HbA1c was 45 mmol/mol.

**O53**

Comparison of treatment regimes in children with type 2 diabetes and its effect on glycaemic control

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**Objective:** To compare change in HbA1c at 1-year among different treatment groups of patients with T2D who were initiated on insulin-only, oral-only or combined insulin & oral therapy.

**Methods:** Retrospective review of data from diabetes registry of patients diagnosed with T2D. Treatment is categorized into single versus combination therapy, while single therapy group includes oral-only or insulin-only. The change in HbA1c within treatment groups was analysed using SPSS version 19.0 & values reported as mean±SD.

**Results:** Out of 70 patients, 18 were started on insulin-only, 30 on oral-only & 22 on combination therapy. Mean HbA1c at diagnosis was significantly lower in patients on single therapy than those on combination therapy ([9.47±3.18 vs. 12.1±1.42%]; p< 0.001), while mean HbA1c was lower in oral-only than insulin only [7.91±2.06 vs. 12.2±2.95%]; p< 0.001]. Patients on combination therapy are younger than those on single therapy (p<0.021). Mean weight at diagnosis was significantly higher in those on oral-only vs. insulin only [75.5±21.1 vs. 55.8±18.0 Kg ; p=0.004]. There was no correlation between race, gender or C-peptide level and choice of therapy. Reduction in HbA1c at 1-year was seen across all treatment groups (Graph 1), but was more in combination than single therapy and more in insulin-only than oral-only group.

**Conclusion:** All types of treatment regimens help to achieve glycaemic control in T2D but combination & insulin-only therapy is more effective than oral-only.

**O54**

A new approach to compare between different screening tests for type 2 diabetes and prediabetes in overweight and obese children

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**Objectives:** In children, studies appear to show that A1C has lower sensitivity when compared to fasting plasma glucose (FPG) or oral glucose tolerance test (OGTT) as “gold standard”. However, FPG and OGTT have themselves never been validated in children. The analysis in these studies is confounded, as the tests under study are themselves being used as the ‘gold standard’. When defining one test arbitrarily as the gold standard, any other test, by definition, will not measure up.

We compared the three tests not to a ‘gold standard’, but to a final diagnosis reached through combining the results of more than one test.

**Methods:** Fifty four children aged 5-15 years with BMI ≥85th percentile were recruited into the study. For all participants, FPG, 2h-PG on the 75-g oral glucose tolerance test (OGTT) and A1C were performed.
If two different tests are both above the diagnostic threshold, this confirms the diagnosis. On the other hand, if a patient has discordant results on two different tests, then the test result that is above the diagnostic cut point should be repeated. The diagnosis is made on the basis of the confirmed test.

Sensitivity and specificity were calculated for the 3 tests. The k coefficient was calculated as a measure of agreement.

Results: One male obese child had T2DM, 36 showed normal glucose tolerance, while 17 children had pre-diabetes.

A1C was the most sensitive test (86.67%) followed by FPG (62.5%). Both FPG and 2h-PG had equal specificities (97.3%) while A1C had a lower specificity of 84.25%.

Fair agreement existed between FPG and both 2h-PG (κ=0.215; 95% CI –0.086 to 0.516) and A1C (κ=0.330; 95% CI 0.069 to 0.591) diagnoses. While, there was poor agreement between A1C and 2h-PG diagnoses (κ=-0.179; 95% CI -0.052 to 0.410).

Conclusions: A1C could be a valid screening test for prediabetes in overweight and obese children and further studies are needed.

O56
Activity of the antioxidant enzyme paraoxonase in indigenous versus urban Argentinean children
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Background: We have previously found that indigenous children from San Antonio de los Cobres (SAC) had lower HDL levels than Buenos Aires (BA) urban children. Among the different antiatherogenic functions exerted by HDL, its antioxidant capacity is mainly attributed to the enzyme paraoxonase 1 (PON1), which is synthesized by the liver and circulates in plasma bound to HDL. Serum PON1 activity was found to be reduced in a number of pathological conditions including cardiovascular disease and type 2 diabetes.

Objective: To compare PON1 activity in indigenous SAC versus urban BA children.

Methods: A cross-sectional study compared 150 (67 males) SAC versus 93 (47 males) urban BA children (6-16 years) between October and November 2015. Anthropometric data, lipid levels, and PON1 activity were measured in both groups.

Results: The prevalence of overweight/obesity was significantly lower in SAC (26/150; 17.3%) than in BA (30/93; 32.6%). However, the prevalence of low HDL was significantly higher in SAC (14/150; 9.5%) than in BA (4/93; 4.3%); and the prevalence of high triglycerides was significantly higher in SAC (28/150; 18.7%) than in BA (4/93; 4.4%). Comparisons of BMI percentile (59 vs 66; triglycerides (120 vs 78 mg/dL), HDL-C (45 vs 51 mg/dL) and Apo B (83 vs 70 mg/dL) levels, as well as PON1 activity (170 vs 203 IU/L) showed significant differences in mean levels in SAC compared with BA. In separate linear regression models, adjusted for sex, age, and BMI, SAC children had 44 mg/dL higher triglyceride levels, 6.6 mg/dL lower HDL (p< 0.001) and 14 mg/dL higher Apo B (p< 0.001) levels, and 45 IU/L lower PON1 activity (p< 0.001) compared with BA children.

Conclusion: This study shows that SAC children had an unfavourable lipid profile and lower PON1 activity compared with BA children. These findings suggest that this community may be at higher risk for earlier cardiovascular disease and type 2 diabetes.
Oral Session VIII - Nutrition and DM in Developing Countries

O57 Is the glycaemic response from fat in meals dose dependent in children with T1DM? Interim analysis of 11 patients
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Background: Management of people with T1DM on intensive insulin therapy (IIT) uses algorithms based on the meal carbohydrate (CHO) content (MCC) to calculate prandial insulin dose. Typically, these calculations do not consider the meal content of fat or protein.

Objective: To determine if the postprandial blood glucose (BG) response to varying fat content is dose dependent when standard insulin bolus is given based on MCC.

Methods: Randomised repeat testing of 11 patients with T1DM >1 year duration, aged 8-18 years on IIT. A test meal was given on 6 consecutive days in random order without insulin 4 hours after the regular evening meal; 5 test meals varying in fat content (3, 13, 25, 38, 50g), but without CHO/protein, and one 20g CHO meal with no fat/protein. A continuous glucose monitoring system was used to assess BG levels (BGL) at 10 minute intervals for 8 hours afterwards. The relationship between the fat loads in the meals and the mean change in BGL were analysed.

Results: The graph illustrates the change in BGL from baseline [Mean post prandial BGL excursion over time] of Ireland, Physiology, School of Medicine, Galway, Ireland

Conclusions: In 11 patients studied to date, there was no significant dose response to fat consumed without CHO in either the early or late postprandial period indicating that fat does not cause the immediate increase in BGL seen with CHO. More data are needed from this ongoing study to accurately determine the full impact.

O58 Impact of advanced carbohydrate counting method on oxidative stress and metabolic control in children and adolescents with type 1 diabetes (DM1) on multiple daily injection (MDI) therapy
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Objective: To compare daily glycemic profiles and nutrient intake in youth with type 1 diabetes (T1D) and coeliac disease (CD) vs T1D only.

Methods: Case control study of 10 youth with T1D+CD and 7 with T1D, who were blinded continuous glucose monitoring systems (CGMS) for 6 days, with 5-minutely BGLs downloaded at study end. Main meal BGLs (pre-meal, peak, 2-hr post meal) and time to reach peak BGLs were compared between T1D and T1D+CD using Mann Whitney U tests. Participants consumed a gluten free cereal and milk test meal for 3 days and kept weighed food diaries, which were analyzed for nutrient intake and compared to national dietary recommendations.

Results: Overall, 222 main meals were identified from CGMS traces (median 16, range 8-18 meals per patient). Youth with T1D+CD vs T1D only had shorter time to peak BGL (77 vs 89 mins, p=0.03), higher peak (9.3 vs 7.3mmol/L, p=0.001) and higher 2-hr post prandial BGL (8.4 vs 7.0 mmol/L, p=0.01), despite similar pre-meal BGLs (9.2 vs 8.6 mmol/L, p=0.28), insulin to carbohydrate ratios (11.1 vs 10.4, p=0.84) and insulin sensitivity factors (3.3 vs 2.7, p=0.54) and
HbA1c (7.5% vs 8.0% / 58 vs 64 mmol/mol, p=0.34). For the test breakfast, the difference between post-meal BGL and peak BGL post-meal was significantly correlated with longer CD duration (R = 0.53, p=0.01). Caloric and macronutrient intake did not differ between T1D+CD vs T1D, however, collectively the majority had inadequate dietary calcium (7%), folate (71%) and fiber (53%) intake, with excessive saturated fat (12% total energy intake) and sodium (>2,000mg/day).

Conclusion: A gluten free diet is associated with greater glycemic excursions in youth with T1D+CD. Youth with T1D did not meet ISPAD guidelines for saturated fat, fiber and sodium dietary intake. Clinical management should address both glycemic variability and dietary quality to increase calcium and fiber, and reduce saturated fat and sodium intake.

O60 Carbohydrate counting from onset of diabetes reduced insulin requirements but increased weight in children and adolescents

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Objective: The aim was to evaluate if carbohydrate (CHO) counting improved glycemic control and anthropometrics compared to conventional treatment, one and two years after onset of diabetes in children and adolescents. A secondary aim was to explore patients and caregivers perception of insulin dosage to meals with focus on efficacy, time consumption and adherence.

Methods: 371 subjects were included and divided into two groups, based on whether onset of diabetes occurred before or after the introduction of CHO counting as standard treatment method in our clinic. Data was collected retrospectively from the Swedish pediatric quality registry (Swediabkids). HbA1c, body mass index standard deviation score (BMI-sd) and total daily insulin were calculated at three months, one and two years. Occurrence of severe hypoglycemia was also measured. A web-based questionnaire provided information on perception of carbohydrate counting, answered by 78 subjects.

Results: CHO counting reduced insulin requirements (p< 0.001) and eliminated differences in insulin requirements between pump- and pen users as well as between boys and girls. Glycemic control was not improved by CHO counting one and two years after diabetes onset (p=0.233, p=0.295). An adverse effect was increased body mass index standard deviation score (BMI-sd) (p=0.044), especially amongst girls (p=0.038). Patients found CHO counting effective and time efficient. Learning CHO counting from onset increased adherence.

Conclusion: CHO counting lowers insulin requirements with maintained glycemic control. Contradictory, greater weight gain was found in the carbohydrate counting group, especially among girls. A plausible explanation is that CHO have taken focus off protein- and fat intake in combination with a more liberal approach to energy dense foods, causing excess energy intake. The strength of CHO counting does not lie in its ability to lower HbA1c-values but as a helpful tool, which patients are happy to use.

O61 Costs to governments of type 1 diabetes care in youth in less-resourced countries - three scenarios for different income levels

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Objectives: Evidenced-based tools are needed to help persuade governments in less-resourced countries to provide adequate youth diabetes health care. We developed 3 scenarios for differing country income levels, calculating the annual cost of care/child needed to achieve a healthy life year, and comparing that to Gross Domestic Product (GDP)/capita as per WHO’s CHOICE approach.


Costs of insulin, syringes/pens, SMBG, ketone strips, HbA1c, complications screening, outpatient and inpatient care were determined from publications, known international costs, and local investigations. A healthy life year was assumed for 10+ years with this care. The cost was compared to GDP/capita.

Results: Projected estimated annual costs were S1: (US)$761, S2: $1,067, S3: $1,980. Annual costs in Mali were $740 (105% GDP/capita), Tanzania $889 (93%), Azerbaijan $1,980 (26%). Expressed as a % total cost, supplies were 48%, 48%, 60% in S1, S2, S3 respectively; laboratory/complications 10%, 7%, 4%; and health service delivery 2%, 4%, 36%.

Conclusion: This is a straightforward approach to determining costs of youth diabetes care that will be useful for advocacy to governments. Next, the research team will quantify the healthy life years gained for these 3 scenarios, and conduct a cost-effectiveness analysis in line with WHO CHOICE, where the indicative level for a very cost-effective intervention resulting in a healthy life year is < 100% GDP/capita.

Standard youth diabetes care can be provided at a relatively low cost, even in low-income countries.

