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POSTER TOURS

Poster Tour 2 - Psychosocial Issues, Education, Nutrition, and Exercise

P001
The sweet spot: moderate caregiver anxiety is associated with better glycemic control in youth with type 1 diabetes mellitus in Beirut, Lebanon

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Introduction: The influence of caregiver anxiety on youth with type 1 diabetes mellitus (T1D) is understudied, particularly in less developed countries. Lebanon lies in a region with a higher than average mental health burden.

Objectives: This study assesses anxiety levels of primary caregivers of youth with TID in Beirut, Lebanon and their association with target level glycemic control (HbA1c ≤7.5%).

Methods: Youth 11-17 years old with T1D and their primary caregivers were recruited at routine diabetes visits from the American University of Beirut Medical Center and the Chronic Care Center in Beirut, Lebanon, Jan.-May 2019. Caregivers completed the State-Trait Anxiety Inventory (STAI), state and trait forms. Quartiles of STAI scores were used to define low and high anxiety. Regression models were used for analysis.

Results: 142 youth-caregiver dyads were recruited (youth mean age 14.1±1.7 yrs, 57.0% female, mean duration of diabetes 6.1±3.3 yrs; caregiver mean age 42.5±7.9 yrs, 81.7% female). Mean HbA1c was 8.5%±1.5 (range 5.2%-14.3%). Mean STAI state was 34.1±11.2. A STAI state score in the middle 50% was associated with higher odds of having HbA1c within target ≤7.5%, controlling for caregiver recall of frequency of hypoglycemic episodes, caregiver involvement, and financial burden of medications/supplies: adjusted Odds Ratio (aOR) 4.84 vs those scoring in the bottom quartile, aOR 1.63 vs those scoring in the top quartile (Table 1). Caregiver state anxiety levels did not differ based on caregiver gender, income, education, frequency of severe hypoglycemia, diabetes duration, youth age, or insulin regimen.

Conclusions: Mid-range caregiver anxiety levels were associated with HbA1c being more often in target range. That this association did not change after controlling for hypoglycemia frequency suggests that general caregiver anxiety, not just the well recognized fear of hypoglycemia, may impact glycemic control.

Table 1. Association between caregiver anxiety scores and glycemic control

Caregiver anxiety level as measured by STAI State	Youth with HbA1c ≤ 7.5% n (%)	aOR (95% CI) for HbA1c ≤ 7.5%
Bottom quartile (score 20-24; n=36)	4 (11.1%)	4.84 (1.48, 15.85)
Middle 50% (score 25-40; n=71)	28 (39.4%)	ref
Top quartile (score 41-69; n=35)	10 (28.6%)	1.63 (0.64, 4.20)
	p-value = 0.01	

[Table 1]

P002
Assessing eating disorders risk in youths with and without type 1 diabetes

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Assessing eating disorders (ED) risk in persons with type 1 diabetes is challenging compared with general population. Type 1 diabetes (T1D) treatment requires focusing on diet especially for the carbohydrates counting, and insulin use which could be used as a purging behavior not assessed by general population ED screening surveys. The objectives were to compare two different tools to assess the risk of ED in youths (ages 8-20) with T1D (N=40) and, to compare the ED risk between T1D group vs a comparable control group (N=40). Two different screening surveys were used to assess the risk of ED; the EAT-26/ChEAT designed for general population and the EPAD-R, the Spanish translation of DEPS-R, a specific survey for persons with T1D. Both surveys had a cut off of 20, thus scores ≥20 indicate high risk of ED. We found no significant differences between T1D group vs control group in EAT-26/ChEAT scores (p=0.98). In the diabetes group, 23% of youths had high risk for ED by EAT-26/ChEAT (mean score 9.8±5.3, 50% males, all aged < 11) while 55% had high risk of ED by EPAD-R (40% more subjects than using EAT-26/ChEAT, mean

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score 19.6±12.3, p=0.006). There was an association between both scores (r=0.69, p=0.02), but the kappa index was -0.17 (p=0.30). Only the Bulimia EAT-26/ChEAT subscale had statistically significant association with the score of EPAD-R (r = 0.50, p = 0.003). The results indicated that both tools assess different outcomes. The results by using EAT-26/ChEAT could show false positives scores in persons with T1D due to the diabetes management dieting concerns. In addition, EAT-26/ChEAT is not able to properly detect risk of ED in T1D, especially insulin misuse. Therefore, it is important to use specific surveys designed for persons with T1D.

P003
Randomized controlled trial of an online coping intervention developed by and for parents of very young children with type 1 diabetes

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Objectives: Managing type 1 diabetes (T1D) in young children (YC; < 6 yrs) is complex and responsibility falls almost entirely to parents. Parental coping efficacy and YC-T1D outcomes are linked, but there have been few rigorous trials of interventions targeting this population. We utilized principles of user-centered design to develop an online coping intervention for parents of YC-T1D. We then conducted a randomized controlled trial comparing usual care for YC-T1D with and without access to the website intervention on parent and child outcomes. We hypothesized that participants with access would have significantly more favorable status on HbA1C and measures of parent and child functioning at 6 months.

Methods: Participants were 172 parents of YC-T1D recruited via a pediatric healthcare system or social media forums. They were randomized 2:1 to website access plus usual care (WA; n = 114) or usual care only (UC; n = 56) for 6 months. Participants were 91.3% mothers, 86.6% Non-Hispanic, Caucasian, and their YC-T1D had an avg. Hba1c of 7.8% (SD=1.3); 59.4% used insulin pumps and 84.3% used CGM at baseline. HbA1c and self-report measures of parent adjustment, psychiatric symptoms, benefit finding, self-efficacy, hypoglycemia fear, adherence, and child behavior problems were collected at baseline and 6 months later.

Results: Of the 114 WA participants, 111 (97.3%) logged into the website at least once with an avg. of 4.8 logins per participant. On average, participants spent 47 min on the website and each session lasted an average of 7.7 min. All data have been collected and are being analyzed. We will examine group differences on HbA1c and self-report measures at the end of 6 months.

Conclusions: The efficacy of the online coping intervention will be presented. This intervention has the potential to provide real time emotional support, information, and parenting guidance, enabling parents of YC-T1D to cope more effectively with the daily demands of T1D management.

P004
A stepwise approach to psychosocial risk screening in children with type 1 diabetes in Ireland

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Objectives: To evaluate the utility of stepwise psychosocial risk assessment in an Irish cohort of children and young people (CYP) with type 1 diabetes (T1D) in terms of its association with poor glycaemic control and psychopathology.

Methods: The Risk Index for Poor Glycaemic Control (RIPCG) is the screening tool to assess psychosocial risk (low, moderate and high risk). The Paediatric Index of Emotional Distress (PIED) was used for emotional distress (ED) assessment (symptoms of anxiety and depression).

Results: As a part of 2-year longitudinal study 245 children with T1D (129 males) aged 3-18 years (mean 11.7±3.5) were analysed. On the RIPGC 59.4% of patients had a low risk, 17.5% had a moderate risk, 23.1% had high risk. The mean HbA1c in our cohort was significantly higher in the high RIPGC risk children compared to low risk (p=0.002). As a step 1 RIPGC screening revealed psychosocial issues (high and moderate risk) in 40.6% of CYP and impact on diabetes outcomes. As a step 2 those identified as high/moderate RIPGC risk (n=80) were screened for ED (16.3% at high risk), anxiety (20% at high risk) and depression (27.5% at high risk). In high RIPGC group 19.1% of children were at high ED risk (p=0.001), 23.4% at high anxiety risk (p=0.026), 36.2% at high depression risk (p< 0.000). As a step 3 high/moderate RIPGC risk and high ED, anxiety depression risk patients (20.8% of the cohort) were referred to mental health professional.

Conclusions: Our data demonstrated significant association of high psychosocial risk on RIPGC with poor glycaemic control and high risk for ED, anxiety and depression. With high numbers of T1D CYP in Ireland and the lack of clinical Psychologists, these data support a Stepwise Approach to Psychosocial Risk screening for these children nationally. Then those identified through this targeted process will be referred to Psychology/CAMHS in a timely and appropriate manor.

P005
The Getting Ready for Transition (GReaT) intervention programme: an evaluation of a family based multi-disciplinary intervention to support children with type 1diabetes and their parents in the transition to secondary school in a UK tertiary paediatric diabetes service

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Introduction: Transition to secondary school is a challenging time for children and parents, with simultaneous physical, developmental, social, emotional and environmental changes. Diabetes brings

additional changes such as the amount of support available and dilemmas over how to manage diabetes with new peers and teachers. The GReaT intervention programme consists of a two hour parent information session followed by a day workshop for parents and young people that include:

- Information for parents on preparing for secondary school from the diabetes MDT and other parents
- Opportunities to meet families facing similar challenges and share ideas
- Activities to encourage children to see themselves as experts in their diabetes, including creating a 'school bag of life' (Figure 1) and a practice 'school canteen' session with a dietitian

Objectives: To evaluate the effectiveness of GReaT intervention programme in a UK paediatric diabetes service.

Method: Between 2016 and 2018, 37 children (15 male, 22 female) aged 10-11 years old and their parents attended 8 GReaT groups. In 2017 and 2018 34 parents additionally attended 2 parent information sessions. All children and parents completed evaluation forms.

Results: Six themes emerged in a thematic analysis of the evaluation forms.

1. Increased confidence
2. Reduction of worries/concerns
3. Having a space to talk
4. Diabetes education/management
5. Social connectedness
6. Having a space for fun

Parents rated likelihood of recommending the group as 9.57 out of 10 (10 being extremely likely) and young people rated it as 8.68.

Conclusion: The GReaT intervention increases confidence and reduces worries of young people and parents ahead of the transition to secondary school. Further research is needed to explore the impact of the group on successful transition and to better understand the challenges for young people with diabetes and their families at this time.



[Figure 1. Example 'School Bag of Life' - connecting children to their skills, resources and hopes]

P006

Access to psychological support and the psychological needs of young people with diabetes: a parent survey

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Objective: In 2012 the paediatric Best Practice Tariff (BPT) was introduced in England to improve services for children with diabetes. Part of the BPT was an annual assessment of their psychological needs. This survey aimed to investigate parent perspectives on access to psychological support, and the psychological needs of young people and their parents.

Methods: The South East Coast & London Diabetes Network (SECLDN) Paediatric Psychological Therapies group carried out an anonymous online survey through the Network's parent Facebook group, to establish parent views on the access to psychological support, and what the psychological needs of this group were, for both the young people and the parents themselves.

Results: 52 parents completed the survey from across the network. Diabetes had a huge impact on the parents, who report experiencing high levels of psychological difficulties themselves, 'anxiety/stress/worry' (96%), and 'poor sleep' (92%) being the most common. The most common psychological challenges they reported their children experiencing were, 'being more argumentative when BGs were not in range' (85%), 'feeling frustrated around food' (75%), 'anxiety around injections/blood glucose checks' (71%) and 'being angry when reminded to check BGs/take insulin' (67%).

With this high level of need, 71% of parents reported their child had had contact with a psychological therapist since their diagnosis. However only 38% of parents reported that psychological support was offered at the point of diagnosis. With continuation of BPT funding we hope this percentage will increase.

Conclusion: Parents of young people with diabetes reported that they, as well as their children, experience high levels of psychological difficulties as a result of their child's diabetes. This demonstrates the need for ongoing psychological support to be available to this population.

P007

A qualitative study investigating solution focus brief therapy in improving delivery of diabetes care by healthcare professionals

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Introduction: Solution Focused Brief Therapy (SFBT) approach focuses on strengths and ´life without the problem´ rather than a detailed analysis of problem dimensions. SFBT practitioners are encouraged to adopt a respectful and cooperative stance towards

clients and to see the client as having the solutions and potential for change. This qualitative study aims to evaluate the diabetes team's experiences of using SFBT in their delivery of diabetes care, discovering aspects that assist their work and providing a greater insight into the use of SFBT in a paediatric diabetes setting.

Methodology: The study had a qualitative descriptive design which was considered the best method for describing the team's experiences with SFBT (Polit and Beck, 2012). Data was collected using semi-structured interviews within a specialist paediatrics diabetes team in the northwest of England. The team consists of a Consultant Paediatrician, 2 specialist nurses, 1 patient educator and a specialist dietitian. Face-to-face, semi structured interviews were conducted individually with each member. One independent researcher completed all interviews. Voice-recorded interviews were transcribed verbatim and analysed by another independent researcher using a thematic approach to identify main themes.

Results: The study found that SFBT used within the team, improved self-reported confidence, skills, trust and relationships with patients and their families. Additionally, each team member reflected how patients and their families have responded positively to the SFBT approach.

Conclusion: Evaluating healthcare professionals´ experiences of utilising SFBT in the delivery of paediatric diabetes care highlighted that SFBT is perceived to facilitate and support children, young people and their families in managing diabetes. The implications of SFBT for clinical practice and the dissemination of this approach to routine clinical practice should be explored.

P008
The complexity of care and support in families with type 1 diabetes: Pre-teen and family perspectives on everyday life with diabetes and the transition from childhood to adolescence

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Objectives: Family interactions play an important role in the diabetes management of children. However, psychosocial interventions in pre-teen children with type 1 diabetes often overlook the value of targeting all important family members and their relational dynamics. The aim of this study was to explore how care and support were enacted and negotiated in pre-teens (9-12 years old) with type 1 diabetes and their families.

Methods: We conducted four interactive workshops with pre-teens (n=17), their parents (n=26) and their siblings (n=14) across four hospital settings. Dialogue tools were applied to facilitate discussion and reflection around family life with type 1 diabetes. Data were analyzed using radical hermeneutics.

Results: The preliminary data analysis indicated that managing diabetes is a relational and contested activity for pre-teens and their families involving negotiations of trust, roles and responsibilities. Pre-teens mentioned that they preferred to take care of diabetes themselves. Accordingly, their parents described their children as self-reliant. However, parents expressed frustration with the unpredictable blood glucose levels of their children and were continuously trying to find a balance between doing too much or too little. Siblings expressed a wish to support their sibling with diabetes. At the same time, they did not want diabetes to take up too much space in the family. All families used glucose monitoring technologies, which made it possible to act on the everchanging blood glucose levels at the expense of constant attention.

Conclusions: The study indicates that it is difficult for pre-teens and their families to navigate the transition period, which is marked by changing roles and responsibilities. Insights from the study will inspire the development of an intervention.

P009
Healthcare providers understanding of the psychosocial needs and experience of young children newly diagnosed with diabetes

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Introduction: Our review of the literature revel that, the experience of diagnosis from the perspective of young children under the age of 7 years are absent. Clinical practice recommendations, regarding psychosocial issues from the American Diabetes Asosiation, address children from the age of 7-8 years. No recommendations for younger children currently exist.

Objective: The aim of this study is to gain an initial insight into the psychosocial needs and experience of young children (age < 7 years) newly diagnosed with diabetes (first two years), through the knowledge and experiences of paediatric diabetes healthcare providers (HCP).

Methods: All 17 paediatric diabetes clinics in Denmark were invited to participate in the study. Seventeen doctors, nurses, dieticians and psychologists, from 9 clinics were interviewed individually, using a semi-structures interview guide. Data was analysed using thematic analysis.

Results: Our data analysis reviled 4 preliminary themes: 1. The relationship between child and HCP as the foundation for trust and engagement. 2. “They just provide a body”- the child's emotional needs may be overlooked when HCP gain information mainly through parents and pump data. 3. There is a large range in which each clinic value, view and prioritise psychosocial aspects of diabetes care. 4. HCP express a need for age appropriate tools in order to engage and communicate with young children.

P010
Identity and autonomy in pre-teenagers with T1D: balancing family involvement in the transition from childhood to adolescence

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Introduction: Several interventions have been developed to address psychosocial issues in teenagers with type T1D. However, the interventions have limited effect and tend to have a reactive rather than

pro-active character. Greater attention to the pre-teenage group could result in prevention or minimization of adherence problems and family conflict, which typically occur during adolescence and track into adulthood. Thus, the potential impact of this health promotion approach on children's health is high - and it is possibly a more effective point of intervention than at the time where the situation has become very difficult. Yet, little is known about the pre-teenage group and the transition from childhood to adolescence as regards how to balance family involvement in a phase of identity construction and emerging autonomy in the child.

Methods: Qualitative data from 5 participatory workshops with 9-12-year old children with T1D (n 19), their parents (n 31) and their siblings (n 17) were combined with 15 individual semi-structured interviews with pre-teens with T1D. Workshops and interviews were transcribed verbatim and analyzed using radical hermeneutics.

Results: The analysis disclosed 3 interconnected themes: 1) The children with a strong sense of identity were more likely to be able to adapt to shifts in autonomy, 2) The children identifying positively with their diabetes were actively seeking autonomy, 3) The children with parents who found it difficult to pass on autonomy to their children, often had problems disclosing their disease to their peers.

Conclusions: Focusing on the links between identity and autonomy give healthcare practitioners a new way to approach difficulties in the transition from childhood to adolescence. Helping the children develop a strong and positive sense of identity will enable an easier shift in autonomy within the families and thereby minimize the adherence problems and family conflicts that often occur in adolescence.

Poster Tour 10 - Psychosocial Issues, Education, Nutrition, and Exercise

P011

The degree of fathers' involvement in taking care of their children with diabetes and its implications in family functioning in the assessment of diabetic's mothers

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Introduction: Children's type 1 diabetes is one of the most mentally aggravating chronic diseases for the patient and his parents. The disease disturbs relationships in the family, aggravates communication and it enforces a change in the organization of daily life.

Aim: The aim of this paper was to gather opinions about fathers´ involvement in taking care of children with type 1 diabetes. Opinions were stated by mothers of sick children regarding managing of diabetes and its impact on functioning and relationships of the family.

Material and methods: The survey (conducted in 2017) in the form of a questionnaire was filled by 459 mothers. The average duration of the child´s illness was 3.8 years, (SD 2.95, Me 3), the average age of the child was about 8.9 years (SD 3.96, Me 8.5).

Results: 83% of the respondents indicated that the child´s disease is a huge psychological burden for them and that it is mother who mostly takes care of a sick child. 38.8% of mothers can count on the support of other family members. Because of the need to take care of a child, 58.8% of them are not professionally active and 24.2%, despite their professional activity are the only ones in the family, who control the diabetes. In 15.3% of families, the father does not perform any activities related to child's diabetes. 33.8% estimate that the child´s disease worsened the situation of the family and in 4.4% it caused its disintegration. Only 18.1% of mothers declare that the father can look after the child with diabetes by himself.

Conclusions: It is necessary to support families affected by diabetes Their personal and social skills should be developed so that they can cope with chronic disease and the duties related to managing diabetes. The responsibility should be shared by both parents.

Keywords: Type 1 diabetes, chronic disease, quality of life, family, mother

P012

Longitudinal associations between medical provider autonomy support and regimen adherence in adolescents with type 1 diabetes

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Objectives: Studies have identified cross-sectional and 6-month associations between patient perceptions of their provider and treatment adherence. However, no studies have examined changes over longer time periods. This study aimed to examine reciprocal longitudinal associations between patient-provider relationship and self-reported adherence in adolescents with type 1 diabetes (T1D) over two years.

Methods: This is a secondary analysis of data from a longitudinal, multi-site study of disease management in adolescents with T1D. Data was collected via survey and laboratory results at baseline (N=165), 12 months (N=156) and 24 months (N=144). At baseline, participants were 49.1% male, 79.4% Caucasian, with a mean age of 16.4 years (SD=1.3). An autoregressive cross-lagged analysis was conducted to examine reciprocal longitudinal associations between patient-perceived medical provider autonomy support (Healthcare Climate Questionnaire; HCQ) and self-reported adherence (Diabetes Self-Management Profile; DSMP), across two years, after controlling for covariates.

Results: The full model demonstrated good fit (c^2=40.386 (39,134), p=.4089; CFI=.995, TLI=.993, RMSEA=0.016 [90% CI=0.00, .063]). Significant effects were identified across HCQ (baseline to 12 month, B=.393, p< .001; 12 to 24 month, B = .305, p =.013) and DSMP time points (baseline to 12 month, B=.657, p< .001; 12 to 24 month, B=.741, p< .001). No associations were identified between HCQ and DSMP across time; however, HCQ and DSMP were significantly correlated at each time point (baseline, r=.193, p=.004; 12 month, r=.251, p=.004; 24 month, r=.081, p=.004).

Conclusions: Provider autonomy support from previous interactions predicted later autonomy support, and self-reported adherence at earlier interactions predicted later self-reported adherence. While each factor was not predictive of the other over time, patient perception of autonomy support was concurrently associated with self-reported treatment adherence.

P013

Innovative strategies in adolescent research: using a clinic-based research registry and internet platform to assess risky behavior in a national sample of older adolescents with type 1 diabetes.

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Objectives: Adolescents are difficult to recruit into research studies. They need parent consent, yet also require privacy and confidentiality, especially when disclosing risky behaviors. Internet-based research has the potential to provide a private setting for research

participation. However, challenges exist such as obtaining health outcome information remotely and assuring surveys are completed by the intended participant. The current study used a clinic-based research registry (Type 1 Diabetes Exchange) to recruit and survey a national sample of older adolescents with type 1 diabetes (A-T1D). We also collected medical chart information through the registry.

Methods: We sent invitation emails to 1811 eligible families from 54 clinical sites in the T1D exchange registry, based on inclusion criteria: age 15-18 years, T1D duration >1 year, no comorbid chronic condition, most recent HbA1c 6.0-13.0. Interested families provided contact information via a link to the study's RedCap website. The study team telephoned each family prior to initiating consent/assent forms and surveys. Adolescents completed a 15 minute survey and received electronic gift cards.

Results: Over 7 weeks, we received contact information for 385 families and successfully contacted 247. Of those contacted, 3 were ineligible, 2 declined participation, 242 enrolled in the study, and 224 completed the survey (M age=16.4±1.1, 47% female, M A1c=8.3 ±1.3, 76.8% on insulin pumps). Unique challenges arose, such as navigating a central IRB, consenting remotely, verifying eligibility, and protecting privacy and confidentiality.

Conclusions: We successfully recruited and enrolled a large, national sample of adolescents with T1D in a very short time. Utilizing a research registry and RedCap proved an efficient way to conduct survey research with A-T1D. We will present lessons learned and ethical and logistical recommendations for researchers interested in using these methods for future studies.

P014

Long-term associations between parental depression and diabetes distress in the two years following child-onset of type 1 diabetes (T1D)

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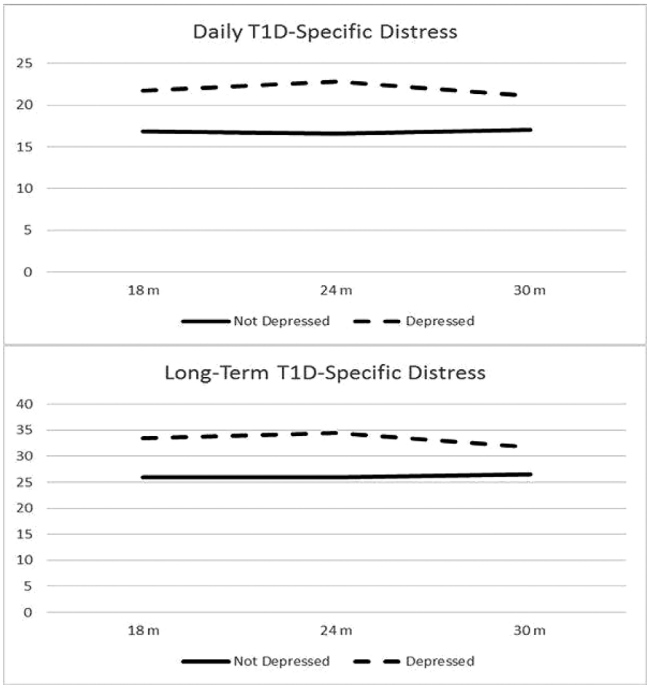
Objective: We previously reported on the association between parental depression and perceptions of T1D-specific distress during the first year after childhood-onset of T1D (Noser et al, 2018). Here, we examined these associations in the same sample of families 18-30 months post-T1D diagnosis.

Methods: In a prospective study of 5-9 year-olds with recent-onset T1D (parent age= 36.6±6.42 years, 89% mothers; child age 7.4 ±1.3 years, T1D duration 4.6±3.3 months at baseline), 78 parents completed the Center for Epidemiologic Studies Depression Scale-Revised (CESD-R) and the Problem Areas in Diabetes Survey—Parent Revised Version (PAID-PR) every 6 months. We used the published clinical cut-off score of 16 to group parents as depressed or not depressed based on their CESD-R scores at 18 months. We used multilevel modeling to examine trajectories of daily and long-term T1D-specific distress from 18-30 months and examined whether parental depression at 18 months was associated with distress trajectories.

Results: We found no change in daily (p=0.579) or long-term distress (p=0.906) over time. However, there was a main effect of depression for both daily (p≤0.001) and long-term distress (p≤0.001). Post hoc analyses showed that parents with depression at 18 months reported higher daily and long-term distress than parents without depression at 18 months at all timepoints (p's< .05; Figure 1). We found no interactions for time and depression and parental T1D-specific distress.

Conclusions: Consistent with previous research, parental depression at 18 months post-diagnosis is associated with higher perceptions of T1D-specific distress up to 30 months. It is possible that treating parent depression in children with recent-onset T1D may help facilitate parent adjustment to T1D; whether treating parent depression or distress improves child glycemic control remains to be determined.

Figure 1



[Twelve month trajectories of T1D distress in parents with and without depression]

P015

Regional differences in glycemic control and psychosocial/patient-reported outcomes (PROs) in adults (26-44 years) with type 1 diabetes (T1DM): the SAGE study

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Introduction: T1DM is a chronic disease affecting both physical and psychosocial health.

Objective: To examine glycemic control in non-US adults (26-44 years) with T1DM for ≥1 year; this analysis explores regional variations in glycemic control and PROs.

Methods: SAGE was a multinational, cross-sectional study of data collected from patient medical records and interviews at a single visit in the period Jan-Dec 2018. The primary endpoint was the percentage of people achieving HbA_{1c} < 7 % (< 53 mmol/mol). Secondary endpoints included insulin device type, hypoglycemia and PRO questionnaires (Hypoglycemia Fear Survey [HFS-II], Problem Areas in Diabetes [PAID], Insulin Treatment Satisfaction Questionnaire [ITSQ] and the Audit of Diabetes-Dependent Quality of Life [ADDQoL]).

Results: SAGE included 1724 people aged 26-44 years from 17 countries in five regions (**Table**). HbA_{1c} < 7 % achievement was low, with lowest achievement seen in Latin America (LA) and the Middle East (ME), highest in Eastern Europe (EE). Insulin injections were the most common mode of therapy and use of pumps was low, except in Western Europe (WE). Globally, incidence of severe hypoglycemia was 11.5% (highest: ME and LA; lowest: Asia). Across all regions, HFS-II and PAID total scores showed low hypoglycemia fear and emotional distress (highest: LA and ME; lowest: WE and Asia). ITSQ scores showed moderate to high treatment satisfaction (highest: EE and WE; lowest: LA and ME), while ADDQoL total scores showed a small negative impact of diabetes on quality of life (greatest: EE; least: ME).