O62 Type 1 diabetes care and outcomes in rural low income settings in India using family support strategies

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Objective: Patient outcomes are hard to achieve in rural settings because of lack of education in the family, lack of financial resources and unavailability of specialized care. This a study of 100 children supported by Udaan, an NGO based in Aurangabad, India to identify low-cost strategies that can improve patient outcomes within these constraints, bringing them at par with those observed in developed countries.

Methods: 100 Udaan supported children with Type 1 diabetes were studied. 30 children were below 10, 34 were between 10-14, and 36 were between 15-20 years of age. Average income of a family was about 100 USD / month. Families were provided conventional insulin, Glucometer and 50 strips a month to minimize the cost of care. The average education level of mothers was below 9th grade with 15% being illiterate. In place of traditional written material, weekly interactive learning programs were provided to parents and/or children. Each family attended an average of 15 sessions a year. To address the lack of access to specialized care (there is no pediatric endocrinologist in the region and the nearest doctor is about 50 km away), Udaan ran 24 hour helplines for diabetes support, which each family used approximately 22 times a year.

Results: Average HbA1c level for the 100 children was 8.37%, at par with values observed in developed countries. Of the 100, 9 children...
achieved scores below 7%, 24 between 7-8%, 38 between 8-9% and 29 children had HbA1c levels between 9-10%.

**Conclusion:** 100 children with Type 1 diabetes from rural, low income, low literacy families with no access to specialized care were able to achieve average HbA1c levels of 8.37%, at par with those observed in less resource-constrained settings. They achieved this cost-effectively, using conventional insulin and less than 50 glucometer strips a month, overcoming access and literacy constraints through 24 hour helplines and localized education support provided by Udasan, an NGO for children with diabetes.

**O63**

**Diabetes support groups in Ghana, 3 years of diabetes youth care**

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**Introduction:** The prevalence of diabetes in adults in Ghana is estimated to be 3.35%. The prevalence of diabetes mellitus in Ghana among the young is not known. Management of diabetes is multidisciplinary and also involves a lot of support for the young person and the family as a whole.

Started in 2012, Diabetes Youth Care has the main aim of filling the unmet social support of these young ones and their families.

**Problem statement:** There are few support groups for and young people living with diabetes in Ghana.

**Aim:** To assess impact of support network Diabetes Youth Care on young ones living with diabetes in Ghana.

**Objective:** To determine the influence of monthly support group meetings.

**Method:** Assessment of the support network was done by analyzing the attendance and behavior at the monthly, support group meetings and the number of admissions due to acute complications.

**Results:** The support network initially began with 5 young ones under the age of 30 and has grown to over 100 across the country. The young ones have been empowered with the knowledge about managing diabetes and are able to identify acute complications, manage them to prevent death.

Most of the young ones living with diabetes were in a better position to tell their friends and family about diabetes and also educate them about immediate measures to take when they develop acute complications.

A website created by the support network encourages the young ones living with diabetes to share their real life stories to encourage each other, educate and create awareness about diabetes in young people. This has led to some of them becoming peer educators and mentors to the younger ones with diabetes.

**Conclusion:** Support network groups are vital in the management of diabetes in young people as they serve as a point of information and education about diabetes. Diabetes Youth Care has been a positive impact in the life of these young ones living with diabetes and that of their families.

**O64**

**Follow-up of successful community mobilisation with women’s groups to assess impact on growth of children aged two to four years in Bangladesh**

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**Objectives:** Community Mobilisation (CM) with women’s groups (WG) practising participatory learning and action are a cost-effective strategy to improve neonatal survival in low-resource settings, with a reduction in neonatal mortality in Bangladesh by 38%. The long term effect, if any, has yet to be established. We studied differences in anthropometric outcomes at ages two to four years of children to examine the impact.

**Methods:** In a cross-sectional survey, anthropometric measures (height, weight, and abdominal, head, chest, mid upper arm circumferences, triceps and sub-scalpular skinfold thickness) in children born to women who had been directly exposed to CM were compared at ages 2-4 years with a random sample of age-matched children, whose mothers were not exposed to the intervention. Maternal weight and height and BMI were recorded. Data were analysed as z-scores and results stratified by maternal BMI.

**Results:** 2587 children were inducted. Children whose mothers were underweight at the time of the survey, and were exposed to WGs interventions had significantly larger z-scores for HC (z-score increase of 0.22 (95% CI 0.08, 0.36), p=0.002), AC (0.23 (0.05, 0.42), p=0.013) and MUAC (0.13 (0.00, 0.25), p=0.045) than children whose mothers were not exposed to the intervention. Children with overweight mothers, exposed to the interventions had significantly smaller weight-for-age (−0.23 (−0.43, −0.04), p=0.018) and weight-for-length (−0.17 (−0.33, −0.00), p=0.047) z-scores compared to control children. Results for weight-for-length z-scores also showed a significant differential effect depending on the child’s gender.

**Conclusion:** Beneficial growth effects on the offspring of the most under-nourished mothers in particular, could have a lasting effect on diabetes and lifelong cardio-metabolic susceptibility. These findings offer a potential public health approach to reducing cardiometabolic risk through a population-level intervention in early developmental life.
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. 125 (12.5%) 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 (43%) 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 type 1 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 yrs. T1DM duration: 5.14 ± 3.5 years) and 80 age and gender-matched controls (mean ± SD age: 11.9 ± 2.7 yrs). We examined pupillary dilatation (PD), 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 value distributions.

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%, right: 28.3% vs 4%, p < 0.001) and upper limbs (left: 17.1% vs 2.67%, 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%, 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 glycemic 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 standing. Ankle ROM was measured using an inclinometer while sitting. Joint mobility, flexibility and glycaemic control 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; 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 (p = 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 levels 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 HbA1c 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, BMI, and biochemical (HbA1c, 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, FINS, lipid intake (kJ/EI), and gender as independent ones was also calculated.

Results: Non-HDL-cholesterol was significantly associated with adiposity (kJ/EI; r = 0.27, P < 0.001), body fat distribution ( WHtR, r = 0.16, P < 0.05), lipid (kJ/EI; r = 0.25, P < 0.05) and carbohydrate intake, blood pressure, insulin requirements, EI/pBMR and biochemical parameters other than HbA1c. Multiple regression analysis showed that adiposity (kJ/EI), blood glucose control (HbA1c) and lipid intake independently contributed to explain the inter-individual variability of the non-HDL cholesterol (R2 = 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 (HbA1c), 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. 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. 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 = 0.0013) 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 neither A1C 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. 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 ± 1.1 compared to 0.36 ± 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 TOURS

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 in T1DM 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 diabetes center 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 autoimmunity. 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 7.6I), median duration of T1DM 2.1 years (IQR 4.9I). Distribution per age group: see table 1. In the youngest age group the 95% confidence interval did not exceed 100 kU/L.

<table>
<thead>
<tr>
<th>Age group (yr)</th>
<th>Number of patients</th>
<th>Total IgE-level (kU/L)</th>
<th>%patients with IgE &gt; 100 kU/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>136</td>
<td>24.5 ± 67.0</td>
<td>21.3%</td>
</tr>
<tr>
<td>5-10</td>
<td>345</td>
<td>89.0 ± 208.5</td>
<td>47.0%</td>
</tr>
<tr>
<td>10-15</td>
<td>502</td>
<td>84.5 ± 247.5</td>
<td>45.0%</td>
</tr>
<tr>
<td>15-20</td>
<td>297</td>
<td>80.0 ± 213.0</td>
<td>46.1%</td>
</tr>
<tr>
<td>20-25</td>
<td>69</td>
<td>37.0 ± 127.5</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

[IgE distribution table]

Conclusions: 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).

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 (T1D1) 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 T1D1.

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 T1D1, n = 13; 7 girls and 6 boys)
  - 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 T1D1 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.

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>Time after diagnosis (years)</th>
<th>HbA1c (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>girls/boy</td>
<td>baseline</td>
<td>6 months</td>
</tr>
<tr>
<td>1</td>
<td>7/6</td>
<td>0.6 ± 0.4</td>
<td>12.6 ± 0.1</td>
</tr>
<tr>
<td>1</td>
<td>8/11</td>
<td>2.8 ± 2.5</td>
<td>6.7 ± 0.1</td>
</tr>
</tbody>
</table>

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 - 45, coefficient...
of variation - 0.38, asymptomatic hypoglycemia - 2.4, nocturnal hypo-
glycemia 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 aver-
age percentage of nocturnal hypoglycemia of 10%. Despite the small
sample, the authors observed a huge glycemic instability and this eval-
uation provided important therapeutic settings.

P012
Unexplained hypoglycemia in an adolescent with
type 1 diabetes - simple insulin overdose or
adrenal 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 hypogly-
cæmia. This persisted after a change to basal bolus with aspart and
detemir. Plasma insulin concentration was 914 pmol/L following hypo-
glycæmia on aspart alone, but 31,878 pmol/L following hypo-
glycæmia on basal bolus. Episodes were so frequent, the patient
ceased prescribed insulin for 72 hours, culminating in hospital admis-
sion 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 spe-
cific 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. Addi-
tion 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 glycemic control where the clinical features and bio-
chemistry are suggestive.

P013
International HbA1c benchmarking in type
1 diabetes: Do we need to report between-clinic
variation in addition to national average values?

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Skriverhaug4, D.M. Maahs4, K. Akeson5, J. Warner6, R.W. Holl7,8,
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Objectives: To compare national HbA1c 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 Ger-
many (n = 1732) and Austria (n = 1570) from the Prospective Dia-
betes 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 Norwe-
wegian Childhood Diabetes Registry. Completeness rates for HbA1c ranged from 1.8% in Norway to 66.37, AUC < 70 – 0.73. Comparing
between-clinic variation (Interquartile Range-IQR = 57-65 mmol/mol
[7.4-8.1%]), Norway and Sweden had the lowest between-clinic vari-
ation (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 com-
pared, 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 HbA1c 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 pediatric patients with T1DM and their caregivers, and evaluate how glycemic 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 glycemic control based on HbA1c level and by the presence or absence of DCC. The generic preference-weighted instrument EQ-SF was used to evaluate quality of life. EQ-SF 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-SF for overall population and stratified by glycemic 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: Glycemic control and the presence of DCC may impact HRQoL of pediatric 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-SD for overall population and stratified by glycemic control (HbA1c < 7.5% or ≥ 7.5%) and presence or absence of DCC.

<table>
<thead>
<tr>
<th>Dimension/Group</th>
<th>Overall Mean (SD)</th>
<th>HbA1c &lt; 7.5% Mean (SD)</th>
<th>HbA1c ≥ 7.5% Mean (SD)</th>
<th>No DCC Mean (SD)</th>
<th>DCC Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UTILITY INDEX</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a-</td>
<td>0.92 (0.14)</td>
<td>0.92 (0.13)</td>
<td>0.91 (0.14)</td>
<td>0.92 (0.14)</td>
<td>0.90 (0.12)</td>
</tr>
<tr>
<td><strong>VAS SCORE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b-</td>
<td>81.68 (15.89)</td>
<td>83.62 (15.32)</td>
<td>78.90 (16.33)</td>
<td>82.78 (15.34)</td>
<td>77.66 (17.29)</td>
</tr>
<tr>
<td>Proxy of Child’s HRQoL as Perceived by Caregiver (EQ5D3L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a-</td>
<td>0.94 (0.15)</td>
<td>0.94 (0.15)</td>
<td>0.93 (0.16)</td>
<td>0.95 (0.14)</td>
<td>0.90 (0.19)</td>
</tr>
<tr>
<td><strong>VAS SCORE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b-</td>
<td>86.13 (13.57)</td>
<td>88.03 (12.94)</td>
<td>83.34 (14.03)</td>
<td>86.84 (13.09)</td>
<td>83.59 (15.02)</td>
</tr>
</tbody>
</table>

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, IAC, 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(33%) 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.
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 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 (‘Structured patient education and treatment program for self-reliant continuous glucose monitoring’). 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 beyond basal and bolus insulin, and an overview of recent developments in CGM technology.

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.
PO20  
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/C6 groups, with high risk or unfavorable attributes associated with 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.

![Table of Factors associated with glycemic control in youth](image)

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

*All comparisons significant, p < 0.003

1Factors associated with glycemic control in youth

PO21  
Challenges in paediatric diabetic care - the effect of implementing an outpatient based new patient education programme  
C. Avann1, L. Drummond2, M. Kershaw1, R. Krone3  
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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
POSTER TOURS

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 fulfill 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 PDUs 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 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 5–20 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-, 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 that 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 parents, and 29% were educated only patients. 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.