Conclusions: While PRO scores indicated low levels of diabetes-related impact, distress and fear of hypoglycemia, and moderate to high treatment satisfaction, glycemic control was poor. Regional differences were observed, with LA and ME showing higher distress and fear of hypoglycemia, lower treatment satisfaction and lower glycemic target achievement. **Study sponsor:** Sanofi

	Region					
	Latin America N=251	Western Europe N=540	Eastern Europe N=418	Asia N=328	Middle East N=187	Global N=1724
Participant characteristics, mean (SD)						
Age, years	34.3 (5.3)	34.2 (5.3)	35.2 (5.3)	36.1 (5.7)	32.5 (5.0)	34.6 (5.4)
Years since diabetes diagnosis	17.9 (9.4)	17.7 (9.1)	14.5 (8.7)	14.0 (9.0)	14.9 (7.9)	15.9 (9.1)
BMI, % of participants						
Underweight/normal range (BMI <25 kg/m²)	53.0	55.2	63.6	75.3	60.4	61.3
Overweight (BMI 25—<30 kg/m²)	34.3	32.6	28.2	21.0	25.7	28.8
Obese (BMI >30 kg/m²)	12.7	12.1	8.1	3.7	13.9	9.8
Insulin device, % of participants						
Pump	16.3	48.1	7.4	22.0	4.8	24.0
Injections/pens	83.7	51.9	92.3	78.0	95.2	76.0
Sometimes pump and sometimes injections/pens	0.0	0.0	0.2	0.0	0.0	0.1
HbA_{1c} target achievement, % of participants						
<7 % (<53 mmol/mol)	23.5	27.8	32.1	27.1	23.5	27.6
≥7 % (≥53 mmol/mol)	76.5	72.2	67.9	72.9	76.5	72.4
HbA_{1c}, mean (SD)						
%	8.25 (1.77)	7.72 (1.28)	7.95 (1.58)	7.90 (1.58)	7.96 (1.53)	7.91 (1.52)
mmol/mol	66.7 (19.4)	60.9 (14.0)	63.4 (17.2)	62.8 (17.2)	63.5 (16.8)	63.0 (16.7)
Patients with ≥1 severe hypoglycemia event within last 6 months, %	13.2	12.3	10.8	7.9	14.4	11.5
HFS-II total score, mean (SD) (Range: 0–132)[a]	46.6 (22.7)	37.8 (19.8)	37.8 (20.0)	28.8 (18.3)	44.5 (22.6)	36.1 (21.1)
PAID total score, mean (SD) (Range: 0–100)[b]	39.9 (22.6)	31.3 (20.7)	31.8 (19.6)	31.5 (20.6)	40.9 (24.2)	33.8 (21.5)
ITSQ total score, mean (SD) (Range: 0–100)[c]	64.2 (18.2)	69.4 (16.0)	70.8 (17.3)	66.3 (17.1)	63.3 (21.0)	67.7 (17.7)
ADDQoL total score, mean (SD) (Range: -9 to +3)[d]	-2.4 (1.8)	-1.9 (1.6)	-2.5 (1.9)	-2.4 (1.9)	-1.6 (1.6)	-2.2 (1.8)

[a]Higher HFS-II scores reflect a greater fear of hypoglycemia; [b]Higher PAID scores correspond to higher diabetes-related emotional distress; [c]Higher ITSQ scores indicate better treatment satisfaction; [d]ADDQoL total scores ('average weighted impact') range from -9 (maximum negative impact of diabetes) to + 3 (maximum positive impact of diabetes).
ADDQoL, Audit of Diabetes-Dependent Quality of Life; BMI, body mass index; HFS-II, Hypoglycemia Fear Survey; ITSQ, Insulin Treatment Satisfaction Questionnaire; PAID, Problem Areas in Diabetes questionnaire; QoL, quality of life; SD, standard deviation

[Table.]

P016
Fear of hypoglycemia impacts quality of life in adolescents with type 1 diabetes

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Background: Fear of hypoglycemia (FOH) is associated with adverse glycemic control, reduced quality of life (QOL), and reduced physical activity in adults with Type 1 Diabetes (T1D). Few studies have examined the impact of FOH on these factors in adolescents with T1D.

Objective: To examine the association between FOH and QOL, glycemic control, and hypoglycemia frequency, as well as how continuous glucose monitor (CGM) and insulin pump use influences these relationships.

Methods: Adolescents with T1D completed questionnaires evaluating FOH (Child Hypoglycemia Fear Survey), QOL (PedsQL), and physical activity (PAQ-A). Glycemic control was estimated from hemoglobin A1c, glucometer, insulin pump and CGM data collected at the clinic visit closest to survey completion.

Results: Seventy-three adolescents (43 female) with a median (IQR) age of 16 (15,17) and duration of T1D of 5 (2, 9.5) years completed surveys. Insulin pumps were used by 47 (64%), and CGM by 48 (66%). FOH was associated with reduced QOL (r^2=0.33, p< 0.001), especially when evaluated with the worry subscale (r^2=0.33, p< 0.001), which reflects hypoglycemia-related anxiety. FOH was correlated with glucose concentrations (r^2=0.09, p=0.02), but not hemoglobin A1c (r^2=0.02, p=0.2). FOH scores did not differ with CGM use [36 (23, 46.5) with CGM vs. 38.5 (30, 46) without, p=0.4]. An association between FOH and hypoglycemia frequency existed, but only in patients not using CGM (r^2=0.24, p=0.02 vs r^2< 0.01, p=0.95 for CGM-users). Insulin pump use, duration of T1D and physical activity level were not associated with differences in the FOH score.

Conclusions: The impact of FOH on QOL in adolescents with T1D may be under-appreciated. While diabetes technologies do little to mitigate FOH in this population, CGM use does affect the relationship between FOH and actual hypoglycemia frequency. The impact of FOH on quality of life suggests that diabetes care teams should address FOH in their counseling efforts.

P017
Disturbed eating behaviors in youth with type 1 diabetes during the transition to adulthood: A one-year prospective study

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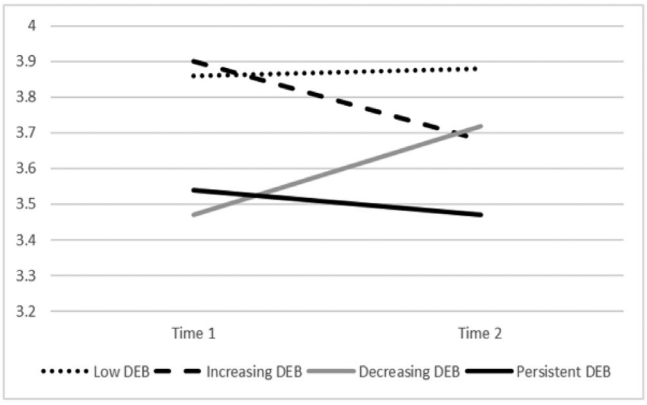
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Objective: Disturbed eating behaviors (DEB) are prevalent in youth with type 1 diabetes (T1D) and are accompanied by an increased risk for complications, morbidity, and mortality. Prospective studies on DEB in the challenging transition to adulthood are scarce. This longitudinal study examined the development of DEB and investigated the directionality of effects linking DEB to diabetes-specific and generic functioning in adolescents and emerging adults.

Methods: .300 youth (14-25 years) with T1D (mean±SD age 20.8 ±3.3 years; T1D duration 7.6±5.0 years; HbA1c 7.4±1.0% or 58 ±10.4mmol/mol; 57% female) participated in a two-wave longitudinal study. Questionnaires tapped into DEB (Diabetes Eating Problem Survey-Revised; DEPS-R), treatment adherence, diabetes-specific distress, and depressive symptoms. HbA_{1c}-values were obtained from physicians. Repeated measures analysis of variance and cross-lagged analysis were used to examine development and directionality of effects.

Results: Mean DEB remained stable in the total sample but significant individual differences in DEB development were observed based on the cut-off score of the DEPS-R: 19% displayed persistent DEB, 8% increased, and 7.3% decreased in DEB over time. Remaining patients scored low on DEB over time. Further, significant mean-level changes in treatment adherence emerged across these four groups (Fig.1). Cross-lagged analyses indicated that DEB significantly predicted self-reported treatment problems and depressive symptoms over time, whereas reciprocal associations with glycemic control were found.

Conclusions: This longitudinal study highlights the substantial impact DEB may have on patients in the transition to adulthood, with a substantial portion of patients being at risk for clinical DEB. Directional pathways linking DEB to generic and diabetes-specific functioning were uncovered, emphasizing the clinical relevance of prospectively assessing DEB.



[Figure 1: Mean treatment adherence scores at T1-T2 for the four groups]

P018

Resilience reinforces the protective impact of family functioning on diabetes distress in youth with type 1 diabetes

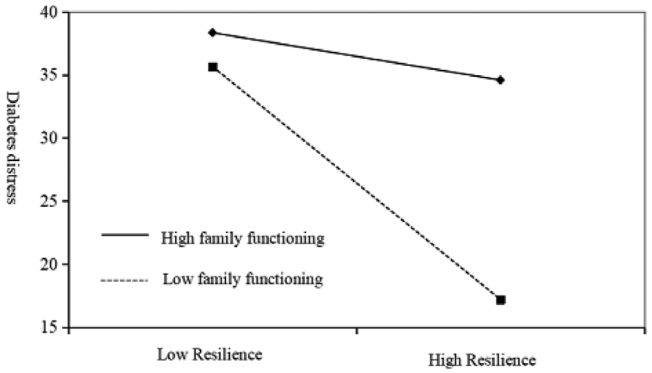
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Objective: a) to explore the effect of family functioning on diabetes distress among adolescents with type 1 diabetes; and b) to examine whether resilience reinforcing the relationship between family functioning and diabetes distress.

Methods: This study was a cross-sectional survey. Adolescents with type 1 diabetes recruited from a national endocrine center in China from May 2017 to October 2018. A total of 189 participants (aged 8-24 years) completed the survey about their resilience, family functioning, diabetes distress and provided demographic and clinical information. The multivariate linear regression analysis was performed to determine whether resilience reinforcing the association that family functioning had with diabetes distress. The simple slopes analyze was used to probe significant interactions.

Results: The mean score of diabetes distress was 29.58±22.09 with 31.7% of adolescents having severe diabetes distress. Multivariate linear regression analyses indicated that resilience reinforcing the association that family functioning had with diabetes distress (β =-0.22, t=-0.318, P=0.002). However, simple slopes found that the reinforcing effect of resilience was only effective in groups with low family functioning (β =-0.941, t=-4.090, P =0.001), See in Figure 1.**Conclusions:** Many adolescents with type 1 diabetes reported severe diabetes distress, which could be directly relieved by improving family functioning. For youth with poor family functioning, reinforcing individual resilience is also promising in relieving diabetes distress.



[Illustrating the interaction of level of family functioning and resilience]

P019

Mindfulness meditation as a modality to improve the glycemic care and quality of life in patients with type 1 diabetes (T1DM)

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Objective: We assessed impact of Mindfulness Meditation (MM) in patients with T1DM through a mixed method approach utilizing clinical methods, glycemic parameters, biochemical investigations and a questionnaire-based approach.

Methods: Standardization of the technique of MM was enabled by formal training of meditation by skilled and trained meditation coach and patients were advised to practice 20 minutes daily. Compliance and adherence were facilitated by virtual weekly telephonic customized call and in person monthly physical follow up. SMBG 7 points at least once in a week was done. We assessed HbA1c, Ambulatory Glucose Profile (AGP), serum creatinine, BP and ECG. Quantification of the qualitative intangible parameters were done utilizing questionnaires to evaluate the quality of life (QoL), Diabetic Distress Score (DDS), Ferrans and Powers quality of Life Index (QLI) and Day to day experience by mindful attention awareness scale. All questionnaires were linguistically adapted and internally validated. These were used for baseline assessment and at six month follow up - post consistent practice of mediation. Study was approved by independent ethics committee.

Figure 1: The triad of QoL, glycemic and biochemical parameters

Parameters	*Baseline*	*6 months*
Body weight (Kg) (Range)	55.9 (38-81.5)	56.6 (39.1-82.6)
BP (mmHg) Systolic and Diastolic	129.9 (106-147) 88.6 (80-97)	124 (106-151) 80.1(62-95)
HbA1c (%)	9.05 (6.3-10.8)	8.3 (6.7-10.7)
Insulin requirement per day (Units)	52.8 (21-99)	49.12 (24-90)
AGP parameters		
HbA1c (on AGP)	7.9 (5.4-11.5)	7.6 (6.1 – 9.5)
Average Glucose (mg/dl)	181.6 (108-284)	172.1 (131 -227
Time in target	25.3 (12-54)	24.2 (14-29)
Time below target	16.3 (1-43)	18.8 (3-34)
Time above target	58.3 (23-83)	56.8 (34-78)
Questionnaire Evaluation		
Day to day questionnaire (Mind fullness scale)	4.2	4.6
Diabetic Distress score (Total)	1.64	1.28
Ferrans and Powers quality of life scale	8.82	10.27
Health and functioning	6.96	9.55
Social and economic	9.96	10.7
Spiritual and psychological	9.51	11.24

[The triad of QoL, glycemic and biochemical parameters]

Results: Total no of patients n=16 (M=6, F=10). Mean age 24.8 years (18 - 48 years) and duration of diabetes 13.25 years (3 - 28 years). Mean Systolic BP was 129.9 mmHg (range 106-147) and diastolic BP was 88.6 mmHg (range 80-97). Five patients had hypothyroidism and seven had developed diabetic nephropathy. Results depicted in Figure 1.

Conclusion: Our study demonstrated positive impact of MM on the triad of QoL, glycemic and biochemical parameters. The quantum of grade of improvement in cluster of parameters enables MM as a beneficial cost-effective adjunctive tool to effectively manage T1DM. Study was limited with small sample size which needs further validation through larger multi-centric, randomized controlled trials

P020

Executive dysfunction in teens with type 1 diabetes (T1D) negatively impacts quality of life

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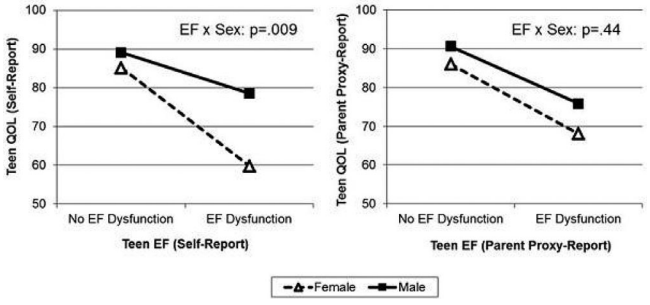
Objective: Executive function (EF), the ability to plan, organize, and complete tasks, is associated with adherence and glycemic control (Berg et al., Diab Care 2018;41:2281; Vloemans et al., Diab Care 2019:42,225); further, suboptimal glycemic control has been related to poorer quality of life (QOL) in teens with T1D (Anderson et al., Diab Care 2017;40:1002). We sought to evaluate associations between EF and QOL in teens with T1D from a multi-informant perspective.

Methods: We studied 169 teens (54% male) with T1D (mean±SD age 16.0±1.3 years; T1D duration 8.4±3.7 years; A1c 8.5±1.2%); teens and their parents completed surveys assessing teen EF (Behavior Rating Inventory of Executive Function; BRIEF) and teen QOL (PedsQL generic scales). BRIEF scores ≥60 indicated executive dysfunction. Correlational and multivariable analyses assessed associations between EF and QOL.

Results: Teen and parent proxy BRIEF scores identified 13.0% and 31.6% of teens, respectively, with executive dysfunction. Greater teen executive dysfunction was associated with lower teen QOL by both teen (r=-.62, p< .0001) and parent proxy report (r=-.65, p< .0001). In multivariable analyses adjusted for teen age, T1D duration, sex, and A1c, 30% of the variance in teen QOL was explained by teen EF (p< .0001); similarly, 31% of parent proxy report of teen QOL was explained by parent report of teen EF (p< .0001). In teen but not parent reports, there was a significant interaction effect of EF and sex on teen QOL (P< .01) (figure). Overall, presence of teen executive dysfunction was associated with poorer teen quality of life.

Conclusions: Results uncovered a substantial impact of executive dysfunction on teens' QOL. Given the associations of both executive dysfunction and poorer QOL with poorer glycemic control, these results emphasize the relevance of assessing both EF and QOL in adolescents with T1D in efforts to improve glycemic control.

Figure - Interaction effect of EF and sex on teen QOL



[Interaction effect of EF and sex on teen QOL]

Poster Tour 18 - Psychosocial Issues, Education, Nutrition, and Exercise

P021
Outpatient diabetes-specific quality of life screening: feasibility and outcomes in parents of children aged 2-7 with T1D

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Diabetes-specific quality of life (QoL) is an important outcome measure in diabetes care beyond A1c. ISPAD Guidelines recommend an annual psychosocial assessment. In research settings, discussion of QoL has been shown to be impactful; however, this is not routinely implemented in clinical practice. The Pediatric Quality of Life Inventory (PedsQL) Diabetes Module is a validated patient-reported outcome (PRO) measure used to assess QoL in several domains. To provide a model for QoL assessment in tertiary diabetes care settings, we used quality improvement (QI) methodology (team formation, setting aims, selecting and testing interventions) to test the feasibility and reliability of administering an electronic version of the PedsQL 3.2 Diabetes Module and discussing parent reported QoL in clinical practice.

Over 12 months, 340 PedsQL Diabetes Modules were completed by 178 unique parents (97% of the eligible population). The sample had a mean age of 5.5 years and an A1C of 8.4%. Intensive insulin therapy via MDI v insulin pump was 45% (n=82) and 55% (n=102) respectively with 34 patients switching from MDI to an insulin pump during the time period. A CGM device was used by 69% (n=127) of patients and 37 patients started CGM use and 4 patients stopped CGM use over the time period. Discussion of QoL scores increased from 30% to 80% during clinic visits within 3 months. The lowest scores for QoL were consistently on items related to worry of high and low glucose values. A clinical decision support was developed to direct referral to a diabetes educator for QoL scores < 50 in any domain.

The assessment of QoL, particularly regarding worry of high and low glucose values, is important for parents of young children with T1D. Through QI methodology, we demonstrate that it is feasible to integrate the assessment and discussion of QoL within a clinical encounter; however, clinicians need guidance on how to discuss PROs during clinic visits in meaningful ways.

P022
The WHO-5 Index in Danish adolescents with type 1 diabetes and the associations with disordered eating, emotional symptoms, quality of life and hemoglobin A_{1c}

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Aim: We aimed to investigate the distribution of the World Health Organization-Five Well-Being Index (WHO-5) in adolescents with type 1 diabetes (T1D) and the associations with disordered eating, emotional symptoms, quality of life (QoL) and hemoglobin A_{1c} (HbA_{1c}). Particularly, we aimed to assess the ability of a WHO-5 in the lowest quartile (Q1) to identify at risk adolescents.

Methods: The study was a sub-study of a Danish national survey on psychosocial challenges in children and adolescents. Questionnaires included the WHO-5 and the Youth Eating Disorder Examination Questionnaire (Y-EDEQ), the depression (BDI-Y) and anxiety (BAI-Y) subscales of the Beck's Youth Inventories, and the PedsQL generic and diabetes module. A total of 525 adolescents (females 49%) mean age 14.6 yrs. (range 12-18 yrs.) were included, and all submitted a blood sample for HbA_{1c}.

Results: Median WHO-5(interquartile range) was 68% (56;76). Boys scored higher than girls, p=0.04.The WHO-5 steadily reduced through the groups: non-overeaters, overeaters, subclinical binge eaters, and clinical binge eaters, p=0.0005.The WHO-5 was negatively associated with BDI-Y and BAI-Y scores, both p< 0.0001, and positively associated with generic and diabetes specific QoL, both p< 0.0001.The WHO-5 was negatively associated with HbA_{1c}, p=0.0004. The sensitivities of a WHO-5 in the first quartile (Q1) were 0.44, 0.55, 0.46, 0.54, 0.43, 0.32 for identifying all clinical binge eaters, scoring BDI-Y-Q4 and BAI-Y-Q4, scoring generic and diabetes specific QOL-Q1, and having a HbA_{1c} in Q4, respectively.

Conclusions: The WHO-5 was negatively associated with disordered eating, emotional symptoms and HbA_{1c}, and positively associated with QoL; but the sensitivity of a WHO-5 in the lowest quartile to identify at risk adolescents was low. The WHO-5 may be valuable for testing wellbeing in T1D adolescents at population level, but as a screening tool for identifying at risk patients at individual level it is less useful.

P023
Symptoms of eating disorders, quality of life, emotional difficulties and metabolic control in Danish adolescents with type 1 diabetes

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Aim: This study aimed 1) to investigate the prevalence of symptoms of eating disorders (overeating (OE), subclinical binge eating (SBE) and clinical binge eating (CBE)) in Danish adolescents with type 1 diabetes

(T1D) and 2) assess the association between these symptoms and quality of life (QoL), emotional difficulties and hemoglobin A_{1c}(HbA_{1c}).

Methods: The study was a sub-study of a Danish national web based survey on psychosocial challenges in children and adolescents. The questionnaires included the Youth Eating Disorder Examination Questionnaire (Y-EDEQ), the PedsQL generic and diabetes module, and the depression (BDI-Y) and anxiety (BAI-Y) subscales of the Beck's Youth Inventories. 525 adolescents (females 49%) mean age 14.6 yrs. (range 12-18 yrs.) were included. All participants submitted a blood sample for HbA_{1c}.

Results: The prevalence of OE, SBE, and CBE were 8.4%, 17.5% and 7.8%, respectively. OE were overrepresented among boys while CBE were overrepresented among girls (p< 0.001). Both generic and diabetes related QoL steadily reduced through the four groups: non-overeaters, overeaters, subclinical binge eaters, and binge eaters, mean (percent scale) 81-77-75-70% and 66-59-59-52%, respectively, both p< 0.0001. Both depression scores and anxiety scores increased through the four groups, p< 0.0001. HbA_{1c} was significantly higher among clinical binge eaters, mean 9.02% (75 mmol/mol) compared with non-overeaters, mean 8.10% (65 mmol/mol) (p< 0.001).

Conclusions: In a national cross sectional T1D adolescent population, more than 30% of individuals had indications of an eating disorder, of them 7.8% had indications of binge eating. Disordered eating was significantly associated with reduced QoL, increased emotional difficulties and poor glycemic control, particularly among clinical binge eaters. Therefore, increased attention toward symptoms of eating disorders is warranted in adolescents with T1D.

P024
Virtual education: prevalence in youth with diabetes and their characteristics

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Introduction: Virtual education (VE) is a cyber-based substitute for traditional school settings in the United States with variable supervision and outcomes. No data are available on youth with type 1 or 2 diabetes (YWD) involved in VE.

Objectives:

1) Identify the proportion of YWD in VE compared to the general population;

2) Determine their characteristics compared to non-VE YWD.

Methods: A retrospective chart review was conducted of all YWD followed in a large diabetes center ages 5-19y in grades K-12 for academic year 2017-2018. Youth were categorized as VE or non-VE. We compared: 1) the proportion of YWD in VE vs the general population reported by publicly available state data and 2) Demographics, HbA1c, body mass index percentile (BMI%), and treatment between VE and non-VE YWD. Comorbidities were described in VE YWD.

Results: Of 1743 patients, 87 (5%) used VE, over twice state enrollment, 2% (p< 0.001). Diabetes diagnosis, race, and BMI% were similar between VE and non-VE YWD. VE YWD were more often female (60% vs 40%, p< 0.05) and older (14.6y vs 13.7y, p< 0.01). VE was significantly associated with higher mean HbA1c (9.0±0.6% vs 8.3±0.6%, p=0.01) adjusted for age, diabetes duration, and sex. Fewer VE YWD met a HbA1c target of < 7.5% (24% vs 36%, p< 0.05). Despite similar insulin pump use (36% vs 41%, p=NS), continuous glucose monitor use was less common among VE YWD (9% vs 31%, p< 0.001). A mental health condition was documented in 38% of VE YWD, most often depression, anxiety, or attention deficit-hyperactivity disorder. By PHQ-9 screen, 51% had at least mild depression.

Conclusions: To the best of our knowledge, this is the first report of YWD in VE. VE enrollment in YWD was significantly higher compared to the general population. VE was associated with poorer glycemic control, lower use of diabetes technologies, and frequent reported mental health comorbidities. VE may be a marker of psychosocial challenges contributing to sub-optimal diabetes management.

P025
Families with pediatric type 1 diabetes: a comparison with the general population on child well-being, parental distress and parenting behavior

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Objectives: The main objective of this study was to compare families with a child (2-12 years) with type 1 diabetes (T1D) to families without childhood chronic illness, in the domains of child well-being (adjustment difficulties, quality of life) parental distress (stress, anxiety, and depression), and parenting behavior (protectiveness, responsiveness, autonomy support and psychological control).

Methods: Mothers, fathers, and children (8-12yrs) of 105 families with pediatric T1D (mean age child 9.0±2.4; mean HbA1c 7.1%±0.8 (54 mmol/mol±8.7); 47.6% female) completed questionnaires on child well-being and parental distress and parenting. The control group consisted of 414 families without chronic illness.

Results: Parents reported significantly more adjustment difficulties and lower quality of life, in children with T1D, whereas children themselves reported higher quality of life compared to controls. In terms of parental distress, mothers, but not fathers, of children with T1D reported more stress, anxiety, and depressive symptoms than controls. With regard to parenting behavior, parent reports revealed less protectiveness in fathers and less autonomy support and responsiveness in both parents as compared to controls. No differences were found in parent-reported psychological control between parents of children with and without T1D, but children with T1D perceived lowered parental psychological control. Lastly, secondary analyses indicated that especially families with suboptimal child glycemic control showed more maternal distress and worse child well-being (according to parents).

Conclusions: Families confronted with pediatric T1D differ from families without chronic illness: childhood T1D impacts parental perceptions of child well-being and differentially affects mothers' and fathers' distress levels and behaviors. The finding that children with T1D did not report lower quality of life than controls is hopeful and deserves further investigation.

P026
Objectively downloaded insulin pump data support maternal self-report of maintaining high blood glucoses

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Objective: To identify patterns in self-management behaviors of adolescents with T1D in relation to maternal fear of hypoglycemia.

Methods: Participants include 18 mother-adolescent (M child age=13.1±2.1 years; M T1D duration=7.2±4.1 years; M A1C=8.7 ±1.8%; 50% male) dyads enrolled in an ongoing randomized clinical trial to treat fear of hypoglycemia (R03DK110459). Dyads were eligible if mothers' ratings exceeded the clinical cut-off on at least 1 subscale (Maintaining High BG, Helplessness/Worry About Low BG, or Worry About Negative Social Consequences) of the Hypoglycemia Fear Survey - Parent. Child insulin pump were downloaded at the routine T1D clinic visit prior to beginning intervention.

Results: Of mothers elevated on the Maintaining High BG subscale (i.e., ≥7), their adolescents "corrected" for extremely high BG levels (i.e., ≥400) significantly less than those whose mothers were not elevated on Maintaining High BG (p=0.007). Although not significant, average carbohydrate entries and insulin boluses per day were lower for children with mothers elevated on Maintaining High BG (6.9 vs. 4.7 and 4.7 vs. 3.4), respectively.

Conclusions: Objective data from insulin pumps may provide clinicians with valuable information about self-management behaviors and assist with identifying psychosocial barriers such as fear of hypoglycemia. This is the first intervention study to address FOH symptoms in mothers of adolescents with T1D and is specifically targeting maladaptive behaviors such as failing to give insulin when BG is high. Enrollment and data collection remain ongoing.

P027
The associations between knowledge and health beliefs/attitudes regarding gestational diabetes (GDM) in American Indian/Alaska Native (AI/AN) Adolescent/Young Adult (AYA) daughters at risk for GDM and their mothers: a dyadic analysis

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Introduction: To date, research on associations between knowledge and health beliefs/attitudes in women at risk for GDM has focused on adults at risk for or having a history of GDM. A gap also exists in examining possible associations with family members or peers.

Objectives: We examined the dyadic associations between knowledge and health beliefs/attitudes about GDM between and within AI/AN AYA daughters at risk for GDM and their mothers.

Methods: Grounded in the Expanded Health Belief Model, this secondary analysis employed a cross-sectional design using baseline data from 62 dyads of AI/AN daughters at risk for GDM (aged 12.0-24.5 years; 89% currently a student; 50% multiracial) and their mothers (aged 31.2-58.8 years; 48% college educated; 18% ever had GDM) participating in an ongoing randomized controlled trial. Daughters and their mothers completed online surveys about GDM-related knowledge and health beliefs/attitudes (benefits, barriers, severity, susceptibility). Structural equation modeling was used to fit actor-partner interdependence models assuming distinguishable dyad members.

Results: A partner effect was observed between mother's knowledge and daughter's perceived susceptibility (b=0.38, p< .001), suggesting that a mother's knowledge about GDM may positively affect her daughter's perceived susceptibility for GDM. Positive actor effects were found for daughters (b=0.45, p< .001) and their mothers (b=0.23, p=.040) between knowledge and perceived benefits, suggesting that greater GDM-related knowledge is associated with higher perceived benefits of GDM risk reduction. Moreover, a positive actor effect was revealed between GDM-related knowledge and perceived barriers to GDM risk reduction for mothers (b=0.24, p=.024), but not for their daughters (b=0.10, p=.430).

Conclusions: As shown in these AI/AN mother-daughter dyads, mothers, as a member of their daughter's social network, may influence their daughter's health beliefs/attitudes regarding GDM.

P028

Do clinic-based interventions make a difference to the psychological wellbeing of youth and young adults with type 1 diabetes?

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Introduction: Psychological stressors are key barriers to the management of diabetes mellitus in youth and young adults. During a patient's annual interdisciplinary clinic appointment, the Waikato youth and young adult diabetes team have been routinely assessing the emotional burden associated with diabetes.

Objectives: The purpose of this project was to determine whether the use of screening tools and responding to identified concerns improves the overall care of youth and young adults with diabetes.

Methods: Ninety-five patients with type 1 diabetes aged between 15 to 24 years completed the Problem Areas in Diabetes Scales (PAID and PAID-T), World Health Organisation Well Being Index (WHO-5), Diabetes Eating Problem Survey-Revised (DEPS-R), and Hypoglycaemia Fear Survey (HFS-II and CHFS) twelve months apart at their annual Youth and Young Adult Diabetes clinic appointments. In response to the concerns identified in the questionnaires, clinicians utilised strategies including psychoeducation, increasing social support, individualised goal-setting and the development of realistic expectations and coping skills.

Results: Over a twelve-month period, emotional wellbeing increased, while diabetes distress, diabetes eating problems, and fear of hypoglycaemia decreased. Although these changes did not reach statistical significance, the improvement in psychological functioning is clinically important. No significant change was identified in HbA1c.

Conclusion: Although there was no statistically significant change over the twelve-month period, the improvement in psychological functioning is valuable for the youth and young adults living with type 1 diabetes. As a team we know more about our patients and their views on living with diabetes than we did before. Patients prefer this interdisciplinary clinic structure and we are continuing to seek improvement in clinical outcomes and the care we provide.

P029

Parental anxiety after five years participation in a longitudinal follow up study of children at high risk for type 1 diabetes - The DiPiS study

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Introduction: Previous studies have indicated that parents to children participating in screening studies may experience increased levels of anxiety, worry, sadness, and guilt.

Objectives: The aim of the present study was to investigate parental anxiety after five years of participation in The Diabetes Prediction in Skåne study, DiPiS. The study follows children with high risk for type 1 diabetes annually from 2 years. Differences between mothers' and fathers' anxiety and potential factors associated with the level of parental anxiety that their child would develop type 1 diabetes were analyzed. Factors investigated included: having a first degree relative with type 1 diabetes, if the child developed autoantibodies, risk perception, frequency of parental worry and social demographic factors.

Methods: At age five years, parents to participating children separately answered a questionnaire regarding parental anxiety for type 1 diabetes diagnosis for the child. Anxiety levels were assessed using the State Anxiety Inventory (SAI) scale. Multinomial logistic regression was used for the analysis.

Results: The parents of 2129 5-year-old children participated; in 94% (n = 2003) both parents answered the questionnaire. In 67% (n = 1426) of the families none of the parents were anxious that their child would develop type 1 diabetes. Mothers had a higher risk of being anxious than fathers. Parental anxiety was increased by perceiving that the child had high risk for type 1 diabetes (mothers OR 4.75, 95% CI 3.29, 6.94, $p < 0.001$; fathers OR 3.19, 95% CI 2.07, 4.92, $p < 0.001$), a child with autoantibody positivity (mothers OR 1.94, 95% CI 1.16,3.21, $p = 0.01$; fathers $p = 0.616$), and decreased by higher education (mothers OR 0.74, 95% CI 0.57, 0.97, $p = 0.028$; fathers OR 0.70, 95% CI 0.51, 0.95, $p = 0.024$).

Conclusions: These findings may add to our understanding of the impact of screening of chronic diseases in children and its' relation to family anxiety and stress.

P030

When adolescents with type 1 diabetes drink alcohol, do they make safe choices around diabetes care?

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Objectives: Adolescents with type 1 diabetes (A-T1D) report similar levels of alcohol use as their peers, despite added risks due to having T1D (e.g., delayed hypoglycemia, reduced awareness of hypo- or hyperglycemia). To our knowledge, no previous studies have examined the extent to which A-T1D engage in diabetes safety behaviors around alcohol use (e.g., ensuring at least one friend knows s/he has T1D, increasing BG checks). We sought to determine whether A-T1D make safe choices when drinking alcohol.

Methods: Recruited via the T1D Exchange Registry, we invited A-T1D (age 15-18 years) to participate in an online survey on choices related to their diabetes care. We contacted A-T1D and their caregiver by phone prior to study enrolment to ensure both parent and A-T1D understood of the need for the A-T1D's privacy and confidentiality. 224 A-T1D (M age=16.4±1.1, 47% female, M A1c=8.3±1.3, 76.8% on insulin pumps) reported on the frequency with which they engaged in diabetes-specific risk-taking behaviors using a secure web portal, REDCap.

Results: Of 48 (21.4%) A-T1D who disclosed, “getting really drunk” at least once in their lifetime, Table 1 presents the number of A-T1D

Of those who disclosed "getting really drunk" at least once in their lifetime:	N	%
drank alcohol without a diabetes ID	30	61.2%
drank alcohol without eating carbohydrates	28	57.1%
went to sleep after drinking alcohol with no plan to check blood glucose overnight	27	55.1%
got so drunk they could not take care of their diabetes	15	31.3%
drank alcohol when no one around knew they had diabetes	12	24.5%

[Table 1. A-T1D Diabetes Care Choices when drinking alcohol]

who reported engaging in five diabetes-specific risks at least once in the last year.

Conclusions: In our national sample of A-T1D, about 1 in 5 self-reported getting really drunk at least once in their lifetime. Most drank alcohol without taking T1D safety precautions, and most thought they retained enough control while drinking to care for their diabetes. About a quarter of A-T1D drank alcohol without at least one person knowing they had diabetes. Given these findings, we recommend routine assessment of alcohol use for A-T1D and education about potential legal and diabetes-related health complications of alcohol use. Future research needs to explore interventions that may help A-T1D understand risks of alcohol use, and if they choose to drink how to do so safely.

Poster Tour 3 - Psychosocial Issues, Education, Nutrition, and Exercise

P031

An exploratory study of how young people experience and perceive living with Type 1 diabetes during late adolescence and emerging adulthood

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Introduction: Suboptimal glycemic control and psychosocial challenges are significant concerns for adolescents and emerging adults (young people) with type 1 diabetes (T1D). Knowledge about young peoples' attitudes towards living with T1D is inadequate, but the issue is important to improve glycemic control and psychosocial well-being in this population.

Objectives: To explore young peoples' perceptions of living with T1D.

Methods: An exploratory, qualitative design was employed. Data were collected through five participatory workshops with 19 young people (age 16-25). Data were thematically analysed.

Results: Participants' perceptions could be divided into five themes. *Special rules during youth*: Participants struggled with making T1D a priority in their lives. They justified the downgraded priority of T1D by the developmental state of youth. *Striving for autonomy*: Participants strove for autonomy, however, their need for autonomy was counterbalanced by their need for parental support. *An uncertain future:* Participants were uncertain about the outlook of their future in terms of diabetes-related complications, pregnancy and generic heritage of T1D. *Social support:* Participants sought and received social support from family and friends, although preferences for support ranged from wanting minimal involvement of others, to wanting and benefitting from assistance. *Stigma and disclosure:* Participants perceived T1D as stigmatized. Disclosing T1D presented participants with a dilemma that included balancing the pros of having others help them if something acute occurred with not wanting them to know about their T1D because they did not want to stand out because of their diabetes.

Conclusions: It is important to probe for the multiple and interrelated social contexts that underlie young peoples' motives for adhering to and deviating from treatment regimens. Future studies should focus on stigma mechanisms, the role of friends, and facilitation of balanced parental support.

P032

The influence of psychosocial factors on the risk of eating disorders (ED) in youths with type 1 diabetes (T1D)

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The confluence of T1D & ED results in higher rates of morbidity & mortality, thus early detection of ED in persons with T1D is necessary. There is little evidence on what issues should be assessed in order to early detect ED in persons with T1D. The objectives were to analyze the influence of psychosocial factors on the ED risk in youths with T1D; and to compare the parent reported ED symptoms with the scores of ED screening tests. 59 youths (9-25 y.o.) with T1D answered validated questionnaires to assess ED risk (EAT-26 and EPAD-R -Spanish version of DEPS-R-), depressive symptoms (CDI/BDI), anxiety (SCAS/STAI), distortion & body dissatisfaction (TSA), and aesthetic models influence (CIMEC12/CIMEC26). Parents answered questions about ED symptoms (adapted SCID interview, DSM-V criteria). According to EPAD-R, the most related factor to the risk of ED was the presence of disordered eating behaviors (chEAT R^2=42'8, panova=< 0'001) in children and early-teens, while the presence of depressive symptoms (BDI R^2=53'7, panova=0'005) was more predictive for older-teens and young adults. In both age groups, the influence of body aesthetic models was decisive (CIMEC p=0'021 & 0'006, respectively). The most frequent parent reported behaviors were Binge eating (17%), Continuous Food Concern (15%) and Negative Self-Assessment (13%). Those who had >1 symptom reported by parents also obtained higher scores in ED screening tests (Tscore=0,138 EAT-26 & 0,392 EPAD-R). Attending to our results, it is advisable to use the CHEAT+CIMEC-12 questionnaires for prepubertal children and to use the EAT-26+CIMEC-26+BDI in older youth in order to get a proper examination of ED risk in persons with T1D. Parent report was correlated to ED screening tools scores and significantly related to the presence of purgative behaviors. Medical providers should be aware to educate patients and families to effectively focus on detecting unhealthy eating behaviors to avoid ED development.

P033

Stigma and discrimination as barriers for adolescent transition in type 1 diabetes (T1D) care

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Objective: To document the perspectives of adolescents with T1D regarding possible interventions for a new T1D adolescent transition program.

Methods: We used a mixed method study design consisting of two-hour long focus groups (n=5) with an embedded survey where participants rated different transition interventions on a 10-point Likert scale. We recruited 22 teens aged 16-18 from a tertiary care pediatric

diabetes clinic in British Columbia, Canada. An adult endocrinologist not involved in the clinical care of participants moderated focus groups, transcribed audio recordings, analyzed data using the grounded theory approach, and tabulated survey results. NVivo 12 was used for thematic content analysis.

Results: Participant characteristics included: mean (± standard deviation [SD]) age 17.1±1.1 years, 59% female, mean T1D duration 9.3 ±4.3 years, 86% in high school, 100% living with family, 59% Caucasian, 45% using insulin pump, mean A1C 8.1±1.7%. The major qualitative theme was acknowledgment of stigma and discrimination by adolescents with T1D. Many subthemes emerged: unwanted disclosure of diagnosis, concealment of self-care, shame associated with self-care, avoidance of self-care in social situations, prohibition of self-care by authority figures, public confusion between T1D and T2D, and possible solutions and coping strategies. None of the a priori-identified interventions in the survey addressed these issues. The top interventions identified were (mean score ± SD): medical summary of past T1D care (8.8±1.5), good communication between pediatric and adult providers (8.8±1.8), pediatric and adult providers in the same building (8.8±1.9).

Conclusions: Stigma and discrimination in T1D may be harmful to diabetes self-care and transition preparation. Innovative interventions such as dialogue about shared experiences, self-confidence building, and resilience education may help teens with T1D cope with stigma and discrimination as they transition to adult care.

P034
Occupational consequences and psychosocial burden among parents after diagnosis of type 1 diabetes (T1D) in their child: results of the German AMBA study

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Parents of a child with T1D have to coordinate their child's ongoing therapy with their own professional careers and the care for the whole family. In 2018 the AMBA-study assessed occupational, financial, and psychosocial consequences of children's diagnosis of T1D for parents and siblings.

In nine certified German pediatric diabetes centers or practices all parents of children with T1D (onset before age of 14 yrs.) were invited to anonymously answer a structured questionnaire on their occupational, financial and psychosocial consequences of diabetes onset. The questionnaire corresponds to a study in 2004.

A total of 1144 parents answered the questionnaire (939 mothers, 202 fathers) (81% of eligible families), 19.4% were single parents (2004: 11%), child's mean age at diagnosis 6.7±3.6 yrs. As consequence of their child's T1D onset 10% of the mothers gave up professional work, additional 39% reduced working hours and gave up career plans (2004: 14% stopped, 26% reduced working hours). Among fathers there were hardly any occupational changes. Relevant negative financial consequences were reported by 46% of families (2004: 44%). Increased emotional stress was experienced by 62% of mothers, 41% of fathers, 47% of children with T1D and 20% of siblings. Mental diseases were diagnosed in 13% of all mothers and in 18% of single mothers. The younger a child was diagnosed, the more pronounced were the negative occupational and psychosocial consequences mainly for the mothers (Chi^2 $p < 0.001$ each). In 23.9% of the families the T1D diagnosis has influenced further family planning.

The study demonstrates extensive psychosocial consequences of T1D for families, especially for mothers. Compared to the corresponding study in 2004, the burden has increased. Under current socioeconomic and therapeutic conditions, families still need more support to ensure their child's proper diabetes care and to preserve the psychological health of all family members.

P035
Moderators of externalizing behavior in youth with type 1 diabetes (T1D)

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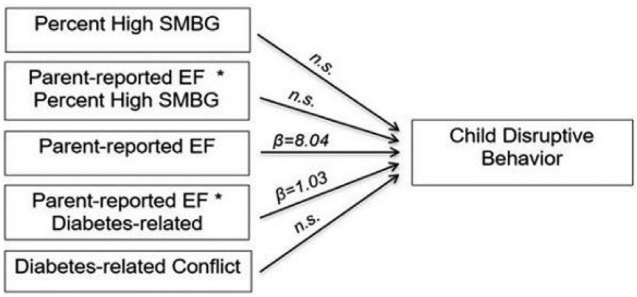
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Objectives: We examined the moderating effect of high blood glucose (BG) values and T1D-specific conflict on the relationship between parent-reported executive function (EF) and child externalizing behaviors in families of 5-9-year-olds with recent-onset T1D.

Methods: Parents completed the Behavior Rating Inventory of Executive Function (BRIEF) to measure child deficits in EF, the Eyberg Child Behavior Inventory (ECBI) to measure child disruptive behaviors, and the Diabetes Family Conflict Scale (DFCS) to measure T1D-specific conflict. We used self-monitoring blood glucose device uploads to calculate percent of high BG values. We entered data into a moderated path analysis using MPlus8 (Figure 1). We used fit indexes to assess model fit.

Results: There are 125 parent-child dyads in the sample. Child mean age was 7.45 ± 1.34 years, mean time since T1D diagnosis was 4.61 ± 3.19 months, and 52% were female. Mean child hemoglobin A1c (HbA1c) was 7.63 ± 1.37% (58±9 mmol/mol). Parent mean age was 36.62 ± 6.40 years and 88% were mothers. The overall fit of the model was good. The path analysis revealed a direct effect for parent-reported EF and child disruptive behavior ($\beta = 8.04$, $p = .01$). Further, the model indicated that T1D-specific conflict moderated the association between parent-reported EF and child disruptive behaviors ($\beta = 1.03$, $p = .01$). We did not find percent of high BG values to be a significant moderator.

Conclusions: Our results suggest when parents perceived more deficits in child EF and reported increased T1D-specific conflict, they reported greater frequency of child disruptive behaviors. The new-diagnosis period may be important to intervene on T1D-specific conflict between the parent and child with T1D. Increased child disruptive behaviors can be problematic for T1D management, and an increase in T1D-specific conflict may escalate challenging behavior for children with EF deficits.



[Figure 1: Moderated Path Analysis]

P036
Converging themes on how to culturally adapt a validated preconception counseling (PC) program for adolescents with diabetes (DM) from three diverse groups: healthcare provider (HCP) perspective

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Objective: Minority adolescent girls (e.g., African American(AA), American Indian/Alaska Native(AIAN), Latinas) have higher risk for obesity, DM, gestational DM(GDM), and reproductive health(RH) complications. READY-Girls (RG) is an ADA PC-program for teens with T1D to raise awareness on healthy pregnancies, but lacks cultural specificity. We explored converging themes in 3 separate studies from recommendationson culturally tailoring RGby HCPs who care for one of these three populations.

Methods: Data were collected using focus groups, individual interviews, expert panels with mental models; in-person or teleconference. Sample size of HCPs who cared for AA=9, for AIAN=16, and Latinas=8. HCPs were experts in DM, adolescents, PC and/or RH. HCPs shared their perspectives on RH issues in either AIAN teens at risk for GDM, or AA and Latinas with existing T1D and T2D; and feedback on tailoring RG video/booklet. Dialogues were recorded and transcribed verbatim.

Results: Content analysis identified 4 converged themes: 1)Social determinants (e.g., AA, AIAN, Latina: access to healthcare, lack insurance). 2)Family-centered healthcare, community involvement (AA: family routines conflict with healthy lifestyle; AIAN: girls communicate with mothers/aunts; Latina: sensitivity to family dynamics/inclusion). 3)Incorporate cultural aspects/beliefs into PC (AA: build self-efficacy to control lifestyle, belief in fate; AIAN: use AIAN motifs/images, avoid using directive language; Latina: use "family and marriage", avoid revealing photos. 4)Trust between patient-HCP (AA: earn trust; AIAN: listen and respect teens' autonomy; Latina: HCP of same culture/bi-lingual Spanish, be holistic).

Conclusion: Similarities and differences between minority groups must be considered when adapting educational interventions. Themes from HCPs in this study could be considered as potential salient factors across groups when culturally tailoring sensitive topics such as RH and PC for diverse communities.

P037
Prevalence of obesity and prediabetes in adolescents and young adults in urban Ahmedabad

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Aim: To find the prevalence of obesity and prediabetes in age group of 14-18yrs in the urban Ahmedabad city and provide them necessary education for a healthy lifestyle.

Methodology: An initiative of screening the teenagers for obesity and prediabetes between the age of 14-18 yrs. has been undertaken by the team of diabetologists, nutritionists and diabetes educators along with social workers and counsellors.

Under this initiative, the team visits schools and measures the anthropometric data of the kids for calculation of BMI. A random Blood Glucose is carried out and all those with a reading of above 200 were asked to undergo a glycated haemoglobin test. Also, those with signs and symptoms of insulin resisitance like acanthosis nigricans, double chin, buffalo hump, high abdominal girth and obesity (BMI > 25) were advised a glycated haemoglobin.

All the kids irrespective of their results were educated collectively on healthy lifestyle and prevention of life style disorders.

For those with obesity and prediabetic range of A1c were individually managed with necessary interventions. The ones with a positive diabetic A1c were managed according to the guidelines.

Results: In the past 1 year this initiative has been carried out at 12 schools. The number of kids screened was 1196.

BMI:

Underweight- < 18 kg/m2 = 42% (460)

Normal BMI - 18.5 - 22.9 kg/m2 = 51.2% (561)

Overweight- 23.0-24.9 = 1.2% (13)

Obesity- >25 kg/m2= 5.6% (62)

HbA1c

5.7- 6.4 = 31.6% (346)

6.4 and above = 0.8 % (8)

Conclusion: We wish to follow these kids to study the effect of the education on the change in their BMI and the glycemic status in the current year. We as a team also wish to cover more schools and screen a larger pool of population in the coming year.

P038

Exploratory study: learning perception from children and adolescents with DM1 attending to an educational camp for the first time

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The Juvenile Diabetes Foundation of Chile (FDJ) is a non-profit institution that seeks for support and education to people with diabetes, promoting adherence and persistence to treatment. FDJ has organized camps for youth with DM1 for over 30 years. However, to date, no systematized data is available to analyze the impact of an educational camp on its participants' learning.

Objectives: The aim of this study was to explore the learning expectations of the campers before attending to the camp and the perception of learning afterwards.

Methods: Campers (8 to 18 years old) were interviewed one month before the summer camp and one month later. Doubts about the treatment and what they would like to learn about it were explored, and subsequently their perception about the learning acquired in the camp. Of the 41 interviews conducted initially, only 27 were completed at the end of the study. The data was collected and analyzed through Grounded Theory, generating categories to group the results.

Results: Learning expectations described by the campers before attending to camp coincided with their learning perception reported after camp. Described learnings were mainly related to the following areas: injection techniques; self-monitoring; symptoms identification; hypoglycemia and hyperglycemia treatment; and recognizing food with and without carbohydrates.

Conclusions: Assistance to an educational camp appears to fulfill campers' learning expectations as confirmed by interviews results. Participation of youth DM1 to camp activities seems to develop a positive perception of learning, strengthening campers knowledge and skills necessary to make decisions and carry out treatment tasks appropriately. Further research will be needed to determine which specific aspects and activities of the camp are directly related to the acquisition of the referred learnings.

P039

Evaluation of community-based education for dietetic students attending and assisting at a camp for children with diabetes

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Introduction: Final year dietetics students assist at the annual "Kids Diabetes Camp" in Bloemfontein as part of community-based education in the undergraduate syllabus. Students plan, prepare and present meals and organize educational activities and games. Students observe glucose testing and injecting of insulin and interact with children to hear their stories.

Objectives: To report on student self-assessment of their knowledge and skills of diabetes care and reflection of their camp experience.

Methods: Self-assessment of 21 items of knowledge and skills regarding diabetes care in children was completed by 34 students before and after the camps of 2015, 2016 and 2017, using a Likert scale (1=none to 5=good). Students also submitted an open written reflection of their camp experience which was summarized in themes.

Results: Thirty students (30/34) completed all 21 self-assessment items (total possible score 105). The median score was 64 (range 38-84) before and 81 (range 45-101) after the camp. Most improvement was seen in blood glucose testing with a glucometer, use of continuous glucose monitoring, choice of appropriate pre-meal insulin dose, insulin injection technique, knowledge of insulin devices, management of hyper- and hypoglycaemia, testing and responding to night glucose levels and assisting children with food choices. The prominent themes included in the student reflections were: value of spending time with children with diabetes for full days and learning from them; gaining respect for children's self-discipline and ability to cope with difficult experiences at school or home; the importance of teaching carbohydrate counting skills and the experience of teamwork among the students in preparing meals.

Conclusions: Including "Kids Diabetes Camp" in the undergraduate dietetics syllabus is a win-win strategy: Students gain skills, learn from children with diabetes through close interaction and contribute to the successful functioning of the camp.

P040

Assessment of school teachers' knowledge and competences on type 1 diabetes management

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Objectives: Teachers' knowledge about Type 1 diabetes (T1D) and their competences in handling urgent or ordinary situations may impact on children's and parents' burden related to T1D management at school. The objective of this study was to assess the knowledge and the abilities to manage T1D among a group of school teachers in Milan.

Methods: A total of 160 teachers of the city of Milan, were asked to complete a 12-items questionnaire on T1D knowledge and management during common school settings. The mean age of the teachers (96% female) was 47.5±8.2 years, with a mean number of years of teaching of 21.1±11.1 years. Teachers with at least one student with T1D in their class were 31.3%, only 5% attended educational course

on T1D previously, while 39.4% reported they had to face emergencies related with T1D at school.

Results: Overall, 60% of teachers reported to have none/or very poor knowledge about diabetes. Up to 63% of teachers correctly answered to general knowledge questions on diabetes causes and therapy; basic competences on hypo and hyperglycemia definition and management were overall correctly addressed by 49% of the group; a good rate of the teachers (71%) knew physical activity is a key stone in T1D treatment but only one third of them (28%) was aware of possible related glycemic excursion; the majority of teachers (62%) recognized the correct diet composition for T1D while more than 60% usually suggest special snacks to T1D children in case of birthday party at school. Teachers who declared to have no/poor competences on T1D had the lowest total score. No significant associations were found between teachers scores and age, teaching years, experience with T1D students; while a positive association was found with previous experience of emergencies.

Conclusions: Data from this study suggest the need for continuous and extended programs for T1D management at school specifically tailored for teachers.

Posters on Display – Psychosocial Issues in Diabetes

P042

A qualitative study of schools that support students with type 1 diabetes

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Schools have an important role to play in supporting the psychosocial health of young people with T1D and studies have found that good school-based diabetes care and support for students is related to better diabetes management and quality of life. However, research has indicated that support for students with type 1 diabetes (T1D) across schools in Western Australia is inconsistent. Schools are often faced with challenges in providing support strategies for students with T1D and other chronic and mental health conditions and strategic capacity building is needed.

Aim: This project aimed to investigate how schools, perceived as being supportive of students with T1D, provide support for the psychosocial wellbeing and disease management of these students.

Method: Semi-structured interviews were conducted with school staff, students and parents. Nine schools participated in the study.

Results: Participating schools provided various levels of support for students with T1D ranging from interpersonal support such as emotional support through to support of an organisational type including policies and communication plans. Therefore, school support for students with T1D was depicted using a bio-ecological framework. Participating schools also discussed the characteristics of the school that enabled support for students with T1D including an inclusive and flexible culture.

Conclusion: The findings provide a framework of psychosocial support and disease management that can be used to enhance the capacity of all schools to support the wellbeing of students with T1D.

P043

Manipulation of capillary blood glucose meter readings, clinical cases and experimental trial

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We present 2 adolescents with Type 1 Diabetes (T1D) whose HbA1c 10.5% & 10.7% were discordant with capillary blood glucose (BG) recorded in their glucose meters (GM) *Accu-chek Performa®* (186 ±80 & 116±63 mg/dl, with 6.0 & 6.1 BG per day). Both had frequent hypoglycemia and immediate repetition of high values with lower values in the second sample. One girl was started on insulin pump with continuous glucose monitoring, showing low sensor adherence from the beginning, with frequent issues as prolonged signal loss, defective sensors, calibration failures and her dog broke the transmitter. She was admitted twice with hyperglycemia and ketosis having adequate BG recorded just before the episodes.

Objective: To reproduce a suspected manipulation of BG results.

Method: A volunteer with T1D was submitted to 50 BG with a similar GM during a 24-minute period. BG was measured adequately 3 times at the beginning (BG=170, 184 & 189mg/dl) and once at the end of the experience (BG=164mg/dl). The BG technique was modified reducing the volume or diluting the blood drop with water or alcohol. BG was considered false by manipulation if it was >15% over or below 181mg/dl (mean initial value).