Objectives: 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 doctor 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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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 again be 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 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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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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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.


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 ± 1.8% (109 ± 20 mmol/mol). Two have since died - one from osteosarcoma and one from a recent 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

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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 associations were found between age at diagnosis and HbA1c 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


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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 + thyroxine oxidase antibodies, at diagnosis and every 2 years thereafter. If Positive thyroid antibodies, thyroid symptoms or goiter: Serum TSH level + thyroxine oxidase 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.

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 or 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 Spirit 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® VeoTM with MiniMed® Mio™ [5], MiniMed® Sure-T™ [6] and MiniMed® Quickset™ [7]; mylifeTM 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](image)

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
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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 HbA1c 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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Introduction: Insulin dependent Type 1 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
children and young adults 27.7% and 66.6% had difficulty reactions to the sensor (pruritus and red spots) were reported by 31% for a median duration of 0.56 years (range 0.21-5.32). Local catheter was reported by 31.6%. Sensor augmented pump was used with batteries, 16% with stop functioning, 14.5% with rewind, 32.1% with 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% of subjects) had difficulty taking away the specks of glue.

Conclusions: 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 12.2 ± 4.7 years, median disease duration 6.4 ± 4.2 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 rework, 22.1 % 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 difficulty 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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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 hyperglycaemia 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 hyperglycaemia 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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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-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.
Mean blood sugar variability versus HbA1c in monitoring effective glycaemic control

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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/mol(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 (9.7 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 73.89mmol/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 Pharmacologic 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, easy to use, 34 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.


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

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 mmol/l and blood glucose 224 mg/dl. She received IV physiological saline fluid, ondansetron, oral carbohydrates and SC insulin boluses. Hydration 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 threatening 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.

**PO44**

**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**


- Parameters derived from time series analysis (alpha Coefficient of Deterrend 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%

**Objective:** 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 hypoglycaemia 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 unawerness hypoglycemia and severe hypoglycaemia 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 ketoadisis. 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 hypoglycaemia before SUP: 10.2. After SUP < 8% (even longer than 3 months, statistically significant). The previous severe hypoglycemia cases have not presented any hypoglycaemia 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 hypoglycaemia episodes is highly benefical. Therefore, these families should receive some subsidy by health public system.

**PO47**

**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 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 ± 2.8 years; HbA1c 68 ± 8 mmol/mol [8.4 ± 0.9%]; duration of diabetes 8.0 ± 3.4 years; 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
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 increased 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.

**PO48**

**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, Ca²⁺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.
PO49
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 aged 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 significant variable, with an R2 of 0.433. In multivariate linear models, ALT stood out as the significant variable, with an R2 of 0.433. In multivariate linear models, ALT stood out as the significant variable, with an R2 of 0.433.

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.

PO50
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, α = 0.92), 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.

PO51
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 being living with their parents. Patients indicated their depressive symptoms and treatment adherence; treating physicians provided parents’ 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.
PO52
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 to 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 yr; T1DM duration 1 ± 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.
Results: Respect to baseline, at time M3 we found a significantly improved 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 M3 (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 seem to reduce stress and to improve social functioning of parents of children and adolescents with T1DM.

PO53
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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Objectives: 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 26 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 health-care 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 provided 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.

PO54
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 α = .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 α = .95. The one-factor solution accounted for 47% of the variance. Scores from the RCT significantly correlated with parent r = .65 and teen r = .56 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**

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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 functioning 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.
Activity of matrix metalloproteinase in development of experimental diabetes
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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 glycate 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.

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

Conclusion: Temporal dynamics of let-7 g showed an association with residual beta cell function and its involvement in the progression of type 1 diabetes.
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 clinical 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, non-dialyzed ones. Eight identifi

Conclusions: An important lipid mediating 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

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Objectives: Type 1 diabetes (T1D) lacking diabetes-associated auto-antibodies 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 HaloFlex 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 those 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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**Objective:** Immune dysregulation, Poliendocrinopathy, Enteropathy, 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**

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**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 patient. 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 (7.9–14.9) 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, 0.5 units/kg; p < 0.0001). Basal insulin rate was low (6.7, 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, 0.52, 0.57, 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 (ρ = 0.0001) and correlation between HbA1c and TDD (ρ = 0.0002), and basal% (ρ = 0.012). At diagnosis correlation was found between C-peptide and TDD (ρ = 0.011), HbA1c (ρ = 0.093), basal% (ρ = 0.036). There was correlation between C-peptide and TDD (ρ = 0.001) and HbA1c (ρ = 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 each 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.

PO68
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) or 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. DKA occurrence 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.


PO69
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 in other groups(P = 0.021), and serum IGFBP-1 levels were not different in 3 groups(P = 0.653). 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-IR 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-IR and HOMA-IR in NGT. However, in IGT + DM group, they were only correlated with BMI, c-peptide, HOMA-IR and IGFBP-1.

Conclusion: Serum IGF-I and IGF-1/IGFBP-1 ratio were significantly elevated in children with glucose intolerance, and their relationships with c-peptide, HOMA-IR 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.

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<th>No past history of SH/HC</th>
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<td>HC in current yr</td>
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<td>13%</td>
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(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.

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 EIF2AK3 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 glibenclamide 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.
**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 HbA1c 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 HbA1c was observed among individuals with retinopathy than without.

**Conclusion:** Since the HbA1c 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.

**Conclusion:** 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. 61 (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)**

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) 19.3 ± 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 146.8 ± 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.
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 than 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.
PO81
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;5.3] 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 < 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.

PO82
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). Glycemic 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.

PO83
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 TIDM. 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. iPro2® 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 iPro2® 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.

<table>
<thead>
<tr>
<th>[Hypo and hyperglycemia during the study period]</th>
<th>Baseline</th>
<th>3rd month</th>
<th>6th month</th>
<th>12th month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean glucose (mg/dl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no high excursions</td>
<td>165 ± 31</td>
<td>158 ± 25</td>
<td>165 ± 21</td>
<td>164 ± 28</td>
</tr>
<tr>
<td>No low excursions</td>
<td>18 ± 2.1</td>
<td>17 ± 2.1</td>
<td>18 ± 2.9</td>
<td>16 ± 4.2</td>
</tr>
<tr>
<td>AUC hyperglycemia</td>
<td>17.5 ± 4.9</td>
<td>18.7 ± 3.9</td>
<td>17.5 ± 4.9</td>
<td>20.9 ± 21.8</td>
</tr>
<tr>
<td>AUC hypoglycemia</td>
<td>0.48 ± 0.03</td>
<td>0.55 ± 0.69</td>
<td>0.67 ± 1.0</td>
<td>0.47 ± 0.64</td>
</tr>
</tbody>
</table>

PO84

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.

Conclusion: 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.

PO85

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

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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.

PO86

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.

PO87

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.

PO88

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. 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 hypoglycaemia 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.
PO89

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

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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 years old (48.4%), 5–9 (35.2%) and 0–4 (16.5%). 54.9% were male. Winter was the season with more diagnoses (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 age of glycemia was 442 mg/dl. 37.3% presented ketoacidosis (DKA). 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%, 14%, (n = 21); IA2 positivity 39%, 11%, 22%, (n = 34); C-peptide < 1.0 mg/mL 93%, 26%, 14%, (n = 94); HLA-DRB1 population frequencies varied significantly among countries as did locus-level DRB1-T1D association: Azerbaijan (p < 10−16), Bangladesh (p = 0.03), Mali (p = 0.02), Pakistan (p < 10−16); 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 find 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.

PO90

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

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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%, 14%, (n = 74 analysed) 59%; IA2 positivity 39%, 11%, 22%, (n = 83) 16%; C-peptide < 1.0 mg/mL 93%, 26%, 14%, (n = 94) 13%. HLA-DRB1 population frequencies varied significantly among countries as did locus-level DRB1-T1D association: Azerbaijan (p < 10−16), Bangladesh (p = 0.03), Mali (p = 0.02), Pakistan (p < 10−16); 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 find 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.

PO91

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 ≥ 97th 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 > 95th percentile for age, sex, height. MUO were defined as having at least one of these risk factors. Fitness was measured by VO2peak. PA and sedentary behavior (SBa) 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 0–30 min) and 120 minutes (AUC I/G 0–120 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).

Poster Tour 12: Diabetes Epidemiology
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, SBV_w 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 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 old (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 (p<0.05) 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 > 0.05). The majority of children were ≤5 years old, and the 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 adolescents 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 U/kg/day and HbA1c < 7.5%) was obtained in 21 children (17.9% 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. Ketoadosis 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 36%, 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 age 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 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 by 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, June 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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Objectives: 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.

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 349 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
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.V683L 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.V683L and p.T944R substitutions in two patients. The p.V683L and p.T944R substitutions were absent or extremely rare in patients with type 1 diabetes. The functional consequences of identified mutations were analyzed by in silico methods. 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.
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

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 peptide. 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 GADA titer and female. It was 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 channel 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.
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 μcU/mL and 0.3
mg/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 HbA1c
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, ZNT2) and HLA D3
and D4 antigens were all negative and an IVGTT showed a FPIR of
47 μcU/mL (1st centile). NGS identified two variant of the HNF1α
gene: 79A > C (p.Ile27Leu) reported as associated with insulin resist-
ance. and G1720A > G (pSer574Gly) associated with increased risk
of type 2 diabetes. At the age of 8 year the girl developed over dia-
abetes (HbA1 of 8.4%, CGM reported a BG value (mean ± SD)
of 152 ± 40 mg/dl and a maximum glycemic value of 311 mg/dl). On
the basis of the genetic results we started treatment with metfor-
m (initial dose: 250 mg OD, the basis of the genetic results we started treatment with metfor-
m (initial dose: 250 mg OD, final dose: 500 mg BID) with a pro-
gressive 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 axillary achenosis, 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 glycemia 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, lepirt-2 mg/ul, insulin-105.1 mcU/mL. On the back-
ground 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-resis-
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 are 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 dom-
inant mutation in this gene, which leads to the development of a gen-
erealized 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 therape-
autic 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 Cau-
casian 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 Sao 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 insu-
lin (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 + 12), −0.534 ± 1.3 (T + 6), −0.547 ± 1.3 (T + 12).
Between T-12 and T0, there was a zBMI reduction of −0.172
(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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Objective: The Wolfram-like syndrome is a rare autosomal recessive
syndrome characterized by diabetes mellitus, optic atrophy and
nephropathy. The association of diabetes and optic neuropathy is
very rare. The aim of this study was to report a case of a child with
Wolfram-like syndrome.

Case report: A. is a boy, 10 years old, referred to the Department of
Pediatrics with clinical signs of visual impairment and diabetes
mellitus type 1. He was born at term by vaginal delivery at 39 weeks
of gestation after an uneventful pregnancy. Birth weight: 3300 g,
length: 54 cm, and head circumference: 34 cm. At the age of 2 years
he was diagnosed with diabetes mellitus type 1 and treated with
insulin. At the age of 9 his diagnosis of optic atrophy was made
based on visual acuity of 0.04 and visual field defects. The patient
was given the diagnosis of Wolfram-like syndrome. The patient is
now under conservative treatment with vitamins and hormonal
substitutions.

Conclusion: The case of a child with Wolfram-like syndrome
reported here highlights the importance of an early diagnosis of
this rare genetic disease and the need for multidisciplinary ad-
dress to achieve a better management of this condition.

Research design and Methods: This is a case report of a child
with Wolfram-like syndrome who was referred to the Department of
Pediatrics due to visual impairment and diabetes mellitus type 1.

Results: The patient was diagnosed with diabetes mellitus type 1
at the age of 2 years and treated with insulin. At the age of 9 his
diagnosis of optic atrophy was made based on visual acuity of
0.04 and visual field defects. The patient was given the diagnosis
of Wolfram-like syndrome. The patient is now under conservative
management with vitamins and hormonal substitutions.

Conclusions: The case of a child with Wolfram-like syndrome
reported here highlights the importance of an early diagnosis of
this rare genetic disease and the need for multidisciplinary ad-
dress to achieve a better management of this condition.
Background: The Wolfram-like syndrome-WFSL is rare autosomal dominant disease characterised by triad: congenital goitre, 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 ear drum; missing os incus. He was under observation from infant age for severe psycho-motor retardation. From the age of 2.5 years treated for hypothyrosis. 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 WFSL1 gene. No mutations were proved in the biological parents.