Results: The GM recorded 29 out of 50 readings, none of the "error readings", (85% error 4, 15% error 1) were stored (n=21). BG diluted with alcohol (n=5) were 100% false high (BG=364, 232, 245, 214 & 201 mg/dl). BG diluted with water (n=20) were 10% correct (BG=186 & 180mg/dl), 40% false low in the target range (BG=155, 76, 122, 103, 115, 154, 104, 105mg/dl), 15% false low in hypoglycemia risk range (BG=61, 67, 56mg/dl) 20% false low < 54mg/dl (BG=19, 31, 27, 17mg/dl), & 15% false severe low (BG=Lo).

Conclusion: Some patients may manipulate BG results in the GM to fit with family and providers expectations. This practice should be suspected when HbA1c and BG are discordant, with excessive BG test strips consumption compared to the records, and when BG is often repeated with dissimilar results.

P044

Prevalence of somatic symptom disorder requiring hospitalization in children and adolescents with type 1 diabetes mellitus

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Introduction: Prevalence of somatic symptom disorder (SSD) in pediatric patients with type 1 diabetes mellitus (T1DM) in unknown.

Objectives: To investigate the prevalence of SSD that required hospital admission in a cohort of T1DM patients with age < 18 years.

Methods: This study comprises data from 67 patients with T1DM < 18 years (47% female, 49% on insulin pump, median age 13.4 years [IQR 11.1-15.4], median duration of T1DM 6.0 years [IQR 3.9-8.6], median HbA1c at last visit 7.3% [IQR 6.9-7.8]) followed in the Institute for Child and Maternal Health IRCCS “Burlo Garofolo” in Trieste, Italy. Data on T1DM patients with hospital admission for SSD (according to DSM-5 criteria introduced in 2013) were collected.

Results: The prevalence of T1DM pediatric patients admitted in Pediatric Department with a final diagnosis of SSD was 7.5% (n=5) in our sample. Median age of patients was 14.76 years, median duration of T1DM 7.4 years, median HbA1c at last visit 7.5%, 80% on insulin pump. Median length of admission was 4 days [range 1-7], with a median of 2 accesses to emergency department prior to admission

[range 0-9] and a median of 2 investigations performed to rule out organic diseases [range 1-4]. One patient was admitted twice (the first reported symptom was left leg pain, the second - after 2 years - abdominal pain). One patient reported several symptoms (abdominal pain - visual disturbances - knee pain). Abdominal pain was reported in 4 out of 5 patients, the other had deglutition problems.

Conclusions: Although the prevalence of SSD in general population is unclear, it is supposed to be 4-6%. A history of physical illness and treatment is reported to increase the risk of developing SSD. In our study we found that the prevalence of SSD in T1DM patients requiring hospitalization is 7.5%. Diabetes health care professional should always be aware that any illness trigger may set off a cascade of symptoms and lead to prolonged recovery or symptom recurrence after illness resolves.

P045
Motivational interview to improve metabolic control in adolescents with poorly controlled type 1 diabetes: A randomized controlled trial

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Introduction: Poor glycemic control during adolescence markedly increases the incidence of later micro- or macrovascular complications in type 1 diabetes (T1D) patients. At the same time, treatment adherence declines and results in increased HbA1c level. At present, technical advancements in insulin delivery fail to address these challenges in self-care. Thus, easily adoptable methods that improve insulin treatment adherence are needed to overcome problems faced by adolescent T1D patients. We investigated whether motivational interviewing (MI), a counseling approach designed to facilitate intrinsic motivation in the patient to change behavior, improves glycemic control and variability in poorly controlled adolescent T1D patients.

Methods: In this national, multicenter, randomized controlled trial, adolescent T1D patients (n=45), aged 12 to 15.9 years, with poor glycemic control (HbA1c > 75 mmol/mol) were randomized to either standard education (SE) or MI plus SE group for 12 months. Half of the study physicians were randomized to employ MI in patient care and participated in a 2-day course on the use of MI. The patients were followed 3-monthly. The main outcome measures were changes in HbA1c, time in range (TIR) and glycemic variability (CV). Study is registered at clinicaltrials.gov (NCT02637154).

Results: The mean adjusted 12-month changes in HbA1C were similar in the MI plus SE and SE groups (-3.6 vs. -1.0 mmol/mol, respectively, P=0.57). Similarly, no differences between the groups in mean adjusted 12-month changes in TIR (-0.8 vs. 2.6 %, P=0.53) and CV (-0.5 vs. -6.2, P=0.26) were evident. The patient recruitment number however correlated with the 12-month change in HbA1C in MI plus SE group (r= -0.5, P=0.006) but not in the SE group (r= 0.2, P=0.4).

Conclusions: The use of MI by diabetologist in the management of adolescents with poorly controlled T1D is not superior to SE alone. However, increasing experience with the method may improve outcomes.

P046
Insulin edema in a 14 year poor adolescent girl with type 1 diabetes mellitus due to surreptitious [but not therapeutic] self insulin use [project DISHA: receiving free medical care]

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Introduction: Insulin edema is an uncommon complication of insulin therapy, mostly appreciated in patients soon after the commencement of insulin therapy. Rare instances of progression to overt cardiac failure, development of pleural effusion and nephrotic syndrome have been reported

Objective: Insulin edema in T1DM adolescent due to surreptitious insulin use triggered by psychosocial stressors

Methods: T1DM age 6 y; recent HbA1c 12.5%, chronically poorly controlled, despite intensive basal bolus insulin [48 units/day self-administered regular and NPH human].

Most enigmatically, presented with multiple episodes of unexplained hypoglycemia with BGs 30-60 mg/dl and “apparently” grossly decreased insulin requirements. Despite lowering insulin doses by treating team [to only 4 units for whole day!!!! disappearing T1DM????], hypoglycemias continued, with new symptoms of rapid weight gain, swelling face/limbs/abdomen, dyspnea- following 2 days. No evidence of acute/sub-acute renal/hepatic/cardiac/pulmonary/infectious disorders. Treated with fluid and salt restriction.

No further hypoglycemia episodes; rapidly improved [disappearance of dyspnea and anasarca].

Results: Various psychosocial [death of father, single parent etc] and economic [less educated working mother] challenges faced by family, and a very recent psychological stressor [impending school examinations] were discovered, with diagnosis of surreptitious insulin use. Persistently high HbA1c, with recent lower serum fructosamine supported diagnosis of transient "improved blood glucose", due to recent short lived overdose of insulin.

Conclusion: Insulin edema is mostly appreciated in newly diagnosed or poorly controlled diabetes, usually shortly after starting intensive insulin therapy. This is the first documented case of insulin edema in a previously diagnosed T1DM in a non-DKA setting, due to surreptitious self-insulin use, and not due to institution of insulin therapy by medical team.

P047
"VIG-Diabetes": assessing the effect on glycaemic control of a video based intervention to improve communication skills in young people with type 1 diabetes

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Introduction: UK outcomes for glycaemic control are poor. Non-engagement with HPs in the adolescent age group is common and a barrier to self-management. NICE has recommended that structured behavioural intervention strategies should be offered to young people as the evidence suggests that these improve psychological well-being and glycaemic control. Video Interaction Guidance (http://www.videointeractionguidance.net/) is an evidence-based technique which supports HP-patient interactions. The VIG method has been successfully adapted for use in the paediatric diabetes out-patient clinic, ´VIG-Diabetes´.

Objectives: to assess through a randomised controlled trial the effect of ´VIG-Diabetes´, a clinic based, cost neutral intervention to promote effective communication between young people with Type 1 diabetes; to improve their engagement with HPs and overcome barriers to self-management. Secondary outcomes: Well-being, quality of life, self-efficacy, treatment satisfaction.

Methods: The impact of ´VIG-Diabetes´ on glycaemic control (HbA1c) of YP(age 13-18) was assessed through a pilot study. VIG was delivered using a tablet computer with in-built video editing facilities. Videoing took place during the routine clinic appointment. The video was edited by the researcher and used to facilitate shared discussion around successful clips of incidences where the YP and HP use the VIG principles in an ´attuned´ manner ie showed evidence of effective two-way communication. YPs were randomised to either intensive support ie monthly clinic appointments for 3 months or intensive support enhanced with VIG.

Results: 11 YP were recruited to the study. 10 of the 11 YP completed all three sessions. HbA1c did not deteriorate in the intervention group compared with control (no statistical difference).

Conclusions: VIG is a well received intervention to support two-way communication between YP and HPs. VIG may be effective in supporting YP who wish to change self-management behaviour.

P048
Quality of life related to health according to the perception of children between 8 and 12 yeras old with tipe 1 diabetes and their parents in a public hospital in Córdoba, Argentina

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Introduction: The quality of life related to health (HRQoL) affects the well-being and treatment of people with diabetes.

Objective: To know the perception of HRQoL among children with type 1 diabetes and their parents.

Methods: Descriptive, analytical, cross-sectional study. PedsQL test was administered in children between 8 and 12 years old and their parents,

Results: 46 families, 26 girls, 20 boys, 80% of the parents were female. The children obtained an overall score of 80% and the parents of 83%. In the emotional block, the children obtained 75% and the parents 67%, in the physical one,the children 83% and the parents 90%, and in the school block, children 71% and parents 76%. Patients with social coverage 82% and without coverage 77%. Families that attend educational workshops 81% and those that do not attend 79%. The correlation between the time of evolution of the disease with the perception of HRQoL in children is -0.096.

Conclusions: There is no significant difference between the perception of HRQoL of children with diabetes and their parents. Significant differences were found when analyzing blocks. Parents have better perception in the physical and school blocks, and worse in the emotional one. Having social coverage improves HRQoL. The perception of quality of life decrease in children as time of evolution of diabetes passes.

Keywords: Quality of life related to health. Diabetes.Children.

P049
Examining the relationship between adolescent type 1 diabetes-specific quality of life and parent-adolescent communication

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Introduction: During adolescence responsibilities for type 1 diabetes (T1D) management shift from being parent dominant to adolescent dominant. Self-management of T1D is arduous and living with T1D can negatively impact on the quality of life (QOL) of adolescents. Previous research indicates that greater T1D-specific conflict within the family predicts lower QOL for adolescents living with T1D.

Objectives: This research aims to examine the relationship between T1D-specific QOL of adolescents and characteristics of parent-adolescent communication.

Methods: Adolescents (n=113) living with T1D, aged between 11 and 17 years completed questionnaires measuring T1D-specific QOL and parent-adolescent communication. Adolescents were recruited via a national paediatric diabetes and endocrine unit and a national diabetes advocacy organisation.

Results: Significant (p< .05) negative correlations were observed between open parent-adolescent communication and the following aspects of T1D-specific QOL: impact on activities (r_s=-.22), parent issues (r_s=-.38) and T1D worries (r_s=-.17). No significant correlations were observed between openness and impact of symptoms and impact of treatment. Significant negative correlations were observed between extent of problems in parent-adolescent communication and impact of treatment (r=-.23), impact on activities (r=-.24), parent

issues (r=-.51) and T1D worries (r=-.31). A non-significant relationship was observed between problems in parent-adolescent communication and impact of symptoms.

Conclusions: The findings indicate that more open and less problems in parent-adolescent communication is associated with greater perceived QOL for adolescents living with T1D. Health care professionals should be aware of the potential for interactions with parents to impact adolescent QOL. Promoting openness in parent-adolescent interactions and reducing instances of problematic communication may contribute to less perceived impact of T1D on adolescent QOL.

P050
Silent heroes: parent and carer needs and perspectives about supporting their children living with type 1 diabetes

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The objectives of the Diabetes Victoria (DVic) study were: to learn from the experiences and needs of parents and carers (PAC) raising children with type 1 diabetes (T1D); and to identify opportunities to provide greater support to families.

A qualitative study involving a series of in-depth, semi-structured telephone interviews was undertaken with PAC raising children with T1D. The participants of the Diabetes Camps Victoria program (DCVP) between October 2017 and April 2018 were invited to participate.

Thirty-five interviews were conducted.

Key findings were:

- The DCVP provides a unique and positive experience for children with T1D, however it lacks the structure to support empowered children with T1D.
- The diagnosis of T1D impacts on the emotional health of PAC, causing concern for their child's future and for their other children.
- It's difficult for families to connect with others going through a similar experience and life-stage with respects to their children with T1D.
- Life-stage-specific information from a credible lived experience and a clinical perspective is difficult to find.
- All relevant DVic programs would benefit from greater collaboration with lived experience experts.

Key recommendations were:

- Provide feedback to DCVP staff regarding the need to support empowered participants.
- Form a PAC Steering Committee.
- Develop more opportunities for families to connect with others affected similarly by T1D.
- Develop a webinar series presented by lived experience experts and clinicians for PAC and children with T1D covering specific life-stages.
- Investigate the experiences and needs of PAC whose children with T1D have not participated in the DCVP.

DVic values the experiences and needs of PAC raising children with T1D. Based on these findings, we must commit to improving support for this group, broadening the scope of our investigations and continue to share our learnings.

P051
Mind the gap [Psychological Bridge in DM1]

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Introduction: DM1 is life-long condition with rising prevalence, which has an enormous impact on family´s lifestyle and national well-being. It´s an irony that whereas medical technology is evolving, the update of these advances are limited proportionately. One of the reasons is lack of structured, evidence drive & innovative psychological support, that can help family accept the past, cope with the present and prepare for the future.

Objectives:

Phase 1 - To identify the single most psychological challenge faced by families with DM1

Phase 2 - To access and implement the satellite model of "My Sugar-Buddy"

Methods: This pilot project was based and run at a relatively large DGH (district general hospital) in South-East London, sponsored by Diabetes-UK.

All of our 290 patients / families were offered to participate in this study, of which 254 agreed. They were followed up for 12 months and data was collected using digital questionnaire (Yes/No format).

Results:

Phase 1 - The "single-most" psychological issues bothering the family / patient was identified, risk-stratified based on age-group -

- **Pre-School Children - "Fear of Hypoglycaemia"**
- **School going Children - "Peer pressure" (with or without bullying)**
- **Teen-agers - "Sense of Guilt" !!!**

Phase 2 - Patients / families were offered immediate, satellite (outreach, including telephonic) appointments and were then paired up with their **"Sugar-Buddies" -** children / families in same boat as them.

After 12 months, the psychological well-being was accessed quantitatively and 89% patients / families reported as being satisfied or above.

Conclusions:

- Paediatric psychology services in DM1 need to structured based on evidence-drive, focus-based and readily- accessible format.
- Psychological issues vary based on age-groups, which needs to be kept in mind while offering psychological support.
- Peer-groups and satellite-models have better acceptability, compliance and positive outcome rates.

Poster Tour 11 - Psychosocial Issues, Education, Nutrition, and Exercise

P052
DEAPP (diabetes education application) a structured education program for newly diagnosed children type 1 diabetes

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Introduction: deapp "diabetes education application" a structured programme for children diagnosed with type 1 diabetes using flipped learning via a mobile optimised platform to enhance self-learning & self-management.

Objectives: A pilot to test deapp's ability to deliver the curriculum at diagnosis using flipped learning alongside physical resources. Does the ease & simplification of deapp reduce the time to train patients & enhance diabetes management?

Methods: 5 East Midlands paediatric units developed the app for patients at diagnosis following a standardised curriculum (based on ISPAD guidelines), a train the trainer programme for healthcare professionals (HCP) & physical resources to test knowledge.

Subjects: 191 patients. 1458 individual downloads.

Intervention: deapp programme via a 3 part learning process:

1.Watch deapp animated videos

2. HCP tests knowledge acquisition using physical resources

3. Continued learning post discharge.

Qualitative and quantitative outcomes were measured over 12 months.

Results: -Outcome data shows good usability: 100% uptake & 0 dropouts.

- Qualitative surveys showed no negative comments.
- HbA1c at 12 months was 57 mmol/mmol. Demonstrated parity compared to control groups using standard forms of education.
- Fear of Hypoglycaemia (Clarke scores) were low
- PAID questionnaire scores were low
- Kaufmann competency mean was 4.1 signifying attainment of core competencies for self-management at diagnosis
- HCP time for education was reduced by 7 hours per patient

Conclusion: deapp delivers structured education via a standardised format using trained educators, app & physical resources. Deapp is comparable to existing education programs. It represents a flexible, mobile training programme for diabetes self -education that is scalable for wider UK/ international use. It reduces time for education, giving a cost benefit. Comparison via a randomised control group is recommended to test outcomes vs standardised education.

P053
Interventions delivered by Certified Child Life Specialists (CCLS) to provide education and support for youth with type 1 diabetes (T1D) in an ambulatory setting

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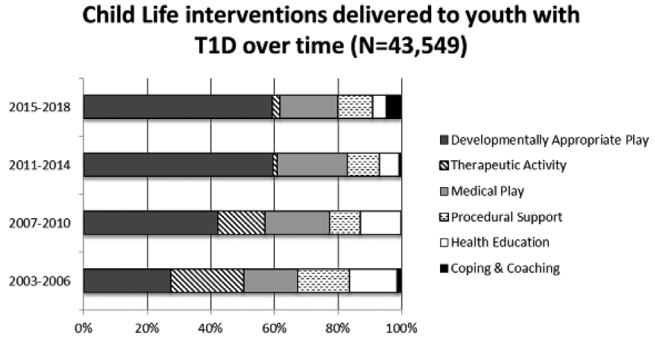
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Introduction: CCLS are healthcare team members with advanced knowledge of child development. These professionals often work in pediatric hospital settings to alleviate procedural fear and provide comfort. We incorporated CCLS in ambulatory diabetes care for >15 years to provide support and education in a developmentally age-appropriate manner.

Objective: To describe interventions delivered by CCLS and frequency of interventions in a pediatric diabetes clinic.

Methods: We analyzed CCLS interventions from 2003-2018 using computer records.

Results: CCLS team includes 2 CCLS and a supervising certified diabetes educator/social worker. CCLS activities occur within the pediatric clinic in the playroom, laboratory, and exam rooms and are delivered before, during, and after diabetes clinic visits. Over 16 years, there were 43,549 CCLS interventions with youth, varying from 1-6 per clinic visit, as children often receive >1 per visit. CCLS interventions fall into 6 categories, delivered at various frequencies: developmentally appropriate play (45%), medical play (19%), procedural support (12%), therapeutic activity (11%), health education (10%), and coping & coaching (2%). Over time, there was an increase in CCLS interventions using developmentally appropriate play and coping & coaching (see Figure). There was a decline in therapeutic activities and health education, while use of medical play and procedural support were relatively stable. A preliminary survey from a sample of families revealed that parents believed CCLS services led to increased support, satisfaction, and positive laboratory experiences for their children.**Conclusion:** CCLS interventions offer 'teachable moments' that can promote positive experiences in ambulatory diabetes care, leading to children's greater acceptance of T1D and prevention of future loss to follow-up care. Impact of various CCLS interventions on youth outcomes needs further study.



[Child Life interventions over time]

P054
Experiential learning in T1D technology education: knowledge of parents and providers

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Background: Experiential learning is beneficial for adult learning, however not all providers have opportunities to wear insulin pumps and continuous glucose monitors (CGM).

Objectives: We compared the knowledge of pumps and CGMs among pediatric endocrinology providers, with and without experiential learning opportunities, and T1D parents using multiple choice questions.

Methods: Pediatric endocrinology trainees, diabetes educators (CDEs), attending physicians, and parents of T1D children with A1c ≤7.5% were recruited for randomized cross-over studies assessing the effect of an online curriculum. The curriculum includes 40 questions, 20 focused on pumps and 20 on CGMs. Questions addressing devices *not used* by their child were excluded from analyses of the parents' performance. ANOVAs compared scores among the four groups of learners. T-tests compared scores of providers with and without experiential learning opportunities.

Results: To date, participants include: 20 attendings, 33 CDEs, 62 trainees, and 30 T1D parents. 64% and 57% of providers had experiential learning opportunities with pumps and CGMs, respectively. The mean ± SD percentage of pump questions answered correctly were: CDE 59 ± 11%, Attending 57± 11%, Trainee 49 ± 14%, Parent 49 ± 15%. There were significant differences among the groups (p=0.006). The only between group difference was superior CDE performance relative to trainees (p=0.01). There were no significant differences among the groups in mean percentage of CGM questions answered correctly: Attending: 58 ± 15%, Parent: 58 ± 16%, CDE: 56± 16%, Trainee: 52 ± 17%. Providers who had experiential learning opportunities with pumps (p=0.03) and CGMs (p=0.047) performed better than those without on the corresponding questions.

Conclusion: Knowledge of pumps and CGMs among a select group of T1D parents appears comparable to that of providers. Experiential learning improves provider knowledge and should be a routine part of T1D technology education.

P055
Personalized training for the school personnel of each child is more effective than general information conference for the management of children with T1D in the school

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Introduction: In Italy, a national plan for the inclusion of children with diabetes at school recommend an education training for the school personnel (SP). This education can be provided as personalized training (PT) for each child during a meeting in the school or as a general information conference with all the SP of the local area.

Objective: Aim of this study was to evaluate the education program for SP for the management of children with T1D at school.

Methods: A cross-sectional nationwide survey on parents of children with T1D was carried out September-November 2018. A parent-reported questionnaire was used to collect demographic and clinic data, including information on blood glucose control, insulin injections before meal, correction of hyperglycaemia, participation in leisure activities. A question asked the parents if the education training was performed directly in the school as a PT for their child or provided as a general information on diabetes for teachers during a local conference. Multiple correspondence analysis was performed to explore the association between the variables evaluated altogether.

Results: Overall, 1450 questionnaires were obtained. Children median age was 11 years (IQR: 8-14), median diabetes duration 6 years (IQR: 3-10), median HbA1c 55 mmol/l (IQR: 50-62). 521 parents out of 1262 responders reported a PT for SP. Results from MCA showed that a PT provided by a health-care professional team was associated to a higher frequency of at target A1c, correction of occasional hyperglycemia at school, no. of blood glucose controls and insulin administration made by school or health-care personnel, children's participation to leisure school activities.

Conclusion: A better management of children with T1D is associated with SP programs provided directly in the school than general conference. These programs should be conducted by trained health-care professional teams.

P056
Social deprivation is an important determinant towards the practice of routinely downloading blood glucose data at home for families and children with Type 1 Diabetes

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Background: Routine downloading and review of blood glucose data is part of clinical practice of healthcare providers in an outpatient setting, patients and families are educated and encouraged to regularly download and review blood glucose data at home in order to make adjustments to insulin dosing. In this study, we describe the characteristics between two groups of patients with T1D who routinely download and review their blood glucose data at home compared with a cohort that do not download data at home.

Methods: Patients and families were considered "routine downloaders" (RD) if their blood glucose device data was downloaded and reviewed at home at least once a month between routine clinic visits which was scheduled every three months. "Non-downloaders" (ND) were defined by those who did not download or review data at home at least once a month, despite being educated on the use of free software. We evaluated demographics, socioeconomic deprivation, quality of life and HbA1c between RD and ND patients.

Results: 98 patients were included in the study (52 males) with a mean age at diagnosis of 7.4 years (SD±3.8, range 1.1-15.0). The patients' characteristics are reported with 33 patients in the RD group and 65 patients in the ND group. Mean HbA1c (mmol/mol) in the preceding 12 months was significantly better in the RD group (60 vs 66, p=0.03). The ND group had significantly poorer overall deprivations scores, poorer employment and education levels (p< 0.05). Multivariable logistic regression analysis examining the factors affecting families downloading found that overall deprivation was the only independent determinant (p=0.03).

Conclusions: This study shows that social deprivation is an important determinant towards the practice of routinely downloading data at home for families and children with T1D. Healthcare professionals should target deprived areas with further support, education and resources for management of T1D.

P057
Parent perceptions of the content and timing of education and resources during the recent-onset period of type 1 diabetes

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Objectives: To examine parents' perceptions of the type and timing of education, intervention, and resources needed following their child's diagnosis of type 1 diabetes (T1D).

Measures: Thirteen parents of children with recent-onset T1D (92.3% mothers; parent age=35.1±6.9yrs; child age=8.9±0.8yrs; time since diagnosis=11.3±7.0mos) sorted 55 cards related to T1D management according to when the information might be most relevant during the recent-onset stage. Timepoints included: ≤1mo, 3-6mos, 6-9months, 9-12mos, ≥12mos post-diagnosis, and Never/Not Relevant. Independently, researchers grouped the cards into seven thematic categories: Family Communication/Conflict (Com/Con); Parenting; T1D Management (Manage); Basic T1D Education (BEdu); T1D-related Anxiety (Anx); Adjustment to illness/Quality of Life (Adj/QOL); and T1D-related Distress (Distress) (87% inter-rater reliability).

Results: Parents sorted most of the Manage category cards (84.6%) as most relevant for education ≤1mo post-diagnosis. They sorted cards from the Com/Con (53.8%; M=2.2±0.5), Parenting (53.8%; M=2.2 ±0.5), Anx (61.5%; M=2.2±0.6), and BEdu (76.9%; M=1.6±0.2) groups as most relevant for education 3-6mos post-diagnosis, while they sorted cards from the Adj/QOL (53.8%; M=2.4±0.8) and Distress (46.2%; M=2.5±0.9) groups as most relevant for education 6-9mos post-diagnosis. Overall, parents sorted very few cards in the sorting task as 'Not Relevant' for education, but one card most consistently sorted as 'Not Relevant' was, "What to do when children are having difficulty sleeping" (n=4 parents; 31%).

Conclusions: Hospitals may standardize T1D education in the recent-onset period. Our results here give insight into the topics and timing of topics that parents perceive most relevant for education. Notably, parents identify topics specific to communication, conflict, parenting, and anxiety, in addition to T1D management, as relevant for education in the recent-onset period of T1D.

P058
A Shared Decision Making (SDM) approach to engage youth with type 1 diabetes (T1D) in Cardiovascular Disease (CVD) prevention

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CVD is the leading cause of premature death in people with T1D, yet many are unaware. Strategies to engage youth in CVD prevention are needed. The purpose of this study was to evaluate a SDM approach to CVD prevention in youth with T1D. Using a quasi-experimental design, teens and young adults (n=80; 18.1±1.5y, 41% female, 86% White) attending a DM clinic at a large pediatric center and parents (n=64) were enrolled in the intervention (IG) or control (CG). Both groups were seen by their DM care team; IG also participated in a DM educator (DE)-led interactive group session with peers. A SDM aid about CVD modifiable risk factors was used to discuss target metabolic values, negotiate self-care decisions that influence risk reduction and collaboratively set behavioral goals to achieve desired values. Parents participated in a similar session, and discussed ways to support youth. CVD-related knowledge, self-care behaviors and DM distress were assessed at baseline and 3-4 months later, on average; changes were compared between study groups. Intention to change behavior and SDM skill development were assessed in the IG at follow-up.

CVD-related knowledge, which was low in youth at baseline with only 11% reporting understanding the connection between DM and heart health, significantly improved in IG versus CG (p=.032). DM distress was mitigated in both groups. At follow-up, IG reported intention to take steps to prevent CVD (81% youth, 88% parents) and monitor CVD risk (81% youth, 100% parents). IG also reported SDM skill development: 81% of IG youth increased understanding of how to discuss heart health with their care team, and 88% of parents were better prepared to include their child in DM-CVD discussions. In addition, 94% of IG parents better understood how to support their child in DM management. In conclusion, this project demonstrated early benefit of a SDM approach to CVD prevention. Further study is needed to determine if initial gains lead to CVD risk reduction.

P059
A qualitative analysis of providers' experiences wearing CGM

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Objectives: To explore the experiences of pediatric endocrinologists and trainees without diabetes while wearing a continuous glucose monitor (CGM).

Methods: Attending physicians and trainees at Boston Children's Hospital were invited to wear a Dexcom® G5 CGM for one week. Separate attending and trainee focus groups were conducted afterwards to debrief. A multidisciplinary team conducted iterative, qualitative thematic analysis of transcripts using deductive and inducting coding.

Results: Five attending physicians (100% female) and six trainees (82% female) participated in the focus groups. Two key themes emerged from the attending group: 1) Intensive focus on personal glycemic variability: Participants were “obsessed” with and “stressed” by glycemic trends related to food, emotions, and activity. 2) Increased awareness of negative aspects of the patient experience: Participants were largely focused on the challenges of device use, including both practical and psychosocial aspects. Two key themes arose in the trainee group: 1) The critical importance of a CGM trial for experiential learning: Participants gained “practical lessons” on the “pros and cons” of CGM use and a greater understanding of glucose metabolism. 2) CGM experience as a trigger for patient empathy: Wearing a CGM helped participants “sympathize” and understand the “emotional rollercoaster” of CGM use. One common theme was identified in both groups: 1) Respect for the pancreas: Participants expressed a greater understanding of the glycemic “excursions” and “reactions” of individuals and caregivers living with diabetes.

Conclusions: Both attending physicians and trainees benefited from participating in a CGM trial. Experiential learning increased empathy for the challenges facing patients with Type 1 Diabetes and helped to develop a greater appreciation of glucose physiology and the benefits and challenges of device use.

P060
Challenges in the inpatient education of new onset type 1 DM patients: Can tablet technology be the answer?

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Introduction: Educating patients and families on the management of Type 1 Diabetes Mellitus (DM) has always been a challenge. Some endocrinologists educate patients and families with new onset Type 1 DM in the inpatient setting, while others have tried to do this process as an outpatient given the changes in the limits of inpatient coverage. Given the challenges in the education process, we must find new and innovative ways to educate patients and families efficiently. In a world where smartphones and tablets are the main way people access information, medical professionals can integrate these devices into the education of patients. Use of such a platform can make patients and families be more independent in the education process.

Objectives: To study whether the use of a tablet platform as an adjunct in the education of patients and families with newly diagnosed Type 1 DM leads to improved understanding of diabetes management.

Methods: Newly diagnosed Type 1 DM diabetes patients were randomized, where 50% received traditional diabetes education and the other 50% received the tablet in addition to the traditional diabetes education. The tablet contained modules that taught the various aspects of Type 1 DM care. Each module contains a pre-test to assess the user's knowledge prior to viewing the modules. The modules have lectures on the topic, as well as instructional video. Following this, there is a post-test to assess the user's knowledge. Each cohort was then assessed for improvements in HbA1c, incidence of hypoglycemia and phone calls to the office

Results: Preliminary data has shown that participants who used the tablets had better improvement in HbA1c, less hypoglycemia and called the office less, when compared to the other cohort.

Conclusions: Preliminary data has shown that the use of tablet technology in the education of Type 1 DM patients has led to in better HbA1c improvement, less hypoglycemia and less phone calls to office.

P061
Practical approach to using trend arrows on rt-CGM system in a camp setting of adolescents living with type 1 diabetes on either MDI or CSII insulin therapy

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Objectives: The primary aim of the study was to determine the effect of an educational intervention on the use of trend arrows of a real-

time continuous glucose monitoring (rt-CGM) to manage daily therapy decisions in a group of adolescents with type 1 diabetes (T1DM) attending a diabetes camp. The secondary aim was to evaluate the variations in total daily dose of insulin requirement (TDD).

Methods: 20 patients (15-17 years) on multiple insulin injections (MDI; n=8) or continuous subcutaneous insulin infusion (CSII; =12) therapy attended at the beginning of the camp a training session to teach them our algorithm for the management of therapy decision depending on trend arrows. Time spent in range (TIR), in hyperglycemia and hypoglycemia in the 24 hours and in the post-breakfast period (3 hours post meal) before the training session (Run-in) and at the end of the camp (T1) as well as TDD were analyzed.

Results: Data show a reduction of time in hyperglycemia (Run-in 42.6%, T1 32.05%, p=0.036, relative mean decrease 24.76%) and an increase in TIR (Run-in 52.9%, T1 62.4%, p=0.013, relative mean increase 17.95%). Reduction of time in hyperglycemia (Run-in 42.5%, T1 37.5%, p=0.05, mean decrease 11.8%) and improvement in TIR (Run-in 49.0%, T1 57.0%, p=0.02, relative mean increase 16.32%) were observed also in the post-breakfast period. Data show a significant reduction in the TDD (p=0.024) between Run-in (52.02±17.44 U/die) and T1 (46.49±12.39 U/die).

Conclusions: Statistically significant improvement of glycemic control (TIR, time in hyperglycemia) and reduction of the total daily dose of insulin were observed in all patients regardless of therapy type. The improvement between Run-in and T1 demonstrates the importance of patients' education on the correct use of rt-CGM data for the correct management of therapy (insulin dosage, time to bolus and corrections); our data corroborates once again the rt-CGM as the main tool for diabetes management.

Posters on Display – Diabetes Education

P062
Carbohydrate counting: evaluation of knowledge and practices in a group of patients with continuous insulin infuser

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The use of continuous infusers in patients with type 1 diabetes(DBT1) has the primary objective of maintaining euglycemia values.The carbohydrate count (CHO) has been identified as a determinant to achieve the therapeutic objectives.This requires education of the patient and family.

Objetive: To assess knowledge and practice in CHO counting of DBT1 patients treated with continuous insulin infuser and their families.

Methods: Descriptive, analytical, cross-sectional study, conducted in a high complexity pediatric hospital by registered dietitians of the multidisciplinary team of DBT.Patients with more than one year of DBT and more than three months treatment with continuous insulin infuser and their caregivers were interviewed.All had been educated in CHO counting.

The validated PedCarbQuiz tool adapted to Spanish was used, evaluating three areas: identification of CHO, counting of CHO and reading of nutritional labels.The cut-off points of each item were expressed as a percentage according to the number of correct answers for each aspect evaluated, considering Very good(80-100%),Good (60-80%), Regular(50-60%), Insufficient(less than 50%). It was defined as acceptable evaluations with more than 60% of successes. Descriptive analysis was performed with SPSS.

Results: Seven patients and their caregivers with an average age of 14 years participated. In terms of identification of carbohydrates and reading of labels, both patients and their caregivers obtained more than 80% correct answers. 70% and 50% of patients and caregivers respectively did not reach acceptable values in the practice of CHO counting.

Conclusion: The results obtained underline the importance of continuous education in the pediatric patients with dbt and their families in relation to the CHO count feeding plan, even in those patients who have new treatment technologies. It is important to carry out periodic evaluation of this knowledge and practices to achieve the proposed treatment objectives.

P063
Diabetes at camp: resources for HCP education and technology integration

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Introduction: Camp medical staff have had to evolve with the advances in technology and diabetes management with little direction. The American Diabetes Association (ADA) hosts an annual conference, convening more than 40 stakeholders, including leaders from the ADA's camp network,Industry partners, The Leona M. and Harry B. Helmsley Charitable Trust and others to plan for the future. As a result, Technology Best Practice Tip Sheets and 12 comprehensive training modules were designed by the ADA and led by a team of experts—a pediatric endocrinologist and 3 CDE´s which included an RN, NP and RD. 6 CEU´s are offered for most licensed medical staff.

Objectives: The education resources

1. provide a quality program of consistent and basic education of type 1 diabetes for all camp medical staff;
2. provide easy-to-access information on insulin pumps and sensors to help medical staff understand and trouble-shoot issues with diabetes technology that may arise during camp.

Methods: A team of experienced medical staff, the ADA and an expert medical committee, developed and reviewed the 12 modules. Topics include: types and actions of insulin; glucose monitoring; hyper- and hypoglycemia; carbohydrate counting, insulin pumps and sensors, ketones and sick days. The tip sheets for all insulin pumps and sensors utilized in the US were created by a certified diabetes educator and reviewed by the American Diabetes Association Camp Medical Advisory committee. The tips sheets are living documents and updated as the technology evolves and more technology is added.

Results: The modules are being provided to all ADA camp medical staff this spring for consistency in training throughout camps in the United States. The tips sheets were launched in 2018 and were well received.

Conclusion: The modules and tips sheets are free and available to all via the web and will help to provide consistency in training medical staff on the basics of type 1 diabetes with a focus on diabetes at camp.

P064
Evaluating the requirement of both verbal and written information at diagnosis

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Objective: To evaluate whether the introduction of written information for families to follow on discharge post diagnosis,improves their initial understanding.Previous research conducted by The Cochrane Collaboration stated ´When children are discharged from hospital,parent's understanding of how to continue care at home is better if they receive both written and verbal information (Johnson,Sandforth & Tyndall, 2008)

Method: Two questionnaires were distributed over a two week period to a purposive sample of fifteen patients' families.Questionnaires were designed based on previous research and in consultation with

the Diabetes MDT.Families who received verbal and written information were compared with those who received verbal information only. Results were analysed using thematic analysis.

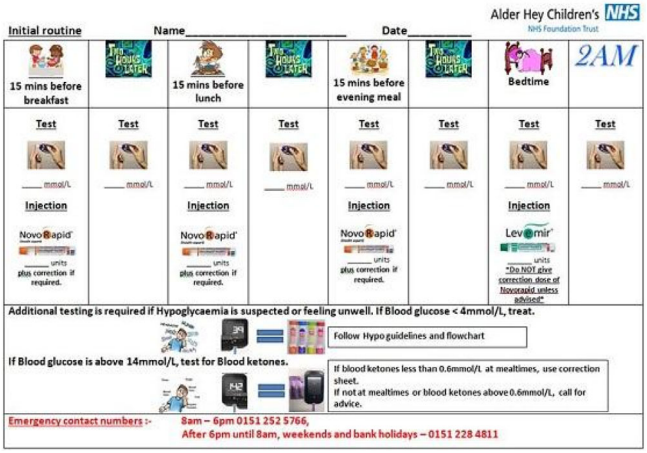
Results: Two main themes were identified; reassurance and usefulness.Families reported feeling reassured that they had information to refer to,and also reported that having written information in one place with visual prompts was useful.

Families who were diagnosed previous to the tool,found remembering when to test and bolus the most difficult,also when to check for ketones and what to do when Blood Glucose is low.They liked the visual prompts and illustrations, stating they were clear and easy to follow.

Comments were made that they thought schools and relatives would also find the tool beneficial.They did say everything was in one place and brilliant.

Our hypoglycaemia guidelines were suggested also to be added and also the 'two hour post check' image is not that clear.

Conclusions: Based on these findings,this tool has now been implemented with all newly diagnosed patients.This evaluation has highlighted that verbal and written information regarding daily management is essential for families due to the complexity and demanding time of diagnosis.The evaluation also identified suggestions that would further improve this tool.



[Initial Routine Daily Diary]

P065

A global partnership approach to delivering education on the management of type 1 diabetes in childhood in Botswana

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Introduction: In April 2019 a team of 12 health care professionals and 12 teenagers with T1D from the East of England Children and Young People´s Diabetes Network travelled from the UK to Botswana to work with their Batswana colleagues delivering the countries first symposium on the management of T1D in childhood.

Objectives: The primary aim of the project was to increase knowledge of the management of T1D for HCP´s from across Botswana.

The secondary aim was to develop strong partnerships between the HCP´s from both countries, through which knowledge, peer mentorship and best practise could be shared.

Methods: Over a 14 month period HCP´s from both countries developed a programme for a 3 day education symposium.

Teaching sessions were designed around the ISPAD guidelines and covered areas of diabetes management from diagnosis, nutrition, technology and psychological support.

Invites were sent to HCP´s from across Botswana who had involvement in the care of children with T1D. Support was sought from the Botswana government who provided funding and study leave for 150 HCP´s to attend.

Young people from the UK and Botswana played a key role in the delivery of the teaching.

Results: The symposium was attended by over 150 delegates from across Botswana, including the Minister for Health and the British High Commissioner.

It was very well received with delegates appreciating the opportunity to learn how to carb count for the first time and how to introduce psychological support into their clinic.

The input from the young people was invaluable as it gave a real insight into life with T1D.

The symposium greatly increased awareness of T1D in Botswana with the teaching being featured on the national news.

Conclusions: The symposium provided a learning opportunity for HCP´s to increase their knowledge about T1D and led to the development of sustainable partnerships between the UK and Botswana, with future opportunities for shared learning already planned.

P066

Long-term evolution of glycemic control in adolescents with T1D in persistent imbalance. Effect of intensive intervention and recovery education

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Adolescence is at high risk of destabilizing T1D in childhood. A significant proportion of adolescents is distinguished by a refractory imbalance resistant to the usual medical follow-up. The purpose of this work is to evaluate, in this situation, an intensive intervention based on nurses, followed by iterative repetitions in each new drift.

The study has been running since 2014. Adolescents, aged 12-17 with HbA1c above 9% in two consecutive quarterly assays were included. The intervention consisted of structured monthly educational sessions, alternating with prolonged telephone interviews conducted by the educators during 4 months. Subsequently, recovery education took place each time HbA1c reached 9%.

The analysis covers 68 adolescents with T1D aged 12-17, including 37 boys. The age at onset was 8.43± 3.48 years; the diabetes duration was 6.33± 3.61. They live on the outskirts of the department of Oran for 24 of them. The number of medical visits coupled with educational sessions and HbA1c measurement was 981 or 14.57± 2.19 (min. 10-max. 19) per subject for the entire study or 3.64 year-patient. Follow-up duration: 42.15± 4.5 months (min. 36.07-max. 58.72). HbA1c was 11.29± 1.38 at inclusion, 8.54± 1.68 at month 4 and 8.90 ± 1.80 after 48 months ($p < 10\text{-}^{9}$), at target of 7.5% in 0%, 37% and 21%, respectively. The only significant predictor after 42 months was the number of visits: HbA1c 8.41± 1.29 and 9.41± 2.09 ($p < 0.02$) for the most diligent (≥15 visits) *vs*. the least diligent (< 15 visits), respectively.

Our study shows the relative effectiveness on long-term glycemic control of multifaceted and iterative interventions in the situation of prolonged and major adolescent imbalance and confirms the importance of attendance. It remains to reach the pediatric target in a larger proportion and to take on particular situations for which we need to devise new educational tools.

P067
The escalating trend of using weight loss supplements with a view to safety concerns among overweight patients with diabetes mellitus type 2. The situation in Albanian community pharmacies

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Objective: The main purpose of this study was to determine the rising trend in the usage of herbal supplements by patients with diabetes mellitus type 2 as a "safe" option for weight loss. This descriptive study was conducted in several major cities in Albania, from June until September 2017.

Many patients due to heavy marketing use herbal supplements as weight loss aid and often combine herbal ingredients with anti-diabetic medications with no regard to any possible interactions.

Although often considered harmless by patients, herbal supplements may cause adverse effects from a possible herb-drug interaction.

Design and methods: The study group included 273 patients with and established diagnosis of diabetes mellitus type 2 and BMI ≥ 30 who were regular patients of 8 largest community pharmacies in these cities and accepted to participate in the study. Data were collected through an investigator-made questionnaire including questions about socio-demographic features and herbal supplements they have used in the last year for helping with weight loss.

Results: In the study were selected patients with an established diagnose of Diabetes Mellitus type 2 for at least 3 years and all the patients were using anti-diabetic medications.

Of all patients with diabetes, 61.9% declared that at least once in the last year they have used a herbal weight loss product. 70 % of them stated that they didn't receive any information from their pharmacist on the possibility of interactions or any other safety concerns.

Conclusions: Since community pharmacists are the most accessible healthcare professionals from patients, they need to follow patients regularly and provide patient education on any herbal supplements requested from the patients, especially the so called "Safe" weight loss products. Considering that the growing appeal of weight loss remedies is likely to continue, community pharmacists' should be updated regularly with the safety information on weight loss supplements.

P068
Antidiabetic potential of polyherbal mixtures on diabetes experimental animals

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Objective: In the present a Polyherbal antidiabetic formulations of different plants was investigated for the anti-diabetic activity in Streptozotocin- (STZ) induced diabetes in rats.

Method: In the present study different herbal plants with proven anti-diabetic acitivit like *Azadirachta indica*, *Cinnamomum tamala*, *Trigonella foenum*, *Momordica charantia*, *Citrullus Colocynthis* at varied concentration was used in streptozotocin induced type 2 diabetic rats. The Acute Oral Toxicity study of polyherbal mixture was performed according to OECD guideline 423. The oral antidiabetic potential of polyherbal mixture (125, 250 and 500 mg/kg) was evaluated against streptozotocin (50 mg/kg; i.p.) + nicotinamide (120 mg/kg; i.p.) induced diabetes mellitus in rats. T The polyherbal mixture was administered for 21 consecutive days, and the effect of the polyherbal formulation on blood glucose levels and other biochemical parameters were studied at regular intervals.

Results: Oral administration of polyherbal mixture for 21 days significantly reverse the bodyweight, cholesterol level and glucose level as compared to diabetic control animals. The antidiabetic activity of polyherbal formulation is supported by biochemical and histopathologic analysis. Polyherbal mixture showed mild congestion and mild decrease in the number of islets of Langerhans with normal β cell population, indicating significant amount of recovery as compared to diabetic control group of animals.

Conclusion: The outcome of present investigation showed that Polyherbal mixture exhibit significant antidiabetic activity at 125, 250 and 500 mg/kg, respectively. This could serve as potential for the development of polyherbal based formulation for the management of diabetes and its complications.

P070
Comparing knowledge and concerns for complications of reproductive health (RH) between female adolescents and young adults (AYA) with T1D in Chile and United States (U.S.)

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Introduction: Globally, AYA females with T1D are vulnerable to poor glycemic control and unplanned pregnancies that can lead to pregnancy-related complications.

Objective: To describe and compare knowledge and concerns for complications regarding RH between two groups of AYA females with T1D from Chile and U.S.

Methods: Participants were recruited from Children's Hospital Diabetes Clinics in Chile and U.S., and a diabetes camp in Chile. U.S. group participated in a Transition Care Program.Both groups were given baseline surveys to assess knowledge and concerns for complications regarding diabetes and RHprior to receiving preconception counseling (PC). English version was translated into Spanish and validated in Chile. Groups of AYA Chilean (n=51) and American (n=27) participants (aged 12-26yrs) completed knowledge measure (5 items scored as total % correct), and ranked complications from 1 (most concerning) to 5 (least concerning) [(n=31), (n=39), respectively]. Complications included retinopathy (RET), neuropathy, nephropathy, high blood pressure (HBP), and RH. Descriptive statistics and Mann-Whitney U-tests were used.

Results: Both groups scored low on knowledge (Means: Chilean=43%, US=53%; p=.04). Items with the lowest proportion of correct answers related to levels of glycemic control (Chilean n=5, 10%; U.S. n=4, 15%). RET was reported on average as most concerning complication (ranked as 1) for both groups (Chilean: Mean=1.9; n=16, 52%; U.S.: Mean=2.2; n=16, 41%). RH was reported as the least concerning(ranked as 5) for Chilean AYA (n=17, 55%), while HBP was least concerning for U.S. (n=18, 46%). Groups were different on the rankings for RH (Means: Chilean=3.9, U.S.=2.9; p=.01).

Conclusion: Although both groups appeared to lack knowledge, significant differences between groups were found on knowledge and concern for diabetes related RH issues. These data confirm that culturally-relevant PC should begin at puberty to prevent unplanned pregnancies and RH complications.

P071
ESPE e-learning in pediatric endocrinology and diabetes

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European Society of Pediatric Endocrinology (ESPE) e-learning was initiated in 2006 by Stenvert L.S. Drop. The web portal's structure and design is based on facilitating problem-based learning (PBL), which is a teaching method towards a learning curriculum for pediatric endocrinology and diabetes. It consists of carefully designed problems that challenge students to use problem solving techniques, self-directed learning strategies and specialty knowledge. The content of all modules are reviewed by international experts.

The ESPE e-learning web portal (www.espe-elearning.org) is an interactive learning environment for up to date topics in pediatric endocrinology and diabetes, consisting of chapters and problem solving cases. A second multilingual pediatric endocrinology and diabetes module has been developed stratified at three levels of health care (primary, secondary, tertiary) within Resource Limited Countries (RLC).

The General Content of the e-learning offers thirteen categories consisting of fifty-seven chapters and fifty-five problem solving cases. The RLC module consists of sixteen chapters and twenty-five cases covering all major subjects of pediatric endocrinology and diabetes. The complete content is globally available and freely accessible in 5 languages: English, French, Spanish, Swahili and Chinese. The web portal can be used for self-study such as gaining in-depth knowledge of pediatric endocrinology and teaching using classroom case-based discussion. The website also supports formative assessment by providing feedback for questions.

In conclusion, the ESPE e-learning is a free and globally accessible portal that provides up to date and relevant educational information on pediatric endocrinology and diabetes topics. It offers interactive learning strategies for self-directed learning and teaching, while the RLC module provides three stratified levels of care and education that is accessible in 5 difference languages.

P072
Development of clinical data standards for Type 1 diabetes (T1D) by CDISC and T1D experts to promote data sharing and reuse

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Introduction and objectives: Development and adoption of standards transform incompatible and disparate data into universal and illuminating information, facilitating discoveries that could have invaluable impact on T1D clinical research. When CDISC standards are applied, data is collected, organized, and analyzed in a clear and consistent manner, *all* researchers can leverage information from studies around the world. Required by leading regulatory agencies and adopted by some of the world's leading research organizations, CDISC standards enable the accessibility, interoperability, and reusability of data and drive operational efficiencies, expediting the regulatory review process and reducing time to market.

Methods: Following the CDISC consensus-based standards development process, a development team was formed consisting of CDISC standards and T1D experts to expand the current CDISC diabetes standards, focusing on ***pediatrics, devices, exercise, and prevention.*** The development process consists of five stages: **Scoping**, **Concept Modeling**, **Standards Development**, **Internal Review**, and **Public Review**, **Publication.**

Results: The Scoping stage was completed in February 2019; the topics in table 1 were identified to move into the concept modeling and standards development processes.

Conclusions: Developing clinical data standards for topics identified during scoping for ***pediatrics, devices, exercise, and prevention*** in T1D will enhance the existing suite of CDISC standards. Working with T1D experts, we were able to identify key areas of data where standards are required. By using a consensus-driven approach, we were able to ensure that the areas of development focused on those topics that would provide most benefit to the research community. Increasing awareness for clinical researchers to participate in the Public Review stages will be key to ensuring the developed standards meet the needs of the broader community.

P073
Costa Rica youth diabetes camp: impact on the nutritional knowledge, attitudes towards nutritional care plan and living with the condition of young people with diabetes

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Introduction: DIA VIDA Diabetes Association's Youth Camp in Costa Rica is attended by ~65 children and young people (CYP) with Type 1 Diabetes (T1DM) for an activity-based 2-night residential. Most use meal plans of prescribed carbohydrate portions that may be reviewed annually and are restrictive to normal eating. We measured nutritional plan adherence, knowledge and attitudes towards diabetes(DM), before and after the camp.

Objective: To assess the impact diabetes camp on CYPs nutritional knowledge and attitude towards living with DM.

Methods: On Day 1 all participants were given a questionnaire to evaluate pre-camp knowledge about nutrition, and their attitudes towards their nutritional plan and living with diabetes. During camp CYP were educated about nutrition and then completed a further knowledge questionnaire to assess changes in their understanding. At the close of camp, another questionnaire was completed to reassess attitudes towards their DM.

Results: A total of 49 questionnaires were returned and suitable for assessment. All participants had T1DM aged 10-21 years, BMI 16-36 kg/m^2, HbA1c < 6.5% - >10%.16/49 respondents had seen a dietitian in the last month.

Pre-camp: 33/49 CYP were willing to follow their plan. 23/49 felt confident to follow it. 16/49 do not regularly follow their plan, most commonly eating more than allowed.12/49 follow their plan. 21/49 follow their plan but eat more than they have allocated. 26/49 feel their plan is too much or too little food for their appetite. *After camp:* 36/49 CYP considered they are willing to follow their plan. 28/49 felt confident to follow it.

Conclusions: Overall, the youth diabetes camp has improved CYP nutritional knowledge and attitudes towards nutritional plans. Although attitudes towards diabetes were unchanged, most of their comments have empowerment and positivity. This camp is a valuable resource to CYP living with T1DM in CR, reducing inequalities in access to education across the country.

P074
Person-centred education to female adolescents with type 1 diabetes

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Objectives: To describe young women´s experiences of self-management and support after participation in individual sessions using the Guided Self-Determination-Young (GSD-Y) education model.

Methods: This was a qualitative interview study including eight young women (15-20 years) with type 1 diabetes after completing an intervention individually using the GSD-Y model at Sachs children and youth Hospital and Ersta hospital, Stockholm, Sweden. GSD-Y is an empowerment-based, person-centred reflection and problem-solving education model. The participants attended seven sessions and were asked to complete specific reflection worksheets before each session. Communication methods were used to support participants to express themselves while reflecting on the difficult issues that emerged.

The participants were interviewed individually, and the interviews were analysed using qualitative content analysis.

Pediatrics and Devices	Prevention	Exercise
Diabetic Ketoacidosis Events	Metabolic Markers	Types of Exercise Activity and Context
CGM & Insulin Management	History of Viral Infections	Fitness and Strength Status
Diabetes History	Family History of T1D	Activity Devices
Vital Signs & Growth Percentiles	Islet Autoantibodies	Meal Descriptions and Nutrient Content
Lab Tests Related to T1D	Genetic Risk	

Pre-camp	After nutritioal education
71%	84%

[Average nutritional knowledge score]

Results: Three categories emerged from the analysis; Attitudes to diabetes, experiences of support and autonomy.

Young women with type 1 diabetes have a desire to live a life like everyone else. Regarding self-management, they have high demands on themselves. Further, they described how "traditional" healthcare meetings did not highlight management of emotions and difficult thoughts, loneliness, conflicts and mental illness. The reflection worksheets facilitated this and the participants described how they gained an increased understanding of themselves. They processed thoughts and feelings about their illness and they described how attitudes towards health care improved.

An overarching theme that emerged were; Young women need person-centred support from healthcare staff.

Conclusions: GSD-Y is useful to empower young women with type 1 diabetes and helpful in strengthen the individual´s ability to self-management. The traditional healthcare system needs to embrace person-centered care to catch each person's own capabilities, resources and objectives.

Poster Tour 19 - Psychosocial Issues, Education, Nutrition, and Exercise

P075

What foods cause problematic glucose excursions in young people with type 1 diabetes and what strategies do families use to manage this?

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Despite accurate carbohydrate (CHO) counting and insulin dose calculation people with Type 1 Diabetes (T1D) report frustration with unpredictable postprandial blood glucose levels (BGL's).

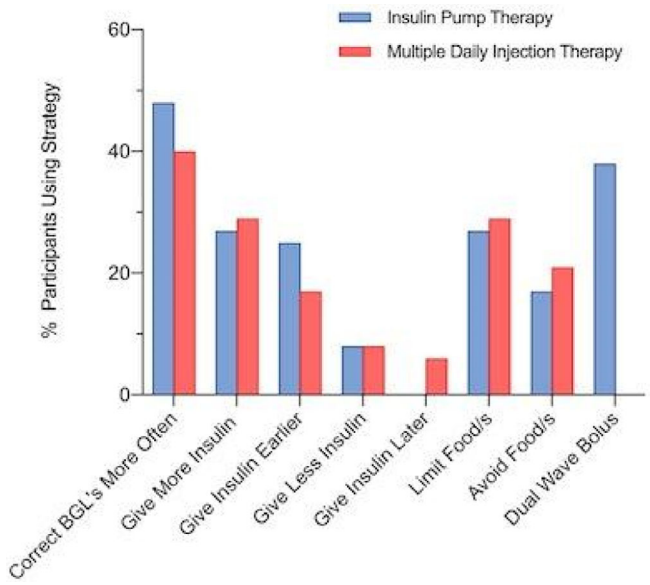
We aimed to

(1) identify the types of foods perceived to cause problematic postprandial BGL's,

(2) identify the strategies used to manage BGL's following these foods and

(3) explore the impact of continuous glucose monitoring (CGM) on meal-time behaviours.