Conclusions: The mutation (p.(Glu809Lys)) in WFSL1 gene is associated with occurrence of the Wolfram-like syndrome-WFSL.
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 develops 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 consisting 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±14.37) compared to fathers (mean NKS score: 58.57±16.90) and patients (mean NKS score: 52.85±16.97). A significant inverse correlation was recorded between HbA1c levels and “Carbohydrate counting” domain score (r = -0.275, P = 0.016), whereas “Healthy 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:** 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, HbA1c, LBGI and HBGI. For each patient was 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%) (R² = 0.194; p < 0.0002). FM% was directly correlated with SDS-DBP (R² = 0.082; p < 0.01) while BMI was directly correlated with the SDS-SBP (R² = 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 (15.5); 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 overweight. 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 modeling 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 9.3%, 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.
[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 ± 0.07 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.
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 cost-low, 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.

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 (HbA1c, 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.

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 (HbA1c, 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.
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 (586) = −.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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Objective: 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: 76 (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 = 0.194, 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.
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 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 from the responses following 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.

Results: The Parent Crowd submitted a mean of 115 responses to the 19 questions; 88 parents answered every question and 52 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%. It is known about the prevalence among adolescents with diabetes.

Methods: A literature search was done. Only 17 articles were useful. 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 illicit drug use as a possible cause of diabetic ketoacidosis and test urine on drugs.
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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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/m²) received 4 NG treatments (trts) ≥1 wk apart. 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 to 221 mg/dL, median Tmax: 0.17, 0.33, 0.50 and 0.33 hrs; PD parameters of change from BL for glucagon were: mean area under the curve 0-3 hr: 2471, 4097, 4639 and 3611 hr.pg/mL, respectively. Baseline (BL) blood glucose range was 40 to 221 mg/dL, median Tmax: 0.17, 0.33, 0.50 and 0.33 hrs; PD parameters of change from BL for glucagon were: mean area under the curve 0-3 hr: 2471, 4097, 4639 and 3611 hr.pg/mL, respectively.

Conclusions: Although repeat dosing resulted in greater systemic glucagon exposure, it did not result in a meaningful increase in 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.

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: To evaluate the effectiveness of NG as a treatment for hypo episodes in children and adolescents with T1D.

Methods: NG was administered by CGs in 31 children and adolescents with T1D (aged 4 to 18 yrs) who experienced ≥2 and ≤10 hypoglycemic episodes/month in the home or school setting. CGs were taught how to administer NG in ≤30 seconds; in all cases administration took <2 minutes. CGs were satisfied with NG after most episodes (91%).

Conclusions: NG is an effective and safe treatment for hypo episodes in 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 glucagon.
P132 Check it! Positive psychology intervention improve quality of life and adherence in adolescents with type 1 diabetes

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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 (n = 60) or positive affect (PA) intervention (n = 60). Blood glucose 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 underestimated BG (hyper deviations > hypo 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 underestimated 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.

P133 Development 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.
P137
Improved diabetes management in Swedish schools: results from two national surveys
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2Rykhov Hospital, Department of Pediatrics, Jönköping, Sweden,
3Institution of Clinical Sciences, Sahlgrenska Academy and the Queen Silvia Children’s Hospital, Sahlgrenska University Hospital, Gothenburg, Sweden

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 participate. 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 T1D 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.

<table>
<thead>
<tr>
<th></th>
<th>TD1 (years)</th>
<th>Control (years)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital Tanner stage 2</td>
<td>10.3 ± 1.0</td>
<td>11.1 ± 1.0</td>
<td>0.003</td>
</tr>
<tr>
<td>Genital Tanner stage 5</td>
<td>15.6 ± 1.1</td>
<td>16.8 ± 1.2</td>
<td>0.002</td>
</tr>
<tr>
<td>Testicular volume 4–9 ml</td>
<td>9.6 ± 0.9</td>
<td>10.1 ± 1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Testicular volume ≥20 ml</td>
<td>14.0 ± 1.1</td>
<td>14.7 ± 1.2</td>
<td>0.056</td>
</tr>
</tbody>
</table>

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: 52.2%; 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 had a significantly lower HbA1c (7.4% ± 0.1) compared to T1DM-nonASD (7.6% ± 0.1; p-value =0.04).
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 pediatric 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 Mediterranean Diet (MD) model, on the glycemic control of children and adolescents with type 1 diabetes mellitus (T1DM).

Methods: The study took place during 2014–2015 in a summer camp in Northern Greece. Children and adolescents with T1D 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).

<table>
<thead>
<tr>
<th>BGmean(mg/dl)</th>
<th>BGmin(mg/dl)</th>
<th>BGmax(mg/dl)</th>
<th>HbA1c(%)</th>
<th>Episodes of Hypoglycemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before vs After</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Year</td>
<td>373</td>
<td>348</td>
<td>348</td>
<td>7.8</td>
</tr>
<tr>
<td>2nd Year</td>
<td>352</td>
<td>333</td>
<td>333</td>
<td>7.2</td>
</tr>
</tbody>
</table>

[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 filled 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 ± 0.8 yrs, mean diabetes duration 8.5 ± 4.5 yrs, mean HbA1c 9.5 ± 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 through 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 ± 4.1 years, mean diabetes duration of 8.5 ± 4.0 years and mean age at diabetes onset of 7.6 ± 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 = 0.001). 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.
P145
Evaluation of a novel method to detect residual β-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 β 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 MMTTs, weekly DBS C-peptide measurements before and after a standard breakfast were collected at home.

Results: DBS and plasma C-peptide levels correlated well (r = 0.88; 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 248–29 home DBS measurements, fasting and postprandial 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 3powering 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
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. When Gla-100 was combined with meal-time insulin lispro, HbA1c and FPG appeared lower vs those on NPH insulin.

### 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.

### Data from the P148 poster

#### 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)


**Objectives:** To explore the experiences of young people with Type 1 diabetes (T1D) on transition from pediatric to adult health services.

**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. 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.

<table>
<thead>
<tr>
<th>Event Rate (.events/pers-year)</th>
<th>Overall</th>
<th>Meal-time Insulin $$$lispro</th>
<th>Meal-time human insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>38.6 (17.7-76.8)</td>
<td>38.4 (17.7, 77.1) NS</td>
<td>42.2 (19.5, 76.8)</td>
</tr>
<tr>
<td>Diabetes duration (years)</td>
<td>14.1 (0.7, 61.0)</td>
<td>14.0 (0.2, 50.0) NS</td>
<td>18.5 (2.2, 55.0)</td>
</tr>
<tr>
<td>HbA1c baseline (%)</td>
<td>7.91 (1.19)</td>
<td>8.00 (1.24) NS</td>
<td>9.18 (1.05)</td>
</tr>
<tr>
<td>HbA1c, 28 weeks (%)</td>
<td>7.80 (0.03)</td>
<td>7.82 (0.03) NS</td>
<td>8.47 (0.13)</td>
</tr>
<tr>
<td>HbA1c change (%)</td>
<td>-0.16 (0.03)</td>
<td>-0.14 (0.03) NS</td>
<td>-1.01 (0.13)</td>
</tr>
<tr>
<td>FPG, baseline (mg/dL)</td>
<td>215 (91)</td>
<td>211 (94) NS</td>
<td>243 (92)</td>
</tr>
<tr>
<td>FPG, 28 weeks (mg/dL)</td>
<td>177 (3)</td>
<td>192 (3) 0.0003</td>
<td>159 (11)</td>
</tr>
<tr>
<td>FPG change (mg/dL)</td>
<td>-36 (3)</td>
<td>-21 (3) 0.0003</td>
<td>-72 (11)</td>
</tr>
</tbody>
</table>

**Confirmed hypoglycemia (PG <70 mg/dL):**

| Total (events/pers-year) | 37.3 (1.7) | 38.6 (1.8) NS | 59.4 (6.2) | 60.3 (6.6) NS |
| Nocturnal (events/pers-year) | 6.5 (0.4) | 8.0 (0.5) 0.006 | 10.7 (1.7) | 11.5 (1.8) NS |
| Total severe (events/pers-year) | 0.7 (0.1) | 0.9 (0.2) NS | 2.2 (0.6) | 2.7 (0.8) NS |
| Nocturnal severe (events/pers-year) | 0.19 (0.04) | 0.33 (0.06) 0.048 | 0.38 (0.16) | 1.12 (0.33) 0.03 |
| Body weight, week 28 (kg)   | 72.3 (0.1) | 72.3 (0.1) NS | 77.9 (0.4) | 78.1 (0.4) NS |
| Body weight change (kg)     | 0.8 (0.1) | 0.8 (0.1) NS | 2.1 (0.4) | 2.3 (0.4) 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 |
| 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 |

**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.**
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 HbA1c 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.

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.

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 throughout 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, HbA1c, 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) in those 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 socioeconomic disadvantage(55% 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 HbA1c. (Table). 3 years post-diagnosis, a greater proportion of children with T2D had microalbuminuria, and higher mean cholesterol and triglycerides levels (Table).

![Table: AT DIAGNOSIS](image)

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
Mean albuminuria 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)
B. Rami-Merhar1, S. Hofer2, E. Fröhlich-Reiterer3, M. Fritsch1, T. Waldhör4, and the Austrian Diabetes Incidence Study Group
1Medical University of Vienna, Department of Pediatric and Adolescent Medicine, Vienna, Austria, 2Medical University of Innsbruck, Department of Pediatric and Adolescent Medicine, Innsbruck, Austria, 3Medical University of Graz, Department of Pediatric and Adolescent Medicine, Graz, Austria, 4Medical University of Vienna, Department of Epidemiology, Center for Public Health, Vienna, Austria

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 chil-

dren 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 IAA 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 IAA 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 (23%) 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 (88.7%) 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 different 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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3BC Ministry of Health, Victoria, Canada.

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 rate [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 a period of 5 years of observation with the highest rise in subjects aged 10–14 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).

P158 Epidemiology and characterization of type 1 diabetes in children in Gran Canaria
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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 was 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 (ICDRN) 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 of T1D in communities in the NRWIMD quintile Q2, Q3, Q4 and Q5 (most deprived) versus NRWIMD quintile Q1 (least deprived) were 0.98 (0.98; 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.
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 (Mage = 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. HbA1c 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 HbA1c.
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 = 0.215, 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 = 1.98). 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. Furthermore, 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 ± 1.7 years. Mean duration of DM 3.12 ± 2.4 years 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.
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 BSEP (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 12.5% (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 pathophysiological 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.
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 (Group B). Symptoms were subdivided into three 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/m², B: 18.65 ± 3.32 kg/m², p = 0.041) and severe symptoms (p = 0.013) compared to slow progression group (Group B). Group A also showed significantly higher 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 ± 0.18 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 (γ = 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 group 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 group 1 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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None Declared.
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[3.0-3.5], 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.

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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.

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.
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 impairment was present in 85% patients (median age of onset 13.2 years). 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 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), respectively.

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 ketoemia, 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)

<table>
<thead>
<tr>
<th>Glucose Tolerance</th>
<th>Normal</th>
<th>Indeterminate</th>
<th>Impaired</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTD (n = 20)</td>
<td>11 (73%)</td>
<td>6 (37%)</td>
<td>2 (22%)</td>
</tr>
<tr>
<td>CFDR</td>
<td>1 (33%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)*</td>
<td>10.1</td>
<td>11.1</td>
<td>11.5</td>
</tr>
<tr>
<td>FEV1 (% predicted)*</td>
<td>79.4</td>
<td>74.5</td>
<td>77.1</td>
</tr>
<tr>
<td>BMI (sds)*</td>
<td>-0.26</td>
<td>-0.76</td>
<td>-0.35</td>
</tr>
<tr>
<td>Difference in peak and trough (mmol/L)*</td>
<td>5.3</td>
<td>9.2</td>
<td>6.1</td>
</tr>
</tbody>
</table>

[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 across continents. The recommended age at start of diabetes screening is 12 years as per CF trust (UK) and 10 years as per ISPAD guidelines.

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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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, macrogenitosomia 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 macrogenenitosis.

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

Results: Case 1 presented prolonged fasting hypoglycemia (minimum 3 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, GGC (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 hyperimmunoglobulin 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 insulin. 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 describing the 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.
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 patients 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]. 6 adult [median age 43±18 yrs]). 4 Glargine/2 Detemir). Compared to other long-acting analogues, IDeg showed non-inferiority for HbA1c reduction (mean difference [MD]=0.05% [95% CI-0.20, 0.12%] vs NS) but superiority for reductions in FPG (MD=-0.82 mmol/L [-1.42, -0.21%] p<0.008). There were no differences in combined RR: 0.87 [0.62, 1.20] or severe hypoglycaemia rate [RR: 0.87 [0.53, 1.44]] vs NS), whereas IDeg was associated with greater reductions in nocturnal hypoglycaemia (RR: -0.61 [-0.47, -0.80] p=0.0003). Basal insulin (MD=-0.06 U/kg [-0.06, -0.05] < 0.0001) and bolus insulin dose (MD=-0.01 U/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], vs 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 hypoglycaemia 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 hypoglycaemia respect to glargine (IGlar). To date studies on children’s 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 meal-time 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 (HbA1C) 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 HbA1C level of 9.5 ± 1.5%) - ketosis, group 2 (n = 36, average age 19.6 ± 4.1, average HbA1C 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 CSI 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 CSI 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, CSI may be more effective in cases of more significant metabolic disorders.
P188
Dapaglirozin, 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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Dapaglirozin, 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 Dapaglirozin on body weight in 3 overweight female adolescents with T1D, acne, hypertrichosis and normal androgen levels. Dapaglirozin (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.

<table>
<thead>
<tr>
<th>Time (month)</th>
<th>Weight (kg)</th>
<th>BMI (kg/m2)</th>
<th>BMI (SDS)</th>
<th>HbA1c (%)</th>
<th>Insulin (U/day)</th>
<th>Glucose (mg/Dl)</th>
<th>Glucose (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>66.7</td>
<td>25.2</td>
<td>1.42</td>
<td>8.1</td>
<td>58</td>
<td>191</td>
<td>92</td>
</tr>
<tr>
<td>6</td>
<td>60.4</td>
<td>22.7</td>
<td>0.75</td>
<td>8.1</td>
<td>36</td>
<td>175</td>
<td>85</td>
</tr>
<tr>
<td>12</td>
<td>64.2</td>
<td>24.2</td>
<td>0.9</td>
<td>8.1</td>
<td>51</td>
<td>177</td>
<td>74</td>
</tr>
</tbody>
</table>

[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 Dapaglirozin, one girl who had showed a progressive reduction of Hba1c (8.3% to 7.5%) and IMC SDS (0.05 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 Dapaglirozin 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.

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; NN401-3816 [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 (250 mg/dL).

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).

<table>
<thead>
<tr>
<th>Trial arm (n)</th>
<th>Number of episodes per PYE</th>
<th>Hyperglycemia[^]</th>
<th>Episodes of ketones &gt;0.6 mmol/L</th>
<th>Episodes of ketones &gt;1.5 mmol/L</th>
<th>Episodes of ketones &gt;3.0 mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 1 I Deg + I Asp (n = 174)</td>
<td></td>
<td>364.3</td>
<td>3.46</td>
<td>0.51</td>
<td>0.02</td>
</tr>
<tr>
<td>(26 weeks) I Deg + I Asp (n = 175)</td>
<td></td>
<td>368.3</td>
<td>6.90</td>
<td>1.02</td>
<td>0.19</td>
</tr>
<tr>
<td>Rate ratio (95% CI) for I Deg vs I Det (FAS)</td>
<td></td>
<td>0.99 (0.84; 1.15)</td>
<td>NA</td>
<td>0.36 (0.17; 0.76)</td>
<td>NA</td>
</tr>
<tr>
<td>Study 2 I DegAsp + I Asp (n = 181)</td>
<td></td>
<td>10.94</td>
<td>0.37</td>
<td>0.11</td>
<td>0.04</td>
</tr>
<tr>
<td>(16 weeks) I Deg + I Asp (n = 179)</td>
<td></td>
<td>8.33</td>
<td>0.76</td>
<td>0.24</td>
<td>0.07</td>
</tr>
<tr>
<td>Rate ratio (95% CI) for I DegAsp vs I Det (FAS)</td>
<td></td>
<td>1.08 (0.64; 1.81)</td>
<td>NA</td>
<td>0.44 (0.11; 1.74)</td>
<td>NA</td>
</tr>
</tbody>
</table>

[^]: P < 0.05. Hyperglycemia: episodes 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; I Deg, insulin degludec; I DegAsp, insulin degludec/insulin aspart; I Det, 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.

**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 statistically 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.

**Table**

<table>
<thead>
<tr>
<th>HbA1c basal and after switch [n(%); ΔHbA1c]</th>
<th>% of hypoglycemic events [%BG &lt; 60 mg/dl]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basal</td>
</tr>
<tr>
<td>Improved</td>
<td>Unchanged</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Group A</td>
<td>16(55); 0.4(0.5)</td>
</tr>
<tr>
<td>Group B</td>
<td>9(31); 0.4(0.6)</td>
</tr>
<tr>
<td>p</td>
<td>NS</td>
</tr>
</tbody>
</table>

**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/m²) (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: 0.438, 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.
P193
Gambling with their health: a pilot study examining risks that adolescents take with their diabetes management
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1Baylor College of Medicine and Texas Children’s Hospital, Psychology, Houston, United States

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.

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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1Joslin Diabetes Center, Boston, United States, 2Baylor College of Medicine, Houston, United States, 3Jaeb Center for Health Research, Tampa, United States, 4Indiana University School of Medicine, Indianapolis, United States, 5Yale School of Medicine, New Haven, United States

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.
P197
Identity formation in youth with type 1 diabetes
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1KU Leuven, Leuven, Belgium, 2University of Leuven, Leuven, Belgium, 3Ghent University, Ghent, Belgium

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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1University Hospital Leuven, Leuven, Belgium, 2University of Leuven, Leuven, Belgium

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.

Characteristics of Study Participants

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>98</td>
<td>77</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>14.00 (9.0-18.0)</td>
<td>14.00 (9.0-18.0)</td>
<td>14.00 (9.0-18.0)</td>
<td>0.411</td>
</tr>
<tr>
<td>HbA1c(%)</td>
<td>8.15 (5.5-15.0)</td>
<td>8.15 (5.9-13.3)</td>
<td>8.15 (5.5-15.0)</td>
<td>0.303</td>
</tr>
<tr>
<td>Diabetes duration(month)</td>
<td>71 (12-188)</td>
<td>60 (12-210)</td>
<td>76 (12-210)</td>
<td>0.247</td>
</tr>
<tr>
<td>DEPS-R score</td>
<td>11.50 (0-55)</td>
<td>11.00 (0-55)</td>
<td>11.00 (0-55)</td>
<td>0.263</td>
</tr>
<tr>
<td>BMI-SDS</td>
<td>0.16 ± 1.27*</td>
<td>-0.11 ± 1.24*</td>
<td>0.04 ± 1.26*</td>
<td>0.140</td>
</tr>
<tr>
<td>BMI-SDS Insulin pump therapy, %</td>
<td>25.5</td>
<td>33.8</td>
<td>29</td>
<td>0.233</td>
</tr>
</tbody>
</table>

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: Short 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
N. Chang

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.
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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Introduction: 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 are at 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 ( \( pH \leq 7.3 \) ) 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 ( \( \leq 19 \) 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.
Three pilot centers between 2016 and 2017. A training program for health care professionals and patient education tools will be implemented. Conclusion: There is clearly a need to improve staff training, and there is no standardization of diabetes educational program. All have a database, but only 50% of them generate data analysis, only 68% of 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 regimens and education programs. MoH and steering committee have decided to initiate a standardized program for childhood diabetes with the support of Sanoofi. 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 the 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, co-morbidities and self-management issues are addressed.

**Results:** Males (100) and females (118) with mean age of 17.5 years and mean duration of diabetes of 7.2 years 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%.

**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.
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 pro-forma 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 ± 4.6 years and 70% were females (26/37). Mean Prism III score was 9.4 ± 6, mean GCS on presentation was 11 ± 3.8 and mean low pH was 7.00 ± 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

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 glycemic control
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Objective: 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 6.4, mean 7.0) and visit 3 (median 5.9, mean 6.3) (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) (<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 type 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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Objective: 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. Guidelines recommend injecting prandial insulins pre-meal. A quarter of patients with T1D in the pediatric environment regularly inject 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, 22.28) (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 (Gbi), VIE-DIAB, telomedical 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).

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) 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 microvascular 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 microvascular 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 atherosclerotic and a link between diabetic micro- and macroangiopathy.
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 BMISDS > 1.645 (≥ 85th 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.

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 HbA1c 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 (Chi2 = 3.8, p = 0.05) and 40% in the MC group. HT occurred in 45% in whole T1DM, with 75% in MC (Chi2 = 9.7, p = 0.001). Lipid abnormalities were present in 34% of all studied, with 45% in the MC group. HbA1c > 7.5% was present 80% in the whole group, with 90% (Chi2 = 5.3, p = 0.02) in H, and 100% (Chi2 = 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 frequency of additional CVD abnormalities. The group with recognized MC appeared to have the most adverse CVD factor profile.
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 myotonia 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 myasthenia 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 grandparents 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.

P220 Type 1 diabetes and epilepsy: the role of GADA

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Objectives: The aim of this study was to evaluate the prevalence of GADA antibodies (Abs) in a large series of patients with T1D and to evaluate the clinical characteristics of patients with GADA Abs.

Material and Methods: GADA Abs were evaluated in 476 Italian patients with T1D (149 boys, 327 girls) aged 0.2-40.9 years. Data were compared with 200 healthy controls.

Results: The prevalence of GADA Abs was 37.7% in T1D patients versus 0% in controls (P < 0.0001). The prevalence of GADA Abs was significantly higher in girls compared to boys (42.5% vs. 33.2%, P = 0.047). GADA Abs were significantly associated with younger age at diagnosis (P=0.011), lower BMI (P<0.001), higher HbA1c (P<0.001), and lower percentage of subjects with c-peptide levels < 0.5 (P<0.001).

Conclusions: GADA Abs are present in a high proportion of Italian patients with T1D independently of BMI and HbA1c. These findings suggest an association between GADA Abs and clinical characteristics of patients with T1D.
**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/m2), 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 3–17 years 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.

**PROSERO registration:** CRD42015024367

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**P222**

**The importance of liver ultrasound 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 adolescent aged 5–18 years were enrolled 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 ultrasound 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 sub-group of obese children at greater risk of NAFLD.

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**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 serologic (anti-endomysium and anti-transglutaminase)
genetic study (HLA DQ2 and/or DQ8) are positive, thus requiring less intestinal biopsies.

**Methods:** Epidemiologic descriptive study included 730 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 times more frequent (95%) compared to general population.

**Conclusion:** DM type I 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 forearm 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. Pathomechanism 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 localized 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-depedined PP was diagnosed. Brain MRI revealed tumor in hypothalumus 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 polyclinic.

**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 4, 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 family. 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 (-4.25SDS). Systemic examination was unremarkable during admission and her blood sugar was persistently high with HbA1c 14.8%. Skeletal survey findings: both hands had few carpal 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 carpal 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, 316 girls with mean age of 9.5 year ± 4.7 and mean duration of diabetes 3.5 ± 0.3 years. Minsk regions – the situation is changing. The median levels of iodine excretion in children of Brest region reached 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 children of Minsk region - the situation is changing. The median levels of iodine excretion in children of Brest region reached 105.5 μg/L. Iodine is a major component of thyroid hormone. It is essential for the normal development of the thyroid gland. Iodine deficiency can lead to hypothyroidism and goiter. Iodine is also important for the proper functioning of the nervous system.

Results: Anti tissue transglutaminase antibody were positive in total 41 patients, 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 with predominantly light and moderate chronic iodine deficiency. Iodine deficiency can lead to hypothyroidism and goiter. Iodine is also important for the proper functioning of the nervous system.

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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2Brest Regional Endocrine Dispensary, Brest, Belarus
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.