This was a cross-sectional, prospective survey of 100 youth aged 2-18 years with T1D attending a regional pediatric centre in Australia. Participants had a mean age of 13.0±3.6 yrs, T1D duration of 5.2±4.0 yrs, HbA1c of 54 mmol/mol (7.1±1.0%), 48% used insulin pumps and 52% used multiple daily injections (MDI), overall 60% used CGM.



[Figure 1. Strategies used by families to manage problematic foods.]

Ninety-one percent of participants identified 1or more foods as problematic. The most common foods identified included pizza (60%), pasta (55%), rice (31%), and fast foods (27%). Ninety-six percent of participants reported using 1 or more strategies to manage BGL's following these foods (Figure 1). Most participants (78%) who gave additional insulin increased the dose equivalent to 7-15g of CHO/serve; All MDI users (n=15) gave additional insulin pre-prandially. More than half of participants (60%) were not satisfied that the strategies used adequately lowered BGL's. The majority of CGM users (88%) reported that CGM had increased their awareness of the glycemic impact of foods; over one quarter (27%) had made changes to their management, including avoiding/limiting foods (43%), eating less to treat hypoglycaemia (38%) and altering the frequency of snacks (36%).This study has identified the types of foods families with T1D find problematic. Sixty percent of people were dissatisfied with the efficacy of clinical strategies to manage these foods. CGM has increased awareness of problem foods. Targeted strategies are needed to improve postprandial glycemia.

P076

Dietary response to hypoglycemia in adolescents with type 1 diabetes in the Flexible Lifestyle Empowering Change (FLEX) Intervention

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Introduction: Adolescents with type 1 diabetes (T1D) commonly struggle with glycemic and weight control. Hypoglycemia-induced hunger and bingeing may contribute to cycles of restriction and excess intake, promoting weight gain.

Objectives: To estimate the association between a 3-level exposure (days with no hypoglycemia, ≥1 episode of non-severe hypoglycemia [54-69 mg/dL], or ≥1 episode of severe hypoglycemia [< 54 mg/dL]) and diet (calories [kcal] or percent calories from carbohydrate [% carb]).

Methods: Continuous glucose monitoring (CGM) and 24-hour dietary recalls were available on concurrent days for 123 of 258 youth in the Flexible Lifestyle Empowering Change (FLEX) Intervention, an 18-month behavioral trial to improve HbA1c. Sequentially adjusted linear mixed regression analyses tested the hypothesis that kcal and % carb would be greater on days with ≥1 episode of hypoglycemia than days without episodes. The fully adjusted model included demographic and clinical covariates and Diabetes Eating Problem Survey (DEPS) score.

Results: At baseline, participants were 14.8 ± 1.1 years old, 54% female, 79% NHW, 37.4% overweight or obese, had a mean BMIz of 0.69 ± 0.91, HbA1c 9.4 ± 1.1%, diabetes duration 6.4 ± 3.6 years and DEPS score 12.7 ± 8.4. ≥1 episode of non-severe and ≥1 episode of severe hypoglycemia occurred on 63 (22.8%) and 49 (17.8%) of days. Differences in kcal and % carb intake by hypoglycemia (none, severe, or non-severe) were non-significant (kcal crude and adjusted p=0.39 and 0.24; % carb crude and adjusted p=0.96 and 0.99).

	No hypoglycemia, n=164 days	≥ 1 episode non-severe hypoglycemia but without severe hypoglycemia, n=63 days	≥ 1 episode severe hypoglycemia, n=49 days	P-value
Kilocalories	1795.6 (722.5)	1857.7 (903.2)	1682.8 (706.6)	0.48
Total Carbohydrate (g)	218.3 (94.2)	228.7 (108.2)	203.8 (92.3)	0.41
% kcal from carbohydrates	47.3 (10.1)	48.7 (8.2)	48.12 (9.9)	0.59

[Table 1. Descriptive results: mean intake (SD) on days with no, non-severe, or severe hypoglycemia]

Conclusions: Neither kcal nor % carb intake varied by hypoglycemia category. Further analyses may elucidate potential mixing of effects: some individuals may experience hypoglycemia due to systematically lower intake while others may over-correct and thus have higher intake. Future analyses will investigate basal insulin rate as one factor that may help differentiate these two phenomena.

P077
Hypoglycemia reduction using high-carb diet in adolescents with type 1 diabetes wearing a continuous glucose monitoring during a sport camp

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Introduction: An appropriate amount of carbohydrates (CHO) and calories together with an insulin therapy reduction are necessary to guarantee a good performance in adolescents with type 1 diabetes (T1D) during longer physical exercise, like in school camps. Simple and complex CHO are frequently needed before, during and after exercise to avoid hypoglycemia.

Objectives: The aim of this study is to evaluate CHO consumption in T1D adolescents before and during a sport-school camp.

Methods: Thirteen adolescents with T1D from more than 1 year (M10/F3, age 14+/- 1,7yrs, BMI 23,4+/- 1,8 kg/m^2, HbA1c 7,8 +/- 0,8 %) treated with multiple daily injections, without co-morbidities, were enrolled to participate in a 4-day sport-school camp.

Three days before camp, all patients filled dietetic diaries reporting total amount of CHO for all meals and snacks, analyzed from a registered dietitian. During camp, participants reduced their basal and pre-meal insulins, as recommended by international guidelines and wore a continuous glucose monitoring (CGM) from 3 days before until the end of the camp. During camp we collected total daily CHO intake and glucose supplementation to prevent hypoglycemia (< 70 mg/dL), decided upon CGM trend arrow protocol. CGM time below range was compared before and during the camp.

Results: No severe hypoglycemia and diabetic ketoacidosis were observed during the camp. Time spent in hypoglycemia resulted lower during camp (1% vs. 2,7%, p-value = 0,04).

Mean CHO daily amount before and during camp was 3,44 +/- 0,89 g/kg vs 4,13 +/- 0,99 g/kg (p-value=0,0087).

Conclusions: Despite an insulin therapy reduction according to international recommendations, an increased intake of simple and complex CHO based on CGM trend arrow protocol is also crucial to prevent hypoglycemia in T1D adolescents during physical activity. A registered dietitian should be involved to give correct diet indications with a special focus on CHO.

P078
A family-focused approach to healthy lifestyle choices for adolescents with type 1 diabetes

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Objective: Children and adolescents with type 1 diabetes (T1D) have increased risk of obesity compared with their age-matched counterparts, increasing their co-morbidity and diabetes complication risk. Our aim was to develop a multidisciplinary cooking program for parents and adolescents with T1D, to provide a mechanism for family engagement while improving food choices and cooking skills.

Methods: In 2017, a collaboration between Jamie's Ministry of Food Geelong, Diabetes Victoria and Barwon Health Paediatric Diabetes Service supported a pilot of Jamie's' Ministry of Food (JMOF) program. The seven-week program was tailored to families with T1D adolescents from mixed socioeconomic status. It was run with food-trainers, dietitians and diabetes educators and focused on cooking skills, healthy food choices and carbohydrate counting. A low literacy feedback tool was developed to assess participant satisfaction and program impact.

Results: The successful pilot led to four additional programs being run during 2017-18 for 32 adolescents and 31 parents. The project outcomes included: 77% of adolescents and 81% of parents tasting food they had never eaten before; 84% of adolescents and 81% of parents stating they had a better understanding of healthy food; 84% of adolescents and 88% of parents learning new cooking skills; 91% of adolescents and 94% of parents wanting more involvement in cooking at home with their family; and 65% of adolescents and 90% of parents planning to eat healthier food more often. A Net Promoter Score of 81.36 was achieved, indicating high satisfaction and high likelihood to recommend to others.

Conclusion: The JMOF program for adolescents with T1D improved participant perceptions of healthy food and taught practical cooking

skills while providing peer support and strengthening engagement between adolescents with T1D and their parents. It has shown to be innovative, fun and beneficial way to support self-management of diabetes in adolescents.

P079
Quality of infants´ diet does not relate to who has type 1 diabetes in the family

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We aimed to compare the impact of different family probands on the quality of the ENDIA infants' diet. ENDIA is an early life cohort following children at-risk of type 1 diabetes (T1D) with a mother, father or sibling with T1D. Parents' nutrition knowledge influences children's preferences and intake. We hypothesised that having a T1D sibling would improve the infant's diet quality, compared to having a T1D parent, due to more recent nutrition education. We also measured other influences on infant diet.

Infant diet was recorded using three telephone assisted 24 hour recalls on weekend and weekdays with photograph-guided reports of portion sizes. Data were analysed in Foodworks Professional Version 8, Australia. Linear regression models, with generalised estimating equations, compared diet intake between infants.

Diet intake of 433 infants, mean age 12.6 months (SD 0.7), did not show a statistically significant difference depending on whether their mother (58%), father (31%) or sibling (11%) had T1D. Mean infant weight z -score was 0.46 (SD 1.09). Mother probands were 32.9 (4.6) years, fathers 35.4 (5.1), siblings 7.6 (3.3). T1D duration [median (IQR)] was 17.8 (11.6-24.8) years for mothers, 17.4 (9.9-25.2) fathers, 3.2 (1.7-4.6) siblings. Energy intake in all groups exceeded daily requirements by 440-743 kilojoules (excess 13-23% of recommended intake) and protein intake of 38.2 (14) g was triple the estimated daily requirement. Increase in maternal age by one year was associated with a decrease in infant daily sodium intake of 7 mg (95% CI 2.11 - 12.54, p=0.006). Infants with any sibling had a daily increase of 0.3 teaspoon of added sugar (95% CI 0.02 - 0.062, p=0.03) and 74 mg of sodium (95% CI 24-125, p=0.004).

Infant diet quality was not improved by having a sibling with T1D and more recent nutrition education. Infants with any sibling had increased intake of salt and sugar. Most infants consumed excess energy but their weight remained in the healthy range.

P080
Translation, cultural adaptation and validation of the Ped Carb Quiz (PCQ) in Chilean children, youths and adults with type 1 diabetes

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Introduction: Patients with type 1 diabetes (T1DM) require self-management education. A knowledge transfer process to develop the skills needed for diabetes self-care. Carbohydrate counting is an important tool for intensive glycemic management, as it allows the patient to achieve optimal glycemic control while improving their quality of life, by eating a broad diet. The tools for assessing carbohydrate counting and insulin dose calculations need to be adapted to different ethnographic realities, in order to achieve a better A1C and time in range.

Objective: To translate, culturally adapt and validate the Ped Carb Quiz (PCQ) in Chilean children, youths and adults with type 1 diabetes.

Methods: The original version of the PCQ was translated using a forward-backward technique, culturally adapted, analyzed by a multidisciplinary expert panel and pilot-tested in 50 patients. The resulting questionnaire, CCQ (Chilean Carb Quiz), was administered to 93 Chilean youths, adults, and parents of children with type 1 diabetes. Validity was assessed using the Spearman's correlation coefficient and the Mann-Whitney test. CCQ scores were correlated with A1C, expert assessment, and the use of continuous glucose monitor (CGM). To test reliability, Cronbach's Alpha and Split-half methods were used.

Results: CCQ scores ranged from 28.0% to 67.5% with a mean of 57.38 (SD=7.97). A Cronbach´s alpha of 0.79 and a Split-half correlation of $r_s(93) = .427$, $p < .001$, supported a high level of internal consistency. There was a negative correlation between CCQ scores and A1C $r_s(86) = -.281$, $p < .001$ and a positive correlation between CCQ scores and Expert scores $r_s(92) = .434$, $p < .001$. CCQ scores for CGM users (mean rank = 52.57) were significantly higher than for non CGM users (mean rank = 35.65), U = 615, z = -2.917, p = .004.

Conclusion: The Chilean version of the PCQ, CCQ, is a valid and reliable instrument for assessing carbohydrates counting and insulin dose calculation.

P081
Dietary intake and physical activity of a well-controlled group of children with type 1 diabetes mellitus

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Objective: Aim of this study was to assess the dietary intake and physical activity of children and adolescents with Type 1 Diabetes Mellitus (T1DM) and to compare these parameters with a group of healthy controls without T1DM.

Methods: The sample consisted of 80 children and adolescents, 41 with T1DM (age: 11.4±4.5 years) and 39 age-, body mass index (BMI)- and sex- matched healthy controls without T1DM. Dietary intake was evaluated through two 24h recalls. Physical activity was measured using the Self-Administered Physical Activity Checklist, validated for Greek children.

Results: Participants with T1DM were well controlled according to ISPAD guidelines (HbA1c: 7.1±1%). Their daily energy intake (DEI) was lower (1597±280 vs 2031±429 kcal, P< 0.05), as well as energy derived from carbohydrates (44.8±6.5% vs 48.1±6.6% of DEI, P=0.03) compared to the control group. Although T1DM participants had higher % of calories from proteins (19±2.8% vs 16±1.8% of DEI, P=0.00), they had lower % of saturated fatty acids (11.8±2.3% vs 14.1 ±2.3% of DEI, P=0) and higher % of monounsaturated fatty acids (17.7±4.7% vs 14.6±4.5% of DEI, P=0.004). They were also consuming higher amounts of fiber, vitamin A and D. Regarding physical activity, the group with T1DM spent more time in sedentary activities compared to their peers without T1DM (2.42±1.83 vs 1.12 ±0.77 hours/day, P=0.008), yet they met the guidelines of ISPAD to be physically active for at least 60 minutes/day (87±64 min/day).

Conclusion: The results of this study indicate that children and adolescents with well controlled T1DM adopt a healthier diet but they spent more time in sedentary activities compared to their age-, BMI- and sex- matched peers without T1DM. T1DM-related health professionals should encourage their young patients to adhere to a healthy lifestyle, including also regular physical activity.

P082
The role of zinc supplementation as an adjuvant therapy for pediatric patients with β-thalassemia major complicated with diabetes mellitus

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Introduction: The development of abnormal glucose tolerance in β-thalassemia major (β-TM) is associated with alteration in oxidant-antioxidant status. Zinc is an anti-oxidant and an essential element for insulin synthesis, storage and secretion.

Objectives: This randomized-controlled trial assessed the effect of oral zinc supplementation on glucose homeostasis in pediatric β-TM patients complicated with diabetes mellitus (DM).

Methods: Eighty patients were randomly assigned into two groups; intervention group which received oral zinc in a dose of 40 mg daily for 12 weeks and placebo group. Hemolysis markers, serum ferritin, lipid profile, fasting blood glucose (FBG), fructosamine, fasting C peptide, urinary albumin excretion (UAE) and serum zinc levels were assessed. Homeostatic model assessment insulin resistance (HOMA-IR) was calculated.

Results: Baseline clinical and laboratory parameters were consistent among both groups. Baseline zinc levels were decreased in both groups compared with control values. After 12 weeks, supplementation with zinc for the intervention group resulted in a significant decrease in indirect bilirubin, lactate dehydrogenase, serum ferritin, triglycerides, total cholesterol, FBG, fructosamine, HOMA IR and UAE, while fasting C peptide was higher compared with baseline levels and with placebo group (p< 0.05). Baseline serum zinc was negatively correlated to FBG (r=-0.534, p< 0.001) and fructosamine (r=-0.555, p< 0.001) while positively correlated to fasting C peptide (r=0.777, p=0.002).

Conclusions: Zinc supplementation as an adjuvant therapy in β-TM patients with DM possibly potentiates the efficacy of chelation in reducing iron burden and hemolysis. Thus, zinc decreased hyperglycemia, increased insulin secretion and improved glycemic control and dyslipidemia without any adverse effects.

P083
Automation of exercise management by an ideal artificial pancreas (AP) system: perspectives from youth with type 1 diabetes (T1D)

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Objectives: In T1D, glucose management during physical activity remains challenging due to varied and unpredictable effects on glucose levels; emerging AP systems seek ways to overcome these difficulties. We interviewed youth with T1D to explore desired features and capabilities of an ideal AP system for exercise.

Methods: Semi-structured interviews were conducted at two diabetes centers with 39 youth, ages 10-25 years with T1D duration ≥1 year. Interviews were transcribed, coded, and underwent thematic analysis. Participants (72% female, 82% white) were (M±SD) aged 17.0

±4.7 years, with T1D duration 9.4±4.9 years and HbA1c 8.4±1.1%; 79% were pump-treated and 82% used CGM.

Results: Nearly all youth endorsed need for a system to prevent glucose drops during and after exercise; however, preferences for how a system would avoid hypoglycemia varied. Commonly suggested features included individualized basal profiles for exercise and automatic insulin dose adjustments based on glucose trends. Youth also proposed novel features such as automated glucose delivery, a heart rate monitor to recognize exercise, and the system's ability to learn personal glucose patterns and adapt system responses based on previous exercise. Notably, many youth did not endorse a need for full automation. Instead, several youth acknowledged limitations related to an AP system's ability to recognize exercise, prevent lows, and engender trust in the system, resulting in a preference by some youth to manually inform the system of exercise initiation or self-manage exercise entirely.

Conclusions: The majority of youth with T1D endorsed need for an ideal AP system to avoid hypoglycemia during exercise as fundamental, and many valued system automation as an opportunity to reduce self-care burdens. Future AP developers must acknowledge youths' personalized approaches to glucose management during exercise and provide options for user customization to optimize trust in the system.

P084
Partial remission in childhood onset diabetes type 1 - does physical activity matter?

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Objectives: The aim of the study was to elucidate the influence of regular physical activity (PA) on metabolic control, insulin requirement and prevalence of partial remission (PR) in children and adolescents diagnosed with type 1 diabetes (T1D)

Methods: The study focused on a gorup of 125 patients newly diagnosed with T1D, aged 3,5-18yrs (mean 10yrs) who were countinuously followed over 2 years. All the patients were controlled every 3 months in an outpatient clinic and adviced with PA reccomendations according to ISPAD and WHO Guidelines at every visit. We analyzed: anthropometric parameters, HbA1c, C-peptide secretion and daily insulin requirement (DIR). Patients´s PA level was analyzed using self-designed questionnaire. We determined PR based on HbA1c and DIR.

Results: According to questionnaire we classified 43% of our patients as physically-active. Age, HbA1c, DIR and BMI-SDS at the diagnosis were similar in both groups. Over time the physically-active group presented lower DIR than non-active peers after 3 months, 6 months and 2 years ($p< 0,05$). HbA1c after 2 years was also lower in that group (6,5% vs. 6,9%, $p< 0,05$). There was no significant difference in fasting C- peptide secretion between groups after 2 years observation. At discharge from hospital the prevalence of expected PR (assessed as DIR< 0,5 U/kg/24h with normoglycaemia) was similar in both active and non-active patients (44% and 40%), but after 3 months we observed higher PR prevalence in physically active group (70% vs. 55%) that lasted over time, resulting in 44% of active patients vs. 13% of non-active ones after 2 years ($p< 0,05$).

Conclusions: PA plays a crucial role in diabetes management, however not all of the young patients with T1D meet the recommendations. Our study confirms the impact of PA on HbA1c and insulin requirement since the disease onset. The results highlight the potential of regular PA in extending the time of PR phase, that is lately in a great interest of research.

Posters on Display – Nutrition in Diabetes, Exercise

P085

Targeting post breakfast hyperglycemia with protein based foods may reduce macro vascular disease risk?

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Objectives: Post Breakfast hyperglycemia is a very frequent phenomenon in people with Type 2 diabetes. Post meal hyperglycemias are independent risk factor for macro vascular disease. Intensive treatment of diabetes can significantly decrease the development or progression of macro vascular diseases.

Method: The present study was designed to examine differences among type 2 young Adults to see the impact of replace protein based breakfast with cereal based

The study was conducted at diabetes clinic Ahmedabad july 2018 to oct 2018.

40 type 2 patients were selected with post breakfast hyperglycemia age group was 25 to 40 years.

The study involved the implementation of protein base breakfast. Against cereal based diet like paratha,bhakhri.roti, khakhra, upma, poha, idlies, Bread and breakfast cereals.

Results: It was observed that fasting sugar levels were independent on different diet and medicines however post breakfast sugar levels were dependent on the type of diet consumed and average 56 mg/dl post breakfast blood sugar reduction with protein base foods compared to rice, wheat, or cereal combination.

Conclusion: As per popular hypothesis cereal based breakfast is healthy for diabetes Therefore, the real question seems to be, because CVD is major cause of morbidity and mortality in patients with diabetes. In type 2 diabetes understanding the impact on CVD events of treatment directed at specifically lowering post prandial glucose is crucial.

P086

Comparative analysis between the expected and actual nutrients content of blenderized-formulated tube feeds administered in Lagos University Teaching Hospital, Lagos, Nigeria

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Objectives: The purpose of this study was to determine the actual amount of energy and protein in the blenderized-formulated tube feeds (BFTF) administered to a paediatric patient in relation to his expected prescribed amount.

Methods: This was a cross-sectional analytical study that adopted a random sampling approach. A paediatric patient was randomly chosen from the pool of paediatric patients to be administered BFTF the preceding day. Patients' nutritional prescription information was obtained from the hospitals' Dietetics Department. Two samples of the BFTF prepared in the Dietetic kitchen for the patients was collected on two occasions from provisional increase made, and analysed for total energy, carbohydrate (CHO), protein and fat content using the AOAC international methods.

Results: The mean and standard deviation of the nutrient content in the BFTF actual amount served (61.50±1.05g protein, 75.17±4.67g fat, and 112.17±6.59g CHO), expected amount to be served (89.67 ±4.18g protein, 109.83±1.17g fat, and 163.50±1.87g CHO), and the difference between them (28.50±4.64g protein, 34.67±3.72g fat, and 51.33±5.57g carbohydrate) was significantly different among some of the nutrients in the two samples collected ($p<0.05$). On average per 100ml of the actual BFTF was 85.51±4.92kcal energy, 3.79±0.23g (18%) protein, 4.69±0.55g (49%) fat, and 6.85±0.41 (33%) CHO, respectively. The two samples collected and analysed showed discrepancies between the macronutrients content in both the actual and expected amount of BFTF administered.

Conclusion: This study affirms the variability in energy, protein, fat, and CHO of the expected and actual amount of BFTF administered to the paediatric patient. Since nutrients discrepancies are determinant to patient outcome, it is recommended that a standardized BFTF, meticulously prepared, be used for maximum effectiveness and accessibility benefits

P087

Community based research on malnutrition & diabetes: a cross section survey in children of urban slum of Surat (Gujarat)

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Background: The WHO Global Database on Child Growth and Malnutrition seeks to contribute to the transformation of this cycle of poverty, malnutrition and disease into a virtuous one of wealth, growth and health.

Aim: Assessment of Malnutrition & Diabetes in Urban Slam.

Objective:

1) To assess magnitude of Malnutrition in Urban Slum.

2) To study magnitude of malnutrition in different age groups and among boys and girls of urban slums.

3) To compare different anthropometric indices.

Methods:

Study design: Cross sectional study

Study area: Aaganwadi center in urban slum area which is attached to Surat based Aaganwadi Training center was selected for study.

Sample Size: 91 children (0-6 years) of urban slum registered in an anganwadi Centre in Udhna.

Analysis: Data was entered and analysedin Microsoft Excel 2010 sheet by using SAM guidelines-latest as per GOI.

UHCRC Surat team took approval for study; appropriate IEC was shorted and Consent was given by parents of children.

Findings: Out of 91 children, 41(45%) children were normal. 32% were moderately underweight and 23% children were severely under weight.

Malnutrition as well as severe malnutrition is high among children who most irregularly participating at AWC activities.

In this study indices used are Wt/Age to detect underweight children, Wt/Ht and MUAC to detect wasting. Comparative analysis of these indicates that under weight children are more that wasted children. 75% of SAM children are in SUW. Diabetes child was mostly family history, Most of child were malnourished who have Diabetes.

Conclusions: The SMC health dept. with its unique infrastructure, AWC network and initiatives like Urban IMNCI, with quality screening for malnutrition and supportive supervision can reduce malnutrition rate as well as rate of SAM responsible for child mortality.

P088
Carbohydrate counting and its impact on glycemic control & insulin dose titration in children and adolescents with type1 diabetes mellitus in India

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Introduction: India ranks second amongst the top 10 countries worldwide with 16,800 new cases of children and adolescents with type1 diabetes being diagnosed each year.

Objective: The purpose of this study was to understand the impact of carbohydrate counting in improving glycemic outcomes and insulin dose titration in children and adolescents with type1 diabetes.

Materials and methods: 52 subjects with type 1 diabetes mellitus were enrolled.Subjects were divided into study and control group based on their ability to implement carbohydrate counting. These two groups were further sub-divided into four groups based on their current age.13 subjects in the age group of 4 to 12 years (Group 1) & 13 subjects in the age group of 13to19 years (Group 2) were included in the study group(on carbohydrate counting). 26 subjects of the similar age group following a conventional meal plan were included in the control group (Group 3 & Group 4). At enrolment,each of the 52 subjects was on a total daily insulin dose of more than 1 unit/kg body weight.Subjects in Group 1 and 2 were educated on carbohydrate counting based on their ICR using educational tools.Glycemic control and insulin dose titration was evaluated in both groups at baseline and end of the study.

Results: HbA1c decreased by 3.6%in Group 1 vs1.9% ($p< 0.05$) in Group 3 and insulin dosage decreased by 0.4 U/kg body weight in Group 1 vs 0.1 U/Kg body weight ($p< 0.05$) in Group 3. In Group 2, HbA1c decreased by 2.3% ($p< 0.05$) and insulin dosage decreased by 0.3 U/kg body weight ($p< 0.05$) whereas no improvement was seen in Group 4.

Conclusions: Counseling by a dietician using both carbohydrate counting and conventional meal plan helped in improving glycemic control.However,carbohydrate counting had a comparative edge as it showed better outcomes compared to the conventional meal plan in improving glycemic control and reducing insulin dosage. Hence,carbohydrate counting is an effective tool in managing individuals with type 1 diabetes mellitus.

P090
The inhibitory effect of Surya Namaskar yoga therapy with Aloe-Vera juice on the increase in postprandial blood glucose in type 2 diabetic patients in west Delhi metro population

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Objective: According to World Health Organisation, a disease of the middle-aged and elderly, type 2 diabetes has recently escalated in all age groups and is now being identified in adolescents and children, especially in high-risk Indian populations living in metro cities. The aim of the present study was to determine the impact of Surya Namaskar yoga therapy with Aloe-Vera juice on the blood glucose level in type 2 diabetic patients in west Delhi metro population.

Method: The study involved 130 participants, of which 65 were involved and 65 were not involved (control group) in exercise. Using a cross-sectional design, which includes age, family history of diabetes, exercise status and waist circumference, fasting glucose & insulin, glucose tolerance test (GTT), and glycosylated hemoglobin (HbA1c) were recorded. Diabetic patients were treated for one hour for Surya Namaskar yoga therapy (time duration of 06:00-07:00 A.M) early morning with 100 ml Aloe vera juice drink after exercise for one month. In both groups, the level of blood glucose was measured at arrival after they had standard brunch, a total of 250 Kcal. In both groups, the level of blood glucose was measured after 120 minutes.

Results: After one month of treatment there were significant changes in glucose, insulin and glycosylated haemoglobin levels compare to normal levels with changes in life style. We found the inhibitory effect of Surya Namaskar yoga therapy with Aloe-Vera juice on the increase in postprandial blood glucose. This process leads to a balanced energy level which in turn leads to a healthy life.