Methods: A total of 660 children with type 1 diabetes attending the National Institute of Child Health; 334 boys, 316 girls with mean age of 9.5 year ± 4.7 and mean duration of diabetes 3.5 ± 0.3 years. Minsk regions – the situation is changing. The median levels of iodine excretion in children of Brest region reached 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 children of Minsk region - the situation is changing. The median levels of iodine excretion in children of Brest region reached 105.5 μg/L. Iodine is a major component of thyroid hormone. It is essential for the normal development of the thyroid gland. Iodine deficiency can lead to hypothyroidism and goiter. Iodine is also important for the proper functioning of the nervous system.

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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

P229
Autoimmune hepatitis in a boy with newly-diagnosed type 1 diabetes
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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, 316 girls with mean age of 9.5 year ± 4.7 and mean duration of diabetes 3.5 ± 0.3 years. Minsk regions – the situation is changing. The median levels of iodine excretion in children of Brest region reached 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 children of Minsk region - the situation is changing. The median levels of iodine excretion in children of Brest region reached 105.5 μg/L. Iodine is a major component of thyroid hormone. It is essential for the normal development of the thyroid gland. Iodine deficiency can lead to hypothyroidism and goiter. Iodine is also important for the proper functioning of the nervous system.

Results: Anti tissue transglutaminase antibody were positive in total 41 patients, 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 with predominantly light and moderate chronic iodine deficiency. Iodine deficiency can lead to hypothyroidism and goiter. Iodine is also important for the proper functioning of the nervous system.

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

P230
Challenges in the diagnosis of hypoglycemia: Hirata disease vs. factitious hypoglycemia
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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.

Methods: A total of 660 children with type 1 diabetes attending the National Institute of Child Health; 334 boys, 316 girls with mean age of 9.5 year ± 4.7 and mean duration of diabetes 3.5 ± 0.3 years. Minsk regions – the situation is changing. The median levels of iodine excretion in children of Brest region reached 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 children of Minsk region - the situation is changing. The median levels of iodine excretion in children of Brest region reached 105.5 μg/L. Iodine is a major component of thyroid hormone. It is essential for the normal development of the thyroid gland. Iodine deficiency can lead to hypothyroidism and goiter. Iodine is also important for the proper functioning of the nervous system.

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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

P231
Belarusian children are impossible to explain only by non optimal iodine status or life style/nutrition habits. A restoration of active endocrine disruptor and metabolic disorders in the aspect of endocrine disruptor influence.
Conclusion: This study demonstrates successful adoption of a standard screening protocol for CD in patients with T1D which includes screening at admission. Future plans include evaluation of the impact of screening for CD at the time of T1D diagnosis to advance evidence-based guidelines.

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, 50 (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.

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 breast 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 Spearman was studied.

Results: The investigation shows the indvidual level of HbAc% was >8% in all girls. Two girls had delayed physical and sex development and breast hypoplasia. The dysplasia of mammary glands (mastopat-hy) 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 erythematos 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 erythema nodosum, lupus panniculitis, granuloma annulare, sarcoidosis and amyloidosis. Necrobiosis lipoidica might also be a primary disease of collagen. Rarely, squamous cell carcinoma may develop in areas of necrobiosis 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, hyperglycemia (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 occurred. 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 exocidosis 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 hypoglycaemia 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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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.

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glyceria (mg/dl)</td>
<td>503 ± 224 (118-1139)</td>
<td>506 ± 179 (193-1025)</td>
</tr>
<tr>
<td>Bicarbonate (mmol/l)</td>
<td>17.4 ± 5.7 (4.5-24.0)</td>
<td>19.4 ± 5.1 (3.3-27.3)</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>9.9 ± 1.2 (7.4-12.2)</td>
<td>12.0 ± 2.0 (8.4-17.0)</td>
</tr>
</tbody>
</table>

P236
HbA1c levels at diagnosis of type 1 diabetes are related to age and to degree of ketoacidosis
G. Massa1, P. Declercq2, R. Zeevaert1
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Patients assessed: 1508 (54.4 % boys). Median (SD) age was 12.3 (4.4) years and duration of diabetes 5.4 (3.9) years. There were 629 (41.7%) children experiencing at least 1 severe event; 357 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 was 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 hypoglycaemia is followed by a progressive increase in hemoglobin A1c among Danish children with type 1 diabetes.
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, glycemia, 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 20.2.

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 glycemia 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 glycemia, 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 (< 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 hyperosmolality.

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 epidemiological 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%), hyperglycaemia (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 stayed 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 hypoglycaemic 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 hyperglycemia 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 cardiorespiratory, 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 hyperosmolar-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, AST: 3759 U/L, cr.:29,5 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.

P242

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 26.6% 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 < 2 years 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 BPSPED 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 diabetic 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

Severe hypertriglyceridemia in the course of ketoacidosis in a patient with newly diagnosed type 1 diabetes mellitus

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Introduction: Mild hypertriglyceridemia is a common complication found in poorly treated diabetes. Prevalence of mild hypertriglyceridemia was found in about 50% patients with diabetic ketoacidosis (DKA). Severe hypertriglyceridemia (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 hypertriglyceridemia.

Case report: A 2-year-old-girl was admitted to the Emergency Department with DKA (pH 7.1, HCO3- 8.8 mmol/l, BE -21.1 mmol/l), glucose level of 556 mg/dl, hyperlipidemia (TG 11470 mg/dl [1131.1 mmol/l]). After recovery from DKA she was discharged from Intensive Care Unit and trasferred to Department of Children Diabetology. At our departmet she was continued an intravenous fluid and an intravenous infusions of insulin. The bresfetfeeding 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. Because of long lasting lip disturbances we decided to determine if diabetic lipeaemia was caused by loss of function mutations in the LPL gene. Genetic test revealed no mutations in genes encoding lipoprotein lipase (LPL).

Conclusions: Diabetic lipeaemia 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. Moreover, severe hypertriglyceridemia 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 (GADA 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, of onset, triglycerides and disease duration. Predictors for GADA status were sex, age of onset, 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. There were 32 calls 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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**Objective:** 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 homogeneous 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.

<table>
<thead>
<tr>
<th>Low HGI</th>
<th>Moderate HGI</th>
<th>High HGI</th>
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<td>Glucose, mg/dl</td>
<td>162 141 164</td>
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</tr>
<tr>
<td>HbA1c, mmol/mol</td>
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<tr>
<td>HbA1c %</td>
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</tbody>
</table>

[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 outpatient 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 (53–130 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/college (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 dietitian (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 preclinic 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 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 discontinuation, while still on prednisone. The diagnosis of dyglycemia 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.

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 years and BMI is appropriate for age and sex. All of children use insulin analogs, 7 (53.8%) are on pump therapy. Mean HbA1c is

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.
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%)", 2 "education of kindergartens staff (100%)", etc.

Conclusion: The study demonstrates lack of support to the urgent needs of the 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 paediatrician (63%) or adult diabetes specialist (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.

<table>
<thead>
<tr>
<th>Onset</th>
<th>Visit 5</th>
<th>Visit 10</th>
<th>Visit 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.5 U/kg/BW</td>
<td>90 ± 25* n = 468</td>
<td>51 ± 10* n = 1185 (33%)</td>
<td>53 ± 11* n = 477 (15%)</td>
</tr>
<tr>
<td>≥0.5 U/kg/BW</td>
<td>56 ± 10* n = 98 (9%)</td>
<td>56 ± 14* n = 2412</td>
<td>58 ± 12* n = 2687</td>
</tr>
<tr>
<td>&lt;0.5 U/kg/BW</td>
<td>12.7 ± 4.9*</td>
<td>10.1 ± 4.3</td>
<td>10.4 ± 4.2</td>
</tr>
<tr>
<td>≥0.5 U/kg/BW</td>
<td>11.9 ± 4.3*</td>
<td>10.4 ± 5.0</td>
<td>10.8 ± 4.2</td>
</tr>
<tr>
<td>&lt;0.5 U/kg/BW</td>
<td>0.5 ± 0.4</td>
<td>1.3 ± 0.9</td>
<td>2.3 ± 0.9</td>
</tr>
<tr>
<td>≥0.5 U/kg/BW</td>
<td>0.8 ± 0.7</td>
<td>1.9 ± 0.8</td>
<td>2.5 ± 0.8</td>
</tr>
<tr>
<td>&lt;0.5 U/kg/BW</td>
<td>−0.27 ± 1.5</td>
<td>0.42 ± 1.1</td>
<td>0.5 ± 1.1</td>
</tr>
<tr>
<td>≥0.5 U/kg/BW</td>
<td>−0.5 ± 1.5</td>
<td>0.52 ± 1.1</td>
<td>0.5 ± 1.1</td>
</tr>
</tbody>
</table>

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). 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-Whitney 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, specialises 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 P’t 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 8.7% 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. Microalbuninuria 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 ± 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 ± 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 ± 5.42 years with mean duration of diabetes of 6.78 ± 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 ± 2.69% which decreased significantly to 9.77 ± 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 almost in 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 mellitus 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), and 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 restitution 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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1Medical University-Sofia, University Children’s Hospital, Clinic of Endocrinology and Diabetes, Sofia, Bulgaria, 2Medical University, University Hospital, Clinic of Pediatric Endocrinology, Varna, Bulgaria, 3Medical University Pleven, University Hospital ‘George Stamsky’, Clinic for Children’s Diseases, Pleven, Bulgaria, 4Medical University, University Hospital “St. Marina”, Clinic of Pediatric Endocrinology, Varna, Bulgaria

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. 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. 2. The survey was conducted in 11 paediatric endocrine practices in Bulgaria. 3. Statistical analysis: SPSS for Windows, Version 16.0. USA, Chi-square test, T test, ANOVA, Pearson correlation coefficient

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%).

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.

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.

<table>
<thead>
<tr>
<th>Centre</th>
<th>BMI SDS</th>
<th>Mean HbA1c</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH</td>
<td>-2.13</td>
<td>-2.02</td>
</tr>
<tr>
<td>UCLH</td>
<td>-2.08</td>
<td>-1.84</td>
</tr>
<tr>
<td>Treatment</td>
<td>CSII</td>
<td>-2.13</td>
</tr>
<tr>
<td></td>
<td>MDI</td>
<td>-0.8-1.5</td>
</tr>
</tbody>
</table>

[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 14.35 ± 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 ± 10.11%. 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 prevention by VNOW fitness device technology
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Objectives: VNOW is an 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 technology 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 to sedentary 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 prevention.

P266
Longitudinal observation of clinical course of type 1 diabetes (T1DM)
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Oncology, Haematology and Diabetology, Lodz, Poland. 3Medical University of Warsaw, Studies in Molecular Medicine, Warsaw, Poland

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 = 0.2301) 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?

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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 hypoglycaemia. 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.

11% 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:

<table>
<thead>
<tr>
<th>Variables</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>16.3±3.6</td>
<td>15.75±6.8</td>
</tr>
<tr>
<td></td>
<td>(11–27)</td>
<td>(4–40)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n [%])</td>
<td>11(41)</td>
<td>23(42)</td>
</tr>
<tr>
<td>Female (n [%])</td>
<td>16(59)</td>
<td>32(58)</td>
</tr>
<tr>
<td>Insulin regimen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Insulin regimen(Honeymoon phase)</td>
<td>0(0)</td>
<td>2(4)</td>
</tr>
<tr>
<td>MDI with NPH insulin (n [%])</td>
<td>1(4)</td>
<td>0(0)</td>
</tr>
<tr>
<td>MDI with rapid-acting insulin analogue (n [%])</td>
<td>26(96)</td>
<td>53(96)</td>
</tr>
<tr>
<td>CSII (n [%])</td>
<td>0(0)</td>
<td></td>
</tr>
</tbody>
</table>

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  | 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  |
| Hypoglycaemia (n [%])   | 18(5.3)    | 7(14.9)    |
| Normoglycaemia (n [%])  | 187(55.2)  | 266(56)    |
| Hyperglycaemia (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.

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 ± 2.8 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 IU/kg/day, and 90.5 % of them had regular BMI. Mean HbA1c was worse (9.1%) in patients with basal rate under 30% of total daily delivered insulin, and there were 29% uncontrolled among them. 16.7% patients had basal rate 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 recommended probably because of higher basal insulin needs in regard 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 an 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 recompounding 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.
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.

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 specialist nurses within the hospital and expressions of greater patient confidence in consultations. Empirical evidence based on almost 30 years 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 2006 and December 2015 were included in the study. A total of 396 subjects were included in the study but revealed significant views point of view of the patients.
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 reason 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 teams. 25% felt the right decision was made and they didn’t regret the decision. The four year old was able to unlock the pump.
Conclusion: Approximately 9% of the total number of patients commenced on insulin infusion discontinuation. 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. Children under 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 2013. 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 Type 1 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 atherosclerosis 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 ± 0.7) years. Their mean duration of diabetes was (6 ± 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
Conclusions: The mean visceral fat was 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 cardiovascular 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 mmol/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 < 0.0001). 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 < 0.0001). Conclusion: 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, immunopathogenic 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 (normalalbuminuric 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 normalalbuminuric 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 occurred 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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**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 mmol/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 = 0.0001) 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.
Objective: Clinically evident diabetic nephropathy (DN) is rarely encountered in childhood, even if early structural and functional subclinical abnormalities are detectable 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 137 young patients with type 1 diabetes diagnosed between 1994 and. Median duration of follow-up was 11.8 years (1st - 3rd 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 retrospectively 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 type 1 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, HbA1C, conventional and tissue Doppler echocardiography). Flow mediated dilatation (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.
multiple (69%). All changes were localized to the insulin injection sites (abdomen was the least often location). In 29 patients, lipodystrophy 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 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).

Lipodystrophy 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 diabetes clinic and 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.

Results: 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%; syndromes criteria: 5.9% had high triglycerides, 5.5% had low HDL, 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 HbA1c (37.4 vs 52.1 mg/dL), had higher triglycerides (168 vs 131 mg/dL) and had higher ALT (49 vs 22 U/L); there was age 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 even heavier child.

Lipoatrophy also grows, increasing the TDI and ending in an overweight and obesity among children.

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 attended at international meetings and 30% won research grants. The ISSP promoted scientific networking (93%). 56% 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 153.88 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 the camp was 0.78 IU/kg, and at the end of the camp 0.60 IU/kg, absolute difference ~0.44. 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 practiced exercise, followed a supervised diet and took specific lessons. This could encourage patients and professionals to take part into diabetes camps.

P292
Trial of diabetes education for staff of Japanese schools with a low incidence of type 1 diabetes
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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 MSS 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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P294
Diabetes care at your doorstep - DAUD: an educative support
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Objectives: 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 detailed 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. RSDSI. 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
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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 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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Objectives: 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 4.4/105 in children aged 0–16 years. The next data (1998–2003) showed the growing trend with incidence rate around 11.2/105 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.

Results: The demographic date was obtained from the Statistical Office in Poznan. The onset age of type 1 diabetes in Polish children from 2008 to 2014 was 9.0 ± 4.4 years. The trend for increased incidence of T1DM has been observed in children aged 0–14 (2008: 15.6/105, 95% CI: 8.6-22.4; 2014: 22.9/105, 95% CI: 17.9-27.9). The highest annual incidence was reported among those aged 5–9 years (2008–2012: 28.8/105, 95% CI: 15.6-30.0; 2014–2018: 24.1/105, 95% CI: 21.1-36.2) The fastest incidence increase was found in the youngest age group (2008–2014: 12.3/105, 95% CI: 3.2-11.0; 2013–2017: 17.4/105, 95% CI: 11.5-22.2; 2014–2018: 13.9/105, 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.

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, ET5 and DGKG genes polymorphisms on diabetes type 1 remain unclear.

Objective and hypotheses: To identify the association between polymorphisms of IL2RA, SFRS10, ET5 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, ET5 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, 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 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.
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 occurred 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 autoreactivities 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% 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 (20/141 (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 Correlation among whole genome methylation status and line-1 expression in various age group 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 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 D3 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 diabetes children 21 were presented with severe diabetic ketoacidosis. 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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Objective: 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.
One hundred and fifteen patients were included from which 83 boys. Median age was 17 years. Low mother educational level, being orphan, living far from the clinic appeared to be the most relevant risk factor for poor glycemic control.

Conclusion: Poor glycemic 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 PREDIAM research 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], dia- betes duration 10.6y [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.

Discussion: The results confirm the safety 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.

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 glycemic control, patient satisfaction to enable patient empowerment and better home management of diabetes. The impact of the practice on acute glycemic 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 compli- ance in the study period. There were no admissions with acute com- plications 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 arm.

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 (CTR) [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 glycemic control depends on users behaviour

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Background: Sensor-augmented insulin pump (SAP) with MiniMed™670G 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 time in range and 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; HbA1c:7.5 ± 0.6%;BMI:19.2 ± 2.5 kg/m2) took part of whom 18 followed strictly the protocol.3.15 patients had premature removal. Two patients had suspension 

Conclusions: 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 of]
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 7-day recall period. Blood was assayed for glycemic control (A1c; %) 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 ± 0.9%, 70% pump Rx, BG monitoring 5.7 ± 2.4 X/d. Median PA was 95 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 = .0002), 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 hrs/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.

<table>
<thead>
<tr>
<th>PA 0–5 days/week (n = 70)</th>
<th>PA 6–7 days/week (n = 66)</th>
<th>P value</th>
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<tr>
<td>zBMI</td>
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<tr>
<td>0.8 ± 0.7</td>
<td>0.5 ± 0.9</td>
<td>0.05</td>
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<td>Fat mass (%)</td>
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<td>&lt;0.0001</td>
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<tr>
<td>30</td>
<td>25</td>
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<td>U/kg/day</td>
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<tr>
<td>1.0 ± 0.3</td>
<td>0.9 ± 0.2</td>
<td>0.03</td>
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<tr>
<td>A1c (%)</td>
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<tr>
<td>8.1 ± 0.9</td>
<td>8.1 ± 1.2</td>
<td>0.7</td>
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<tr>
<td>1.5-AG (μg/mL)</td>
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<tr>
<td>2.9 ± 1.8</td>
<td>3.7 ± 2.1</td>
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<tr>
<td>Total cholesterol (mg/dL)</td>
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<tr>
<td>169 ± 31</td>
<td>162 ± 24</td>
<td>0.19</td>
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<td>Triglycerides (mg/dL)</td>
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<td>118 ± 61</td>
<td>103 ± 50</td>
<td>0.09</td>
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<tr>
<td>HDL / LDL (mg/dL)</td>
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<tr>
<td>54 ± 13 / 91 ± 26</td>
<td>59 ± 14 / 81 ± 21</td>
<td>0.04 / 0.04</td>
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<tr>
<td>BP (SBP / DBP) (mmHg)</td>
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<tr>
<td>110 ± 7 / 67 ± 5</td>
<td>108 ± 7 / 66 ± 6</td>
<td>0.07 / 0.3</td>
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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 normal 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 ≥91st 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).

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 hyperglycaemia infants and children.

Subjects and Methods: Subjects were in-patients with hyperglycaemia, age of onset before 1 year-old, or insulin antibody negative and with family history of diabetes. Gene sequencing for ABC8, KCNJ11, INS and GCK were performed and potential mutations were analyzed. The patients with ABC8 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 ABC8 gene and KCNJ11 gene (11/21). The patients with KCNJ11 or ABC8 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 ABC8 or KCNJ11 gene mutation were treated with sulfonylurea and 9 patients reached euglycaemia.

Conclusions: Mutations in potassium channel related genes (KCNJ11 and ABC8) were the most common cause of neonatal diabetes in Chinese. Sulfonylurea therapy was effective and euglycaemia were reached in most of the patients with the mutations in KCNJ11 and ABC8. Patients who were diagnosed hyperglycaemia 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.
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 PND cases caused by novel homozygous missense mutation in the GCK gene in two families with MODY2. Coexistence of PND, parental consanguinity and a family history of diabetes mellitus, 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.

Conclusion: We report two PND cases caused by novel homozygous missense mutation in the GCK gene in two families with MODY2. Coexistence of PND, parental consanguinity and a family history of diabetes, 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. Insulin dependent 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 lamotrigine 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, MTAP16, MTCOX3, MTND3, MTND4 iMTNDS. 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 lipodystrophy 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 poly(poly)dysaccharid 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 lipodystrophy.

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 lipodystrophy. Futher management includes a particular diet (medium chain polysaturated fatty acid) and a careful 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 precise 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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Sulfonylurea therapy was performed in three patients with neonatal diabetes mellitus. The presence of unusual racial or specific clinical features with SNS suggests the diagnosis of genetic abnormalities, and particularly mutations of the ABCC8 channel gene. Three patients with congenital diabetes mellitus of the severe form with features of SNS and diagnosis of Mutations in the ABCC8 gene confirmed the proposal.
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 cases. It concerns, 6q24 abnormalities, activating mutations in KATP channel subunits (KCNJ11 or ABCC8 genes) and less frequently in INS. Several reports demonstrated that the effect of gain mutations affecting KATP 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 lipatrophy -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 lipatrophy, hypertrichosis, enlarged soft lymph nodes on the posterior neck, umbilical herna. 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 Lirapin 200 mg, Pgiolutazine 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 UI, ALAT 197 UI) and no menarche. Recently Pgiolutazine was added to the therapy.

Conclusion: We present lipatrophy insulin resistant diabetes with therapeutic issues. The prognosis of both girls is obscure. Reombinant 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 insulincemic curve in OGTT, HbA1c, and AUC for glicemia and insulinaemia. 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 insulincemic 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 < 0.0003, after 60' - 230.84 +/- 192.5 vs 129.54 +/- 85.3 IU/ml p < 0.03, after 90' - 286.56 +/- 289.92 vs 118.28 +/- 670.1 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 insulincemic 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 continuous 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 continuous 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.
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.

**P324**

**Sodium pyruvate treatment improved endogenous insulin secretion in a patient with mitochondrial diabetes**

T. Ayabe1, T. Inoue2, Y. Oto2, N. Murakami2, Y. Koga3, R. Sakuta2

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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/dl after 1 day and to 30.2 μg/dl 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.

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**Table: Patient Characteristics**

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<th>Gestational age (Weeks + days)</th>
<th>Sex</th>
<th>Birth Weight (gram)</th>
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<th>Age at start of insulin secretion (days)</th>
<th>Age at start of insulin pump (days)</th>
<th>Age at termination of insulin (weeks)</th>
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</table>

*Note: TDD* is the total daily dose of insulin administered.*

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**P325**

**The importance of awaring monogenic diabetes in Chinese pediatric population - a case series**

L.K. Lee1,2, W.C. Wong2,3, H.C. Yau1,2, W.Y. Tsang1,2, Y.P.L. Yuen4,5, W.K.G. Wong1,2

1Prince of Wales Hospital, Pediatrics, Hong Kong, Hong Kong, China, 2Chinese University of Hong Kong, Pediatrics, Hong Kong, Hong Kong, China, 3Alice Ho Miu Ling Nethersole Hospital, Pediatrics, Hong Kong, Hong Kong, China, 4Prince of Wales Hospital, Chemical Pathology, Hong Kong, Hong Kong, China, 5Chinese University of Hong Kong, Chemical Pathology, Hong Kong, Hong Kong, China

**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, and 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 G to A mutation 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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2University Children’s Hospital, Skopje, Macedonia, the Republic of, 22nd
Discussion:
Worldwide there is an increasing prevalence of youth diabetes (T2D) with a normal fasting glucose ranging between 90-140 mg/dL. 

Case report:
A 2.5 year old lean boy (BMI = 16.8 kg/m²) 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.

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 glycaemia particularly in the afternoon and some overnight hyperglycemia. Insulin antibodies (GAD, IA, ICA and IAA2) were negative. DNA analysis of GCK gene tested by PCR and direct sequencing confirmed heterozygosity for c.45 + 1G > A in the intron 1. The father of the boy reported higher glycaemia 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 hyperglycaemia due to inappropriate glucose sensing by the beta cells. Usually no therapy is needed since the unfavorable progression of the hyperglycaemia 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 glycaemia excursions.

P327
Novel glucokinase mutation in a boy with MODY 2 followed by continuous glucose monitoring
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1Children’s Hospital ‘Auf der Bult’, Diabetes-Center for Children and Adolescents, Hannover, Germany, 2Alicedis GmbH, Gliess, Germany
2Astra Zeneca GmbH, Wedel, Germany

Objective:
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 relation 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]18.6 [16–20] 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 β-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.

Conclusion:
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.