Conclusion: Type 2 diabetes can be controlled and regulate by treating patients with Surya Namaskar yoga therapy and Aloe-Vera juice in diabetic patients without using any harmful drugs. Our study indicated the importance of daily opportunities for Surya Namaskar yoga therapy in patients with diabetes.

P091

Altitude hiking in non-experienced people with type 1 diabetes: importance of CGM, prior preparations and insulin adjustments to minimize the risk of hypoglycaemia

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Objectives: Exercise in high altitude, high temperature and humidity can be challenging for people with type 1 diabetes (T1D) and diabetes control. Continuous Glucose Monitoring (CGM) may be helpful in reducing the episodes of hypoglycaemia. The aim of this study is to analyse the diabetes control and safety in participants of "The League of DiAthletes Global Challenge".

Methods: 11 adults with T1D, not experienced in altitude hiking, took part in a 3- days trek in Costa Rican tropical forests. The 47-km long trek (14/7.5/16 km per day) included downhill and uphill parts. The highest altitude was moderate (2100 m), with the humidity of 80-90%, and variable temperature (12 to 35C degrees). The day before the trek all participants received advice on diabetes management, dietary recommendations, and began to use Dexcom G5/G6 (10/1) CGM (9 of 11 people for the first time or after a long break). Diabetes-related data pre and post challenge were collected (diabetes review questionnaire), as well as CGM downloads (Clarity): time-in-range (TIR), frequency of hypo- and hyperglycaemia, and Patterns.

Results: All participants (6/5 F/M average age 27, diabetes duration 20 years, 3 insulin pumps users) completed the challenge with no adverse events such as severe hypoglycaemia or DKA. At baseline, the average A1C was 6.9%, and total daily dose (TTD) was 49.6 insulin units. Average time of exercise was 7 hours 45 minutes a week (varied from 1 to 18h). The most frequent intervention during the challenge were basal (average: -30, from -10 to 50%) and prandial insulin (varied from none to - 100%) reductions. Average BG was 190 mg/dl (SD: 67 mg/dl), TIR - 38% (2.4% below and 54% above the target). There were no adverse events. "Night-time highs" was the most popular pattern.

Conclusions: Prior preparations, insulin reductions and CGM use were important in minimizing the risk of hypoglycaemia during altitude hiking in high humidity and temperature in non-experienced hikers with T1D.

Poster Tour 7 - Diabetes Epidemiology, Genetics, Immunology, and the Environment

P092

The association between socioeconomic status and severity of diabetic ketoacidosis at onset of type 1 diabetes

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Objective: To determine the association between socioeconomic status and diabetic ketoacidosis (DKA) at initial diagnosis of type 1 diabetes mellitus (T1DM).

Methods: We retrospectively analyzed inpatient records of patients admitted to the Children's Hospital of Philadelphia with new onset T1DM from January 2010 to December 2013. Included subjects were < 19 years old, had pH recorded at diagnosis, and were positive for at least one diabetes related autoantibody. Socioeconomic status (SES) was defined according to the 2014 US census bureau's median household income based on the patient's census block.

Results: 448 patients met inclusion criteria; 48% (n=216) were female, 21% (n=93) were African American, 72% (n=320) were Caucasian, and average age at diagnosis was 9.9 ± 4.2 years. At diagnosis, 14.5% (n=65) were ≤5 years old, 51.5% (n=231) were 5-12 years old and 34% (n=152) were >12 years old. The mean of the 2014 median household income was $78,980 ± $34,018. Mean initial pH was 7.31 ± .13. In multivariate analysis, median household income was independently associated with initial pH after controlling for sex and age at diagnosis (p=0.027).

Conclusions: SES defined by neighborhood median household income is associated with the initial pH at diagnosis. DKA at diagnosis is increased in those with lower SES. These findings can be used to identify and implement prevention strategies including increased awareness in targeted low SES communities.

P093

Type 2 diabetes in children in Kuwait: results from the Childhood-Onset Diabetes eRegistry (CODeR)

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Background: Type 2 diabetes (T2D) has been emerging as a public health problem in children and adolescents worldwide. Despite this, there has been paucity of data accurately assessing T2D in Kuwait. The aim of this study is to report the incidence of T2D in children in Kuwait.

Methods: As per the 2018 ISPAD guidelines, all Kuwaiti patients (aged 0-14 years) who were newly diagnosed with T2D registered through the Childhood-Onset Diabetes eRegistry (CODeR) during the period of 2011-2013 were included in the study.

Results: During the study period, a total of 32 patients were diagnosedwith T2D. The male to female ratio was 1.0. The crude incidence rate was 2.5 (per 100,000). At diagnosis, the mean agefor males was 12.9 years (±1.2) and for females 11.5 years (±2.0) (p=0.025). The mean body mass index SDS as per the WHO standards was at diagnosis was 3.4 SDS (±1.2) and the mean HbA1C was 9.9% (±2.7) with no gender difference.Median C-peptide level was 1376.0 pmol/L (1000.0, 1630.0) and insulin level was 29.1 µIU/ml (14.3, 45.5).

Conclusion: We present the first report on incidence rate of T2D in Kuwait. Due to the increasing rates of T2D in children and adolescents associated with obesity, active screening for T2D is needed to identify and treat patients at an early stage to avoid long-term complications.

P094

Is low sun exposure during early life a risk factor for type 1 diabetes?

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Objectives: The study investigated the relationship between ambient UVR levels, during early life, and subsequent risk of T1D.

Methods: A nested case-control study using linked data from the Western Australian Children's Diabetes Database (WACDD), Midwives Notification System and Mortality Register. Cases (n=1,869) included all children born in WA between 1980 and 2014 with a diagnosis of T1D on the WACDD. Population-based controls (n=27,209) were randomly selected from all live births in WA during the same period who were the same sex, born on the same day, were still alive and had no T1D diagnosis by the time of diagnosis of their matched case. Location specific UVR data was obtained from NASA satellite archives; temperature data from the Australian Bureau of Meteorology. UVR and temperature was calculated by summing recorded daily erythemal UV dose and minimum temperatures for each trimester of pregnancy and the first year of life. Conditional logistic regression was used to estimate effects of UVR and temperature on T1D risk for each trimester and quarter of the first year of life adjusting for maternal

age, ethnicity, maternal diabetes, delivery method, gestational age, birth weight and parity.

Results: Dividing UVR levels into quartiles, the risk of T1D was 32% lower in offspring of women with UVR levels in the highest quartile during their third trimester compared with the offspring of women with levels in the lowest quartile (p=0.03). No association was observed for UVR in the first or second trimesters and offspring T1D risk. Higher UVR in the first nine months of life, particularly months 3-6 (aRR 0.84 per 100KJ increase, p=0.02), was associated with a significantly decreased risk of T1D in later life.

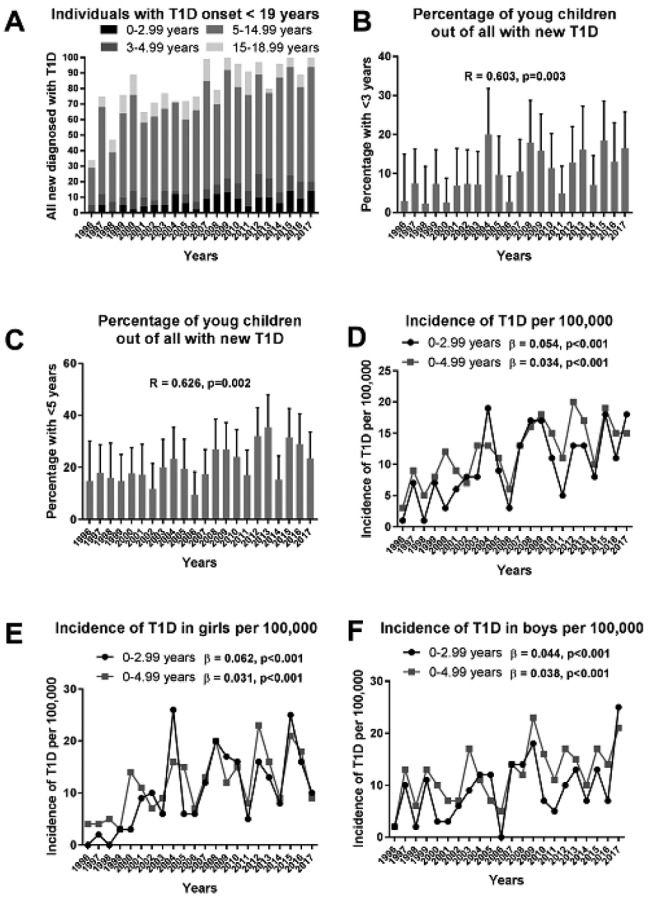
Conclusion: In this study, examining ambient UVR levels throughout pregnancy and infancy and T1D risk, higher UVR in the third trimester and first nine months of life was associated with significantly lower T1D risk in later life.

P095
Epidemiology and remission phase of type 1 diabetes mellitus in infants and toddlers

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Figure 1



[Frequency data on T1D in children in Slovakia in the years 1996-2017]

Objectives: Prevalence of Type 1 diabetes (T1D) in children under 3 years is increasing worldwide. We aimed to 1. study the prevalence of the early onset T1D in Slovakia, and 2. find indicators of the onset and duration of post-initial remission in ifants and toddlers.

Methods: Children included in the study (n=91) had T1D onset < 3 years and were diagnosed in Children Diabetes Centre of the Slovak Republic. Clinical and laboratory parameters associated with the post-initial remission were evaluated retrospectively.

Results: Incidence of T1D in the age group of patients < 3 years annually increased by 5.4% (CI: 3.9-6.8; p < 0.001) during the last two decades (1996-2017). Sixty three of 91 children (69.2%) had ketoacidosis at the diagnosis of diabetes. Remission phase (insulin requirement less than 0.5 U/kg/day and HbA1c level < 8.0%) was observed in 42 (46.2%) of children, whereas 5 children (11.9%) had a complete remission without insulin treatment. Initial pH was significantly associated with both 1. the presence of remission in forward logistic regression (R^2 = 0.370, β = 8.86±2.06, p=0.001), and 2. the duration of the remission in forward linear multiple regression analysis (ΔR^2 0.207, β = 23.28±6.35, p< 0.001).**Conclusion:** Initial pH may be one of the key factors influencing the remission. Therefore, campaigns focusing on the early diagnosis of T1D could be beneficial.

P096
Real-world self-management behavior and glycemic status of pediatric and adolescent with diabetes

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Objectives: Digital diabetes management tools have the potential to offer insights into real-world self-management behavior and glycemic status. In the current retrospective observational study, we aim to characterize self-management behavior and glycemic status of pediatric and adolescent individuals with diabetes.

Methods: We surveyed self-monitoring of blood glucose (SMBG) behavior and glycemic data collected from pediatric and adolescent patients from January 2018 through December 2018 from the Glooko data warehouse.

Results: Data from 41690 pediatric and adolescent users were included in this study. Among patients with demographic information available, 50.4% were female, 94.9% had type 1 diabetes, and 4.2% had type 2 diabetes. Stratifying by age group, patients aged 1 to 6 years (n = 4512) shared 3.4 SMBG checks with Glooko daily (IQR: 2.1 - 4.7), had average blood glucose of 195.0 mg/dl (IQR: 163.2 - 227.2), and had 44.4% of SMBG readings in-range (70 - 180 mg/dl; IQR: 33.3% - 58.9%). Patients aged 7 to 12 (n = 15080) performed 3.1 SMBG checks daily (IQR: 2.0 - 4.2), had average blood glucose of 202.0 mg/dl (IQR: 166.3 - 243.3), and had 41.0% of SMBG readings in-range (IQR: 29.1% - 56.9%). Patients aged 13-17 (n = 22098) performed 2.1 SMBG checks daily (IQR: 1.2 - 3.2), had average blood glucose of 206.8 mg/dl (IQR: 167.2 - 253.7), and had 38.0% of SMBG readings in-range (IQR: 26.3% - 55.0%).

Conclusions: These data provide a better understanding of real-world self-management behavior and glycemic status of pediatric and

adolescent individuals with diabetes. These results complement the findings from other large-scale registries.

P097
Month of birth and risk of developing type 1 diabetes among children in the Swedish national diabetes cohort, the BDD-study

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Objective: Infections may trigger the development of type 1 diabetes (T1D). We tested the hypothesis that there is a correlation between month of birth (MOB) and type of autoantibodies at diagnosis among Swedish children with early onset of T1D.

Material and methods: A total of 8761 children (< 18 years) diagnosed with T1D (May 2005 to December 2016) in the national Better Diabetes Diagnosis (BDD) study were analyzed for sex, age, month of birth and autoantibodies (GADA, IAA, IA2-A, ZnT8RA, ZnT8WA and ZnT8QA) at diagnosis. The children were divided into groups of < 5 years (n=1584, boys n=844) and ≥5 years at diagnosis. The patients were compared to the general population born during the same periods, with data from Statistics Sweden. Chi-square test was used for the calculations. A reduced subset of the material (BDD1) was used for the antibody analysis. This included 3647 patients (< 5 years n=631, boys n=344) from May 2005 to December 2010.

Results: We did not find any association between month of birth and risk of T1D in the BDD-group as a whole. However, more boys born in May tended to develop T1D before 5 years of age than expected (p=0.004). In the BDD1 material, among boys < 5 years born in May there was a tendency (p< 0.023) to have less IAA at onset and they had ZNTR8A more often (p=0.006) compared to boys born in the other months. (See table). We did not find any associations in girls < 5 years at onset of diabetes.

Conclusions: We could not find any consistent results indicating a difference in month of birth among the children with T1D and the general population as a whole but there are some groups of children where month of birth may influence the risk of T1D and type of autoantibodies, which may mirror differences in trigger mechanisms in the immune system.

P098
Well-being among Danish schoolchildren with and without type 1 diabetes: a population-based cohort study

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Objectives: To examine if children with type 1 diabetes (T1DM) reported different school-related well-being compared to their peers in a nationwide survey administered among Danish public-school children, and to investigate the association between well-being and glycemic control.

Methods: Population-based prospective cohort study from 2015-2017 involving 436,439 public-school children attending grades 4 to 9, of which 1,499 had T1DM. Outcomes were answers to 7 prespecified questions related to self-efficacy, social well-being, perceived competences, teacher support, and somatic symptoms. Questions were answered on a 5-point ordered scale. Ordered logistic regressions were performed with and without adjustment for socioeconomic status (SES).

Results: Children with T1DM were more likely to answer positive to *Most of the students are helpful and friendly*, OR 1.17 (95% CI: 1.08 to 1.27, p< 0.001) and more likely to report often having a headache, OR 1.11 (95% CI: 1.01 to 1.21, p= 0.03). Children with T1DM did not respond differently to items related to self-efficacy, perceived competences, and teacher support. Children with T1DM with higher levels of HbA1c (> 70 mmol/mol / 8.6%) reported lower levels of self-efficacy, OR 0.75 (95% CI: 0.61 to 0.91, p= 0.004) and lower levels of perceived competences, OR 0.64 (95% CI: 0.51 to 0.80, p< 0.001). These differences were insignificant with adjustment for SES: OR 0.90 (95% CI: 0.72 to 1.12, p= 0.34) and 0.79 (95% CI: 0.62 to 1.00, p= 0.05). Higher levels of HbA1c were associated with more often having a headache, OR 1.50 (95% CI: 1.22 to 1.85, p< 0.001) and this remained significant with adjustment for SES, OR 1.34 (95% CI: 1.07 to 1.67, p= 0.01).

	MOB: May	%	MOB: Other months	%	Total
IAA POSITIVE	12	41%	198	63%	210
IAA NOT POSITIVE	17	59%	117	37%	134
Total	29	100%	315	100%	344
ZNT8RA POSITIVE	20	69%	133	42%	153
ZNT8RA NOT POSITIVE	9	31%	182	58%	191
Total	29	100%	315	100%	344

[Boys < 5 years and antibodies]

Conclusion: Children with T1DM had similar responses as children without T1DM, except for questions related to having a headache and support from fellow peers. Poor glycemic was negatively associated with well-being, but this was partially explained by SES.

P099
Incidence, clinical and biochemical features of type 1 diabetes in children and adolescents in the Republic of Maldives

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Objectives: There is little published data on type 1 diabetes (T1D) in children and adolescents in the Republic of Maldives. This study aimed to determine incidence, clinical & biochemical features.

Methods: Incidence was determined from a prospective national registry from Jan. 2009-Dec. 2018. Samples for HbA1c, fasting C-peptide and diabetes associated antibodies (Ab) to glutamic decarboxylase (GADA), insulinoma antigen-2 (IA-2A), insulin (IAA) and zinc transporter-8 (ZnT8A) were collected during routine follow-up visits in 2019. Blood for Ab measurement was collected on filter paper as dried blood spots, and measured by radiobinding assays at the Islet Autoantibody Laboratory at the Barbara Davis Center.

Results: Over 10 years, 77 new participants <20 years of age were clinically diagnosed with T1D. Annual mean incidence rates (per 100,000 subjects) for <20y and <15y were 6.2 and 6.9 respectively. Incidence increased with time (p=<0.01,<0.02 respectively, (a 12% and 13% increase from 2009 to 2018). More registry participants were female (54.5%, n=42), and age at diagnosis spanned childhood with 35.1% 0-4y (n=27), 36.4% 5-9y (n=28), 36.4% 10-14y (n=28) and 15.6% 15-19y (n=12). Fasting C-peptide was measured in 39 participants with a mean of 0.32±0.49 ng/mL (range 0.05-2.89 ng/mL). Ab were measured in 52 participants with T1D duration of 3.5±3.2y (range 0.09-15.9y). Four participants (7.7%) had negative Ab, and 71.2% (n=37) had ≥2 Ab. Ab positivity rates for GADA, IA-2A, IAA and ZnT8A were 57.6%, 32.7%, 84.6% and 26.9% respectively.

Conclusions: The vast majority of children clinically diagnosed with T1D in the Republic of Maldives are positive for ≥1 Ab and have undectable to low C-peptide levels. Interestingly, the incidence rate is increasing and higher than reported values from neighboring countries, India and Pakistan (IDF Atlas 2017). Examination of samples collected for genetic analysis, including HLA, will further phenotype T1D in the Republic of Maldives.

P100
Recent loss of winter dominance in the incidence of T1D in children. Analysis of a register of 2252 cases recorded since 1973

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Diabetes in children has undergone a profound change in the last twenty years, with the increase in the incidence of T1D and the decrease in age at onset. Seasonal variations in diagnosis are consistently found in T1D registries. The predominance of incident cases in the cold season is usually attributed to autumn-winter infections acting as a precipitating factor. The aim of our study was to determine to what extent seasonality considered as an infectious environment factor could have been impacted by the new presentation of T1D in children.

Retrospective study based on a DT1 register. The recruitment is that of a department where the average annual incidence reached 30 per 100,000 children under 15 in 2013-2017. The comparison concerns the monthly cumulative incident cases from this period and 1973-2012. The Wilcoxon and Chi2 tests were used.

Two thousand two hundred fifty two incident cases were recorded, including 1307 (58%) in cold seasons and 945 in hot seasons. Monthly cumulative incident cases are in favor of the 6 cold months ($p < 0.01$) with a peak of 237 cases (10.5%) for January compared to hot months with a minimum of 126 cases (5.6%) for July. The incident cases for the cold seasons 1973-2012 and 2013-2017 are 900/1466 (60%) and 407/733 (54%, $p < 0.01$), respectively. The comparison of the monthly ranks for the 2013-2017 period loses its significance ($p = 0.08$) compared to the previous period ($p < 0.01$). Analysis of the age at onset of T1D shows significant decline in classes 0-4 and 5-9 vs. 10-14 years ($p < 0.01$) without influence of the seasonal pattern described.

The loss of seasonality of T1D in recent years suggests that non-infectious environmental factors now equate with the previously dominant infectious environmental factors in the onset of T1D. It must be considered as an additional alert, as well as the decline in the age of onset, highlighting the risk factors that are childhood obesity, toxic and other endocrine disruptors.

P101
Regional differences in glycemic control, hypoglycemia and disease management in adults with T1D: the SAGE study

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Introduction: The Global TEENs and US-based T1D Exchange registries demonstrated that the majority of people with T1D do not achieve HbA_{1c} targets. SAGE examined diabetes control in adults outside the US with T1D, across Asia, Eastern Europe [EE], Western Europe [WE], Latin America [LA] and Middle East [ME].

Objective: To evaluate the percentage of participants achieving HbA_{1c} < 7 %, and assess other glycemic and hypoglycemic outcomes and therapeutic management of T1D.

Methods: SAGE was a multinational, cross-sectional study of participants aged ≥26 years with T1D for ≥1 year. Data were collected at a single study visit for each patient, from medical records and interviews.

Results: Cross-sectional HbA_{1c} < 7 % achievement was highest in WE (27%) and lowest in ME (19%). Incidence of documented symptomatic hypoglycemia (≤70 mg/dL) within the last 3 months was lowest in Asia (59%) and ME (37%). Severe hypoglycemia incidence was lowest in Asia (9%). Physician-driven (vs patient-driven) titration of any insulin was very common in Asia (56%), LA (53%) and ME (73%), but less so in EE (29%) and WE (31%). NPH insulin was used more commonly in EE (22%) and LA (15%) vs other regions. First-generation basal insulin (BI) analogs were used more frequently in ME (69%), while most patients in Asia (43%) used second-generation BI analogs. BI dose adjustment often occurred more than once a week in EE and WE (29%), while >50% of participants in LA titrated less than once a month.

Conclusions: SAGE identified suboptimal overall glycemic control across regions. EE and WE had greater achievement of HbA_{1c} < 7 % but also higher incidence of symptomatic hypoglycemia vs other regions. Observed regional differences could be related to variations in treatment strategies (type of BI, insulin pump usage, physician- vs patient-driven titration, titration frequency), but also ethnic, cultural and healthcare system-related factors.Study sponsored by Sanofi.

Patient characteristics and outcomes	Asia (n=780)	Eastern Europe (n=996)	Western Europe (n=1150)	Latin America (n=488)	Middle East (n=444)
Patient characteristics, mean (SD)					
Age, years	49.0 (14.0)	48.6 (13.9)	46.7 (14.1)	45.6 (13.9)	46.0 (13.6)
Years since diabetes diagnosis	16.8 (11.6)	19.8 (12.1)	23.0 (13.3)	22.5 (12.4)	22.0 (12.3)
HbA_{1c} <7 % (<53 mmol/mol), n (%)	165 (21.2)	261 (26.2)	310 (27.0)	116 (23.8)	84 (18.9)
HbA_{1c}, mean (SD)					
%	7.98 (1.37)	8.02 (1.48)	7.70 (1.21)	8.15 (1.64)	8.21 (1.55)
mmol/mol	63.7 (15.0)	64.1 (16.2)	60.7 (13.2)	65.6 (17.9)	66.3 (16.9)
Hypoglycemia, n (%)					
≥1 symptomatic,*	458 (59.2)	746 (74.9)	851 (76.7)	356 (73.4)	165 (37.2)
≥1 severe,†	72 (9.2)	116 (11.6)	142 (12.4)	68 (14.0)	62 (14.0)
≥1 severe hyperglycemia leading to DKA,† n (%)	18 (2.3)	30 (3.0)	77 (6.7)	22 (4.5)	15 (3.4)
Injection device, n (%)					
Pumps	138 (17.7)	45 (4.5)	498 (43.3)	74 (15.2)	14 (3.2)
Injections/pens	638 (81.8)	950 (95.4)	650 (56.5)	413 (84.6)	430 (96.8)
Titration, n (%)					
Physician-driven	436 (56.3)	286 (28.7)	355 (31.0)	242 (53.1)	323 (72.7)
Patient-driven	338 (43.7)	710 (71.3)	791 (69.0)	214 (46.9)	121 (27.3)
BI type, n (%)					
Intermediate-acting NPH insulin	29 (3.7)	217 (21.8)	15 (1.3)	75 (15.4)	47 (10.6)
Long-acting analogs	516 (66.2)	682 (68.5)	606 (52.7)	322 (66.0)	309 (69.6)
First-generation	181 (23.2)	431 (43.3)	323 (28.1)	223 (45.7)	308 (69.4)
Second-generation	335 (42.9)	251 (25.2)	283 (24.6)	99 (20.3)	1 (0.2)
BI titration frequency, n (%)					
>1 per week	58 (11.4)	247 (28.7)	165 (29.0)	75 (20.3)	51 (14.3)
<1 per month	158 (31.1)	91 (10.6)	168 (29.5)	195 (52.7)	120 (33.7)

Included patients had a clinical diagnosis of presumed autoimmune T1D treated with insulin. Patients were excluded if they had switched treatment regimens between pump and multiple insulin injections within 3 months prior to the study visit, or if they had received oral antidiabetic drugs at any time since T1D diagnosis.

*BG ≤70 mg/dL, within the last 3 months; †Within the last 6 months. BG: blood glucose; BI: basal insulin; DKA: diabetic ketoacidosis; SD: standard deviation; T1D: type 1 diabetes. 'n': numbers refer to overall group size, but their availability for analysis of each outcome may vary.

[Table. SAGE patient characteristics and outcomes by region]

Posters on Display – Diabetes Epidemiology

P102
To find prevalence of type 1 with autoimmune thyroid disorders, age, duration, thyroid antibodies, growth and glycemic variability in Indian scenario

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Objective: To Find Prevalence of Type 1 with Autoimmune Thyroid Disorders, Age, Duration, Thyroid Antibodies, Growth and Glycemic variability in Indian Scenario.

Methods and plan: This is retrospective observational Multicentric Study carried out from January to December 2018, We divided Diabetes Type 1 Patient with Autoimmune Thyroid disorder According to Age,Duration, Growth and Glycemic Variability in Indian Scenario.

Results: We studied total 100 (Diabetes type 1 with Autoimmune thyroid disorder) at 4 centers of Dia Care.

Data Recorded between Age - 15 + 5

Children with Diabetes Type 1 :100

Male - 65

Female - 35

1-3 Age -12

6-10 Age -18

10 -18 Age - 48

More than 18-22

Data Recorded Type 1 patient Duration of Diabetes:

0-2 - 46

3-6 - 32

7-12 - 22

Data Recorded in variation in Thyroid Antibodies.

Normal Range - 28

Abnormal Range - 31

Variation in thyroid Antibody - 41

Data Recorded according to Growth

(Every Six months clinically examined growth)

Normal Growth - 41

Delayed Growth - 59

Data Recorded in patient with glycemic variability.

(Glycemic variability according to Daily Glucose measurement and HbA1c according to time interval.)

Good/Stable Glycemic control - 22

Glycemic variability - 48

Poor Glycemic control - 30

Conclusions:

- Study Indicate high Prevalence between Age Group 10 to 18 years.
- Relationship between Thyroid Disorder and Diabetes mellitus type 1 is characterized by a complex interaction, thyroid autoimmunity being more prevalent in people with type 1
- Higher percentage among study of Type 1 children with thyroid disorder are male and duration of diabetes detected 0 - 2 years.
- Higher Percentage of Type 1 children with thyroid disorder have Variability in Thyroid Antibodies.
- Higher Percentage of Type 1 Children with thyroid disorder have delayed Growth.
- Diabetes type 1 children with thyroid disorder found high percentage in Variability in thyroid antibodies, Delayed Growth and High Glycemic Variability in Indian Scenario.