P328
Dapagliflozin lowers insulin requirement by increasing urinary glucose excretion effectively in adolescents and young adults with type 1 diabetes
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2Department of Endocrinology, University Hospital Leipzig, Leipzig, Germany
3Clinic Network Metformin RCT Study Group

Background:
MODY encloses a group of disorders caused by autosomal dominant mutations in genes linked to pancreatic β-cell function. Usually it presents as a non-ketotic hyperglycaemia, in patients under 25y that miss both T1D and T2D features.

Methods:
A 15y Caucasian girl, admitted for non-ketotic hyperglycaemia, in patients under 25y that miss both T1D and T2D features. 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 wk4; in parallel, insulin was progressively withdrawn and stopped on wk5. During the first month of follow-up glycaemia has doubled on wk4; in parallel, insulin was progressively withdrawn and stopped on wk5. When all were lean.

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.

P329
Effect of metformin on endothelial function in overweight adolescents with type 1 diabetes (T1D)
K. Nadeau1, K. Miller2, B. Nathan3, F. Bacha4, M. Katz5, J. Simmons6, M. Gottschalk7, E. Tsallikian8, M. Tansley9, K. Copeland9, D. Linda10, M. Cree-Green11, L. Libman12, M. Haller13, for the T1D Exchange Clinic Network Metformin RCT Study Group

Background:
MODY encloses a group of disorders caused by autosomal dominant mutations in genes linked to pancreatic β-cell function. Usually it presents as a non-ketotic hyperglycaemia, in patients under 25y that miss both T1D and T2D features.

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]18.6 [16–20] 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 β-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.

Conclusion:
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.

Effect of metformin on endothelial function in overweight adolescents with type 1 diabetes (T1D)
K. Nadeau1, K. Miller2, B. Nathan3, F. Bacha4, M. Katz5, J. Simmons6, M. Gottschalk7, E. Tsallikian8, M. Tansley9, K. Copeland9, D. Linda10, M. Cree-Green11, L. Libman12, M. Haller13, for the T1D Exchange Clinic Network Metformin RCT Study Group
Objectives: Overweight youth with T1D are at greater risk for future cardiovascular disease. Metformin’s impact on endothelial function in 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 ± 0.6 in the metformin group (N = 41) and 1.7 ± 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.

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, 5 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.

Medium-term effect of a process of nutritional education on metabolic control in adolescents with type 1 diabetes

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1Bambino Gesù, Diabetes Unit, Roma, Italy, 2Policlinico G. Rodolico Catania, Biancaluna, Italy

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. Improve 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 requirements, HbA1C and serum lipids were evaluated at T0 and T1. In the Nutritional Education Group a structured nutritional program including basal nutritional 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 IRS (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 T1D.

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NEG AND CONTROL GROUP
P332
The longitudinal relationship between parental well-being and adolescents’ glycemic control

M. Ellender1, M. de Wit2, J. Rotteveel2, H.J. Aanstoot2, W. Bakker-van Waarde6, M. Houdijk5, R. Nuboer4, P. Winterdijks3, F. Sneeck1,2
1VU University Medical Center, Medical Psychology, Amsterdam, Netherlands, 2VU University Medical Center, Department of Pediatrics, Amsterdam, Netherlands, 3Diabetes, Center for Pediatric and Adolescent Diabetes Care and Research, Rotterdam, Netherlands, 4UMCG, Department of Pediatrics, Groningen, Netherlands, 5HAGA Hospital, Department of Pediatrics, Den Haag, Netherlands, 6Meander mc, Department of Pediatrics, Amersfoort, Netherlands, 7Academic Medical Center, Medical Psychology, Amsterdam, Netherlands

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 B-18y with type 1 diabetes (N = 174 on T0) participating in the DINO study completed questionnaires at three time points 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 (p = 0.052, p = 0.656). Neither between WHO-5 and DFBC+ (p = 0.042, p = 0.36). WHO-5 was related to DFBC- (p = 0.174, p < 0.01) and PAID-Pr (p = 0.669, p < 0.01). DFBC+, DFBC- and PAID-Pr in their turn related to HbA1c (p = 0.261, p = 0.01; p = 0.376, p = 0.02; p = 0.287, p < 0.01).

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 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. HbA1c-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): Engagement-Rejection (13.0% of the sample), Rejection (17.8%), Engagement-Enrichment (18.7%), Acceptance (25.0%), and Acceptance-Rejection (25.5%). No differences in age, illness duration, or sex were found among the clusters. The Engagement-Rejection showed the least optimal profile (i.e., high on depressive symptoms, low on satisfaction with life, low on treatment adherence, and high HbA1c-values). Acceptance and Acceptance-Rejection showed the most optimal profile (i.e., low on depressive symptoms, high on satisfaction with life, high on treatment adherence, and low HbA1c-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 (TID) living in the Marche region of Italy.

Methods: Basing on the regional registry for TID, 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, socioecononic 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

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Quality of life, psychological functioning and positive affect in children and adolescents with type 1 diabetes


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Objective: 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 participated in this study (mean age: 12.02 yrs; 58.3% boys; mean HbA1c: 7.6%). Children and their parents completed questionnaires regarding general QoL (PedsQLTM 4.0), diabetes-specific QoL (PedsQLTM 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.
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 67.4%, 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-PGC) 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 a 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) compared 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.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Youth-reported strengths (DSTAR items)</th>
<th>n, %</th>
<th>Parent-reported youth adherence behaviors (DSMP items)</th>
<th>n, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>There is someone I can always ask for help with my diabetes.</td>
<td>44, 71%</td>
<td>In the last 3 months, teen completed most boluses or shots (missed once a week or less).</td>
<td>55, 89%</td>
</tr>
<tr>
<td>2</td>
<td>Tie: My parent(s) help me take care of my diabetes. I can ask for help with my diabetes management when I need to.</td>
<td>38, 61%</td>
<td>Teen keeps something handy in case of low blood sugar.</td>
<td>52, 84%</td>
</tr>
<tr>
<td>3</td>
<td>I am able to take care of my diabetes pretty well.</td>
<td>37, 60%</td>
<td>Teen checks blood sugar 4 or more times daily.</td>
<td>39, 63%</td>
</tr>
<tr>
<td>4</td>
<td>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.</td>
<td>35, 58%</td>
<td>Teen usually or always does ketone test when sick, once or more times per day.</td>
<td>26, 42%</td>
</tr>
<tr>
<td>5</td>
<td>I am good at figuring out what to do for my diabetes when problems come up.</td>
<td>32, 52%</td>
<td>Teen or parent treats low blood sugars with prescribed amount of carbs, with or without recheck 15 minutes later.</td>
<td>16, 26%</td>
</tr>
</tbody>
</table>
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 number 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.

<table>
<thead>
<tr>
<th>Category</th>
<th>Total n = 252</th>
<th>Boys n = 103</th>
<th>Girls n = 149</th>
<th>English (upper SES) n = 23</th>
<th>Hindi (lower SES)n = 22</th>
<th>No Group Support n = 22</th>
<th>Group Support n = 23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td>18%</td>
<td>14%</td>
<td>22%</td>
<td>21%</td>
<td>15%</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>Self</td>
<td>4%</td>
<td>4%</td>
<td>4%</td>
<td>5%</td>
<td>11%</td>
<td>12%</td>
<td>16%</td>
</tr>
<tr>
<td>Leisure</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>4%</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Diabetes Related</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>3%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>School</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>4%</td>
<td>7%</td>
<td>2%</td>
</tr>
<tr>
<td>Friends</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

[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 (PIS)
- 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 difficult 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.

P346

**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 χ² 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 (χ² = 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.

<table>
<thead>
<tr>
<th>T1</th>
<th>T0 DEPS</th>
<th>T1 Low</th>
<th>T1 Medium</th>
<th>T1 Above cut-off</th>
<th>T0 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>70.2%</td>
<td>6</td>
<td>1.5%</td>
<td>8.6%</td>
<td>100%</td>
</tr>
<tr>
<td>30</td>
<td>47.4%</td>
<td>0</td>
<td>1.5%</td>
<td>1.5%</td>
<td>50%</td>
</tr>
<tr>
<td>1.5</td>
<td>6</td>
<td>6</td>
<td>6.4%</td>
<td>1.5%</td>
<td>12%</td>
</tr>
<tr>
<td>19</td>
<td>18.1%</td>
<td>6</td>
<td>6.4%</td>
<td>1.5%</td>
<td>31%</td>
</tr>
<tr>
<td>T0 absent</td>
<td>0.6%</td>
<td>1.5%</td>
<td>0.6%</td>
<td>0.6%</td>
<td>1.5%</td>
</tr>
<tr>
<td>T1 absent</td>
<td>0.6%</td>
<td>1.5%</td>
<td>0.6%</td>
<td>0.6%</td>
<td>1.5%</td>
</tr>
<tr>
<td>T0 total</td>
<td>43</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>100%</td>
</tr>
<tr>
<td>T1 total</td>
<td>43</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>100%</td>
</tr>
</tbody>
</table>

(1) Prevalence of DEB at T0 and T1

P345

**Prevalence of disturbed eating behavior in Dutch adolescents with type 1 diabetes: 1 year follow up**

M. Elander1, M. de Wit2, J. Rotteveel2, H.J. Aanstoot2, W. Bakker-van Waarde2, M. Houdijk, R. Nuboer2, P. Winterdijk2, F. Snoek1

1VU University Medical Center, Medical Psychology, Amsterdam, Netherlands, 2VU University Medical Center, Department of Pediatrics, Amsterdam, Netherlands, 3Diabetes Center for Pediatric and Adolescent Diabetes Care and Research, Rotterdam, Netherlands, 4UMCG, Department of Peditrics, Groningen, Netherlands, 5HAGA Hospital, Department of Pediatrics, Den Haag, Netherlands, 6Meander mc, Department of Pediatrics, Amersfoort, Netherlands, 7AMC, Medical Psychology, Amsterdam, Netherlands

Objectives: Type 1 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.

| Table 1: Prevalence of DEB at T0 and T1 |
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 74.7 and Psychosocial health 235.1; 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 ± 13.12) and anxiety (18.08 ± 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 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, 24h helplines. Since 2006, BG meters, 5–10 strips/month added. Basal bolus insulin 100%.


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; ACPOE 2001; FAD 1983.

Results:

<table>
<thead>
<tr>
<th>Glycemic Control</th>
<th>HbA1c %</th>
<th>Range</th>
<th>N</th>
<th>HbA1c %</th>
<th>Mean</th>
<th>Anxiety Score</th>
<th>Depression Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better</td>
<td>&gt;9.1</td>
<td>22</td>
<td>8.04</td>
<td>6.59</td>
<td>6.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>&gt;11</td>
<td>29</td>
<td>12.60</td>
<td>7.38</td>
<td>5.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[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) had lowest depression scores (5.05) 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 (Pluza-Wagner, 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
P353
The mental health of adolescents with type 1 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 notable 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% reporting depressive symptoms in the elevated range. A notable 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% reporting depressive symptoms in the elevated range.

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, 2 RD, 4 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.

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 group A 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.

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 children’s 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 (Elander et al, 2015; Mowisie, 2015).

Recommendation: There is a broad support for a collaborative 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.
Results: Group A 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.

<table>
<thead>
<tr>
<th>Group/Time</th>
<th>Anxiety</th>
<th>Somatic</th>
<th>Internalization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N BL C</td>
<td>N BL C</td>
<td>N BL C</td>
</tr>
<tr>
<td>A/T1</td>
<td>1(7%)</td>
<td>7(50%)</td>
<td>6(43%)</td>
</tr>
<tr>
<td>A/T2</td>
<td>8(57%)</td>
<td>6(43%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>B/T2</td>
<td>5(36%)</td>
<td>8(57%)</td>
<td>1(7%)</td>
</tr>
<tr>
<td></td>
<td>y² = 11.52; p &lt; .01</td>
<td>y² = 5.8; p &lt; .05</td>
<td>y² = 5.7; p &lt; .05</td>
</tr>
<tr>
<td></td>
<td>y² = 1.02; p NS</td>
<td>y² = 2.8; p NS</td>
<td>y² = 1.5; p NS</td>
</tr>
</tbody>
</table>

N = normal; BL = borderline; C = clinical

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; Left nephrosis; 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.

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 hydro nephrosis; 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 potential 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 would benefit from the group, and asked the parents about their expectations for the group, their current struggles, what they gained from the group, whether they would benefit from the group.

Findings: The opinions 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 developmen-
tal 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.
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