P103
Independent determinants of urinary albumin excretion and confounding variables in diabetic patient

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Introduction: Microalbuminuria is a known risk factor for the development of clinical nephropathy in diabetes and also an independent risk factor for cardiovascular disease. Microalbuminuria is a marker of a pathophysiological process that causes both increased renal albumin loss and atherothrombosis. Microalbuminuria is hallmark for early detection of diabetic nephropathy. The aim of this study was to evaluate the independent determinants of urinary albumin excretion, and association between biochemical parameters and socio-demographic factors in Diabetic patients.

Materials and methods: This is a hospital based cross sectional study included diagnosed case of Diabetic patients. Serum uric acid concentrations were measured by enzymatic method (uricase-peroxidase), HbA1c was measured using the principle of dry chemistry, Blood Sugar measured by GOD/POD method and urinary albumin excretion was measured with an immunoturbidometric assay.

Results: Based on categorization of Urinary albumin excretion, 65% normoalbuminuric, 27% microalbuminuric and 8% macroalbuminuric are found in my study population. The frequency of hyperuricemia was found to be 43%.The prevalence of albuminuria increased significantly with increasing glycaemia. UAE is significantly correlated with onset of DM(r=0.203,P=0.013), SystolicBloodPressure(r=0.355,P=0.001),DiastolicBloodPressure(r=0.405,P=0.001),Uric acid(r=0.352,P=0.001), HbA1c(r=0.212,P=0.005) and Smoking(r=0.265,P=0.01).Multiple regression test shows that independent determinant of UAE are Blood Pressure{Diastolic(β=0.313,P=0.006)/Systolic(β=0.309,P=0.002)}, HbA1c(β=0.187,P=0.010), Uric acid(β=0.331,P=0.0001) and Onset of DM(β=0.199,P=0.041).

Conclusion: The findings extend the relationship between confounding variables and the urinary albumin excretion which emphasize on the importance of screening for microalbuminuria to prevent renal dysfunction and HbA1c measurement on a regular interval for good glycemic control.

P104
Epidemiology and phenotype variation in young diabetes patients

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Introduction: More and more people are diagnosed with type 2 diabetes at younger age now a days. It is need of hour to study epidemiology and phenotype variations in this group.

Aims: To study phenotype among the young diabetes population.

Methods: We retrospectively analysed data of all type 2 diabetes patients attending OPD from Jan 2019 to march 2019. Total 106 patients attended OPD during this period. BMI, PBF (% BODY FAT), VFI (Visceral fat index), Hba1c, Triglyceride, LDL and NON HDL, Total Calorie intake and % daily carb intake were reviewed for all 106 patients. All 106 subjects were divided in two groups based on their age; group A age ≤ 40 years (n=33), group B age > 40 years (n=73). Group B was further divided into group B1 (age 41-60 years) (n=58) and group B2 (age ≥ 61 year) (n=15). Average of BMI, Body fat analysis and biochemical parameters were compared between these two groups. Student's T test was used to calculate the p value for all parameters.

Results: We analysed data of all 106 patients and average of BMI, PBF, VFI, HbA1c, TG, LDL, NON HDL, TOTAL CALORIES, % Carbohydrate was compared between Group A and Group B. Average TG, LDL, NON HDL and % daily carbohydrate intake were higher in group A as compared to total as well as group B. out of this all parameters NON HDL and % of daily carb intake was higher in group A as compared to group B [(NON HDL (p value 0.0412); % carbohydrate intake (p value 0.064)]. In sub analysis the difference was more significant in group B2 (NON HDL) p value 0.0118; % of carb intake p value 0.0275).

Conclusion: NON HDL level and % of daily carb intake are significantly associated with in young Type 2 diabetes population (≤ 40 years) as compared to adult population particularly type 2 diabetes population with age ≥ 60 years. NON HDL cholesterol and % of daily carb intake can be more easy target to reduce prevalence of type 2 diabetes in younger population. However, it may require further research in mass population.

P105
Current state of insulin therapy for Japanese pediatric and adolescent type 1 diabetes: the 2018 cohorts of the childhood-onset type 1 diabetic patients in Japanese Study Group of Insulin Therapy for Childhood and Adolescent Diabetes (JSGIT)

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Objective: The aim of this study was to clarify current state of insulin therapy for Japanese pediatric and adolescent type 1 diabetes (T1D). We analyzed the baseline profiles of 2018 cohorts of the childhood-onset T1D in Japanese Study Group of Insulin Therapy for Childhood and Adolescent Diabetes (JSGIT).

Subjects and Methods: The subjects were Japanese T1D at the age of 1 to 18 with onset age of 16yr or younger, enrolled in the 2018 cohorts in JSGIT. This cohort consisted of 936 (393 boys) T1DM in 68 institutions who were followed up from March 2018.

Results: The number of T1A, T1B and unclassified type of the subjects were 843, 53 and 40. And the number of acute onset, slowly progressive and fulminant type of the subjects were 863, 69 and 4. The prevalence of GAD Ab IA-2 Ab, ZnT8Ab, Tg Ab and TPO Ab positive were 72%, 75%, 84%, 12%, and 18%. The frequency of MDI, CSII only and SAP were 62%, 18%, and 17%, respectively. The median HbA1c levels of the subjects treated with MDI, CSII only and SAP were 8.0, 7.9 and 7.9, respectively. The median HbA1c levels of boys at the age under 7 years, during 7 to 12 years, over 12 years were 7.8, 7.9 and 7.8%, respectively. Those of girls were 8.1, 7.9 and 8.1%, respectively. The median total daily insulin dose (TDD)/body weight of boys at the age under 7 years, during 7 to 12 years, over 12 years were 0.76, 0.84 and 1.04. Those of girls were 0.73, 0.88 and 0.94 respectively. The frequency of the CPR levels under 0.1ng/ml was 46% of all subjects and 75% of the subjects more than 7 years after onset. The CPR levels were a significant inverse correlation with diabetes duration and HbA1c levels.

Conclusions: New technologies for T1D management are spreading among Japanese T1D. However, these technologies do not lead to improve their glycemic controls. We should consider how these technologies make T1D good glycemic controls.

P106
Young adult responses to the CANDID survey: health outcomes of childhood diabetes diagnosed 1990-2009

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Objective: To determine self-reported health outcomes and utilisation of adult health services in young adults with Type 1 diabetes.

Methods: Young adults diagnosed with Type 1 diabetes, diagnosed between 1990 and 2009, who had attended the Children's Hospital at Westmead for any diabetes specialist services (including outreach services) were invited to participate in an online survey. Using a REDCap* survey participants were asked to report on their personal and demographic data, current diabetes care, current health and complications status, and lifestyle and family. Letters were sent to 3379 possible participants. The age of respondents was 19 -38 years with diabetes duration of 9-20 years.

Results: Eight weeks following initial invitation letter, 4.5% (n=152) of letters were returned to sender. Only 1.8% (n=62) of possible participants responded and 5 deaths were reported. 66% (n=42) of survey respondents were female of whom 33% (n=14) had born children. 86% of respondents (n=54) reported their last HbA1c (Median 7.5% [IQR 6.9% - 8.2%]). Most reported normal hypoglycaemia awareness. 87% attended an endocrinologist at least once per year.

Conclusion: Within this small sample respondents have shown their understanding of the measure of their diabetes control and most regularly attend an endocrinologist for diabetes management. Insulin pumps are the preferred method of insulin delivery. Whilst severe hypoglycaemia continues to be an acute complication, mental health and bone health appear to be areas of concern for long term complications.

Attends Endocrinologist once per year≥	87%
Insulin Pump/Injections	67% / 33%
Attends Mental Health Practitioner	18%
Severe Hypoglycaemia	16%
Emergency Presentations	32%
Regular Eye Review once per year≥	81%
Regular Kidney Review once per year≥	71%
Reported Fractures	27%
Participate in Physical Activity	84%
Smoking	5%

[CANDID Study Survey Results]
*REDCap (Research Electronic Data Capture)

P107
Increasing coexistence of additional autoimmune diseases at diabetes type 1 onset among children and adolescents in Podlaskie Voivodeship (Poland) diagnosed in years 2010-2018

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Objectives: Type 1 diabetes (T1D) prevalence is increasing, but its association with other autoimmune diseases coexisting since diabetes onset is not recognized. The aim of the study was to evaluate the epidemiology of T1D incidence and prevalence of additional autoimmune diseases comorbidity since diabetes onset among children in Podlaskie Voivodeship (Poland) during nine years of observation.

Methods: The DMT1 incidence rate was calculated as the number of all newly diagnosed cases per 100 000 population persons 0-18 age. Selected age rages (0-4, 5-9, 10-14, 15-18 yrs) were studied separately. The study population consisted of 493 children (264 boys and 229 girls) at the age 0-18 diagnosed with diabetes type 1 in one Polish centre between 2010-2018. Diagnoses of other autoimmune diseases were obtained from medical records from first hospitalization when diabetes was recognized.

Results: In studied period the annual incidence of DMT1 increased from 19.5/100000 in 2010 to 26.4/100000 in 2018 with the incidence rate (IR) ratio of 1.4-fold. The highest increase in incidence rate was observed in group 0-4 yrs old (from 13.8/100000 in 2010 up to 30.6/100000 in 2018). 57 (11.6%) of studied population were diagnosed with at least one additional autoimmune illness, 8% in 2000 vs 18% in 2018 ($p< 0,05$). Celiac disease was diagnosed totally in 26 children (5.3%), prevalence increased from 4.2% in 2000 to 11.2% in 2018 ($P< 0,05$). Autoimmune thyroid diseases were diagnosed in 37 children (7.55%), increasing from 6.2% to 12.8% in 2018 ($p< 0,05$).

Conclusions: The incidence of T1D in children increased 1.4-fold over the 8-year observation period. Additional autoimmunity represents a significant comorbidity in patients with new onset T1D. The number of children diagnosed with additional autoimmune diseases that accompany T1D is rapidly growing in all age groups throughout recent years.

P108
Better glycaemic control first years after type 1 diabetes diagnosis increases the likelihood of residual C-peptide 10 years later

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Objective: To identify factors associated with residual C-peptide production for at least 10 years in children and adolescents diagnosed with type 1 diabetes.

Methods: During the period 2013-2016, 73 children and adolescents (< 25 years), diagnosed with type 1 diabetes at Uppsala University Hospital were included in the study. At least 10 years after having their type 1 diabetes diagnosis, we measured any remaining C-peptide concentration (≥1.17 pmol/L) with an ultrasensitive method and analyzed HbA1c, creatinine, blood glucose, islet cell autoantibodies GAD (GADA) and islet antigen 2 (IA-2A) concentrations. The average HbA1c was calculated during each of the 10 years after diagnosis and further grand average was calculated for the full study period when participants were followed up for more than 10 years.

Results: C-peptide was detectable in 28 (38%) of the participants, mainly in females (p=0.036). The C-peptide concentration was 4.3 ± 5.3 pmol/L (range 1.2-22.7). At diagnosis the participants were 5.1 ± 3.0 years old and their average HbA1c was 79 mmol/mol. The HbA1c was lower in the group with detectable C-peptide during the first three years after diagnosis; 43 ± 6 mmol/mol vs 49 ± 8 mmol/mol (p=0.003), 49± 7 mmol/mol vs 53 ± 8 mmol/mol (p=0.029) and 51 ± 8 mmol/mol vs 56 ± 9 mmol/mol (p=0.026). At a diabetes duration of 12.3 ± 2.4 years and at an age of 16.9 ± 3.3 years, the HbA1c had increased to 65 ± 11 mmol/mol. The BMI SDS had not increased since the one-year follow-up. Nine participants (12%) had been diagnosed with coeliac disease and two (3%) with hypothyreosis. Eighteen (25%) of the participants had retinopathy.

Conclusion: Children and adolescents with detectable C-peptide levels after more than 10 years of diabetes duration were preferentially females and had better HbA1c during the first three years after diagnosis. At 10 year follow-up, they also had less retinopathy, but higher BMI standard deviation score.

Poster Tour 15 - Diabetes Epidemiology, Genetics, Immunology, and the Environment

P109

A multi-disciplinary quality improvement (QI) innovation: improving early diagnosis of type 1 diabetes in children and young people (CYP) in the primary care setting in Cardiff & Vale University Health Board

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Introduction: In Wales, most CYP present with symptoms of type1diabetes (T1D) for the first time to primary care. Delayed diagnosis is not uncommon and is associated with risk of diabetic ketoacidosis (DKA), the commonest cause of morbidity & mortality. The prevalence of DKA at diagnosis over the last 20 years remains unchanged. Current NICE guidance recognises prompt diagnosis of T1D in CYP as a priority

Objectives: To develop effective pathways to facilitate early diagnosis of T1D.The primary objective is to reduce the incidence of DKA at diagnosis

Methods: We worked with partners in primary care to identify barriers faced by Health care professionals(HCP) and developed initiatives to improve timely diagnosis.This included a referral pathway, feedback tools and training.2 audit cycles over 2 years: retrospective case note analysis of all newly diagnosed CYP.The first cycle pre-change covered 2017 and second cycle following QI changes in 2018. Key aspects included appropriate testing and prompt referral. Exclusions included CYP diagnosed in ED,by parents, and other clinics

Results: Pre change:22 newly diagnosed,19/22 presented to primary care; of the 19,4 were in DKA,10 had POC blood glucose (BG) testing and 2 had urine test.3 had fasting BG resulting in delay.3 of 4 in DKA had delayed diagnosis.



[Quality Improvement Cycle: Methodology]

Post QI initiatives:32 newly diagnosed, 22/32 presented to primary care; of the 22,6 were in DKA.17 had POC BG test, and 3 had urine test.5 of the 6 were in DKA at first presentation,had POC testing and promptly referred.

Post QI initiatives,91% had POC testing and prompt referral to secondary care in comparison to 63% pre change.

Conclusions: We have demonstrated a clear improvement in prompt diagnosis following the QI initiatives between primary and secondary care. We cannot as yet demonstrate a reduced incidence of DKA at diagnosis. Ongoing data analysis, feedback, training for HCPs and a public awareness campaign is planned.

P110

In a large unscreened cohort of children with type 1 diabetes, ß-cell autoantibody positivity is a weak predictor of 5 year metabolic outcome: a report from the DPV Registry

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Objectives: To compare the association of autoantibody positivity status and diabetes ketoacidosis (DKA) at disease onset on long term metabolic control in unscreened children with type 1 diabetes (T1D).

Methods: The DPV registry was used to identify cases with T1D diagnosed from 0.5 to 15 yrs with at least 2 autoantibodies (out of IAA ICA, IA2, GAD, ZnT8) measured at onset and at least one annual visit for 5 yrs available. Linear models with repeated measurements with a compound symmetry covariance structure were used to study A1C. Negative binomial regression models were used to study cumulative event rates during 5 years post diagnosis for DKA (pH< 7.3) and severe hypoglycaemia with or without coma (SH). All models were adjusted for age at onset, gender, migration background and use of insulin pump.

Results: 13662 were identified: 53% male, mean age at onset 8.1 (SD 3.7) yr, 21% had DKA and 66% had 2 or more positive autoantibodies (2+AB) at onset. Mean A1C over the 5 yrs was 7.5 % (SD 1.0); average rates of DKA and SH were 4.4 (95%-CI: 4.3-4.5) and 19.4 (19.2-19.7) per 100 PY. Those with 2+AB had higher A1C than those with negative AB (adjusted means 7.54% (7.52-7.56) vs. 7.48% (7.44-7.54); p=0.05); but had similar frequency of DKA over the next five years. DKA at onset was associated with increased A1C (adjusted

means 7.60% (7.56-7.63) vs. 7.51% (7.50-7.53)) and increased DKA over the next five years (5.5/100 PY (4.9-6.1) vs 3.7/100 PY (3.5-4.0), all p< 0.001. Neither DKA at onset nor autoantibody positivity was associated with SH over the next 5 years.

Conclusions: Results from the DPV registry indicated that DKA at onset is a stronger predictor of A1C and post-onset DKA compared to autoantibody positivity. In the future, early detection through identification of genetic and autoantibody status and follow-up of children at risk, or better education of parents and doctors, may avoid DKA at onset and potentially improve 5 year metabolic outcome.

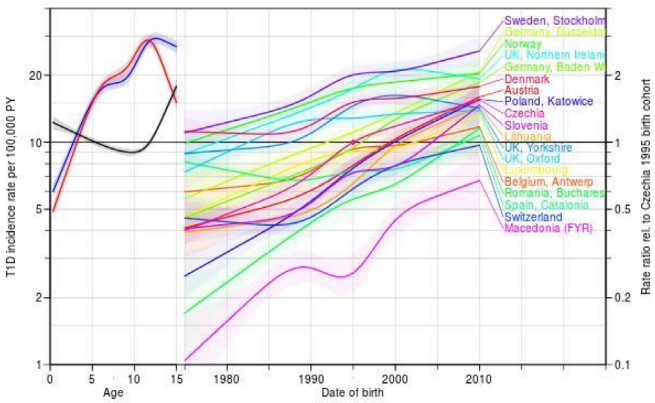
P111
Age-, period- and cohort modelling of type 1 diabetes incidence in Europe among children age 0-15 years

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Aim: Describe incidence trends in type 1 diabetes (T1D) for centers participating in EURODIAB 1989 to 2013 using fine modelling age-period and cohort models (APC-models).

Methods: Each center delivered data in one-year age classes of type 1 Diabetes cases age 0-15 years. Cases were validated using capture-recapture methods. There were 57,725 individual cases from 19 centres from 16 countries. We used age-period-cohort models with natural splines for the age, period and cohort effects, and calculated the overall drift for each country. Further a likelihood ratio test was used to test for non-linearity of period and cohort effects. We fitted a final age-cohort model for all centres with separate age-effect for boys and girls and separate cohort effect for each center.



[T1D incidence rates in children age 0-15 years from 19 European Countries]

Results: There was no clear common cohort effect across centers, and the non-linear period-effects were small. The overall result was an increase in incidence with the highest increase observed in countries with the lowest incidence. During the entire period 1989-2013 Sweden had the highest incidence and Macedonia had the lowest incidence. The male:female ratio changed with age, with a higher rate in boys in the youngest (< 5 years of age) and in the oldest (> 12 years of age). The peak incidence was at age 12 years for girls and at age 13 years for boys (see attached figure).**Conclusion:** The modelling in 1-year classes allowed us to show the changing male:female ratio with age. A common cohort effect across Europe could not be confirmed, but we found that centres with the lowest incidence rates had the largest increase over time.

P112
Distribution and frequency of HLA Class II alleles and haplotypes in Libyan children with type 1 diabetes mellitus

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Objective: HLA class II is the primary susceptibility genetic field to Type 1 Diabetes Mellitus (T1DM) and HLA analysis could help to clarify the relative impact of genetic contribution to the incidence of T1DM. This study examines the HLA typing **for the first time** in Libyan diabetic children.

Methods: This study was done in collaboration with Azienda Ospedaliero-Universitaria of Udine,Italy. We randomly studied 218 Libyan type 1 diabetic children.Mean age 12.2±4.6years, mean duration of diabetes 4.7±4.0 years.HLA genotypes: Genomic DNA prepared from EDTA collected blood, either by salting out or using Qiagen protocol.HLA-DRB1* and HLA-DQB1* genotyping performed by polymerase chain reaction sequence-specific-primer(PCR-SSP).

Results: HLA-DR3-DQ2 or DR4-DQ8 haplotypes are the major disease markers in the Libyan diabetic patients, whereas the other alleles apparently less frequent in this cohort. Nearly 60% of our patients carrier HLA-DQA1*05:01/DQB1*02:01(DQ2); forty percent of them linkage with HLA-DR3. HLA-DQ2/2 homozygous more common than DQ8/8 homozygous (40% and 5%,respectively).The presence of the combination of HLA-DQ2 with DQ8 is significant because it is twice the prevalence of HLA-DQ8 alone(23.9% vs 11.9%,respectively).In addition, most of this association DQ2,DQ8 is linkage with DR3,4 and DR4 (18.9% and 5%,respectively). The homozygous genotype, HLA-DRB1*03,*03, significantly more frequent among diabetic patients, similar to HLA-DRB1*03,*04 haplotype and three times more than the HLA-DRB1*04,*04. Furthermore, HLA-DR4,DQ8 haplotype differs significantly in frequency comparing with HLA-DR3,DQ2 (11.9% vs 40.8%,respectively). 5% of our patients carrier HLA-DRB1*03,*X or DRB1*04,*X; linkage to HLA-DQB1*03,*06 or DQB1*02,*06 genotype respectively and two patients carrier HLA-DRB1*09 -DQB1*02.

Conclusions: Our results showed for the first time that HLA typing in Libyan patients with type 1 diabetes mellitus is similar to Caucasian HLA typing diabetic population.

P113

Review of autoantibody status and titre as predictors of disease progression in type 1 diabetes mellitus (T1DM) in the first 12 months after diagnosis

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Background: Autoantibodies are strong predictors of T1DM[1,2,3]. There is limited evidence regarding whether the number of antibodies/their titre at presentation determine the progression of the disease.

Objective: Review the results of antibodies tested at diagnosis to assess whether these predict HbA1c or total daily dose of insulin (TDD) 12 months after diagnosis.

Methods: All new patients in 2017/18 were reviewed. Their antibody status, HbA1c at 12 months and their TDD at 12months, adjusted for weight, were recorded.

Results: 48 patients were diagnosed. 5 patients were not tested. Table 1 shows antibody results and their correlation with HbA1c and TDD at 12 months.

The insulin antibody was positive in 7%. Every one of these patients had another positive antibody. 1 patient had a positive islet cell antibody status only. 1 patient had positive insulin A2 antibody status only. 1 patient had no antibodies present. This reflects the data in the literature[1]. There was no correlation between specific antibodies and HbA1c. There was no correlation between number of antibodies that were positive in each patient and HbA1c (r= -0.05) or TDD (r=-0.14).

Conclusion: 97.6% of children were positive for at least one antibody. Insulin antibody alone has not aided diagnosis of T1DM in this cohort. Antibody status does not correlate with outcome at 12 months measured as TDD or HbA1c.

References:

1. Bingley P (2010) Clinical Applications of Diabetes Antibody Testing *JCEM* 95:1;25-33

2. Tarn et al (1988) Predicting insulin-dependent diabetes. *Lancet* 1:845-860

3. Achenbach P et al (2004) Stratification of Type 1 Diabetes Risk on the Basis of Islet Autoantibody Characteristics *Diabetes* 53(2): 384-392

P114

The frequency of celiac associated haplotypes in Polish patients with type 1 diabetes

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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 frequency of celiac specific haplotypes (HLA DQ2.5, DQ2.2, DQ8) and previously found for Polish population CD risk variant of MSH5 gene in group of T1D patients.

Methods: 262 children with T1D diagnosed based on ISPAD 2014 guidelines wereincluded to the study. CD based on ESPGHAN 2012 guidelines was diagnosed in 23 (8,78%) patients. HLA-DQ and single nucleotide polymorphism (SNP) in MSH5 (rs3130484 variant) were genotyped with TaqMan SNP Genotyping Assays (Life Technologies, USA) using a SensiMix TM II Probe Kit (Bioline Ltd, United Kingdom) and a 7900HT Real-Time PCR system (Life Technologies,USA).

Results: In the group of 262 children 233 (88,93%) have at least one of the specific for CD allele in HLA (DQ2.2, DQ2.5 or DQ8), but only 96 patients (36,64%) have characteristic for Polish population SNP in MSH5. In present analyses the risk for CD develop in T1D was 8,78%. Compared to all patients included to the study, the odds ratio (OR) for group with at least one celiac HLA haplotype was 1,14 (95% CI: 0,62 to 2,09), for patients with SNP in MSH5 OR=1,92 (95% CI: 0,96 to 3,87), and for patients with SNP in MSH5 and HLA OR=1,92 (95% CI: 0,96 to 3,87). Specific celiac HLA haplotypes were found in all CD patients whereas only 65,22% had risk variant in MSH5. Although sensitivity for celiac specific HLA was 100%, the specificity was only 12,13%. Evaluation of SNP in MSH5 decreased sensitivity to 65,21% but increased specificity to 67,36%.

Conclusions: Genotyping for CD specific HLA alleles in patients with T1D give little

Antibody	Number of tests performed	Positive	Negative	Correlation coefficient with HbA1c	Correlation coefficient with TDD
Islet Cell antibody	43	34	9	-0.13	-0.06
Islet Cell A2 antibody	42	35	7	0.03	0.02
Anti-GAD 65 antibody	44	36	8	-0.11	0
Insulin antibody	41	3	38	-0.1	-0.09

[Table 1. Antibody results and their correlation with HbA1c and TDD at 12 months.]

information about the risk for CD development. The results also do not allow to recommend routine screening for SNP in MSH gene due to low sensitivity.

The study was financed by the Children´s Memorial Health Institute Grant S147/2016 and M32/18

P115

Serum trypsinogen and lipase as biomarkers of exocrine pancreatic function in newly diagnosed type 1 diabetic children and adolescents

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Objectives: Type 1 diabetes mellitus (T1DM) is usually associated with laboratory decrease in pancreatic exocrine enzymes. Nevertheless, the exact onset of low pancreatic enzymes levels in sera of patients is still unknown. We measured pancreatic serum levels of trypsinogen and lipase in Egyptian children and adolescents with newly diagnosed T1DM to validate their role in diagnosis and their relation to HbA1c, lipid profile and fasting c-peptide as a marker of endocrine pancreatic insufficiency in T1DM.

Methods: Fifty Egyptian children with newly diagnosed T1DM (age ranging from 2 to 15 years) were compared to age and sex matched 50 healthy controls. Clinical history of DKA and of pancreatitis was taken as well as clinical examination and anthropometric measurements including weight, height and body mass index. Laboratory data of fasting c-peptide, HbA1c, lipid profile of patients with newly diagnosed T1DM were collected. Serum trypsinogen and serum lipase were collected from both patients and control Groups.

Results: Serum trypsinogen and lipase were significantly decreased in patients with newly diagnosed T1DM compared with control group ($p< 0.001$).There was no relation between the prementioned pancreatic enzymes and fasting c-peptide nor with disease duration ($p>0.05$).

Conclusion: Low levels of pancreatic enzymes in pediatric patients with indicates the presence of significant exocrine pancreatic injury. Nevertheless, more studies are needed to follow- up both pancreatic enzyme levels as well as exocrine pancreatic autoantibodies searching for correlations with disease progress.

P116

The contribution of natural killer cells in children with type 1 diabetes mellitus

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Background : Natural killer cells are a type of cytotoxic lymphocytes critical to the innate immune system associated with their ability to kill target cells and interaction with antigen-presenting cells and T cells.

The aim of study was to determine the role of NK cells in the pathogenesis of type 1 diabetes.

Patients and methods: The study group consisted of 207 children: 76 patients with DM1 and 101 healthy children - siblings of the patients with type 1 diabetes mellitus. The control group consisted of 30 healthy children without diabetic siblings.

The plasma glucose concentration, insulin, C-peptide, and glycosylated hemoglobin, and anti-pancreatic β cell antibodies (anti-GAD, anti-IA2, and anti-ZnT8) were determined in all the children. The percentage of NK cells was evaluated by flow cytometry FACSCalibur (Becton Dickinson, USA). The results were analyzed with STATISTICA 10 PL.

Results. The percentage of NK cells in the children with type 1 diabetes mellitus (10.06%) and in the group of their siblings (11.06%) was significantly lower in comparison to the control (12.53%) ($p=0.002$, $p=0.02$; respectively). We found a significant non-parametric correlation between the percentage of NK cells and the age, BMI, level of glucose, insulin, HbA1C, C-peptide, anti-GAD, anti-IA2, and anti-ZnT8 in all groups of children. The results of the ROC curve analysis facilitated determination of the usefulness of monitoring the percentage of NK cells in type 1 diabetes mellitus. The number of NK cells was lower in type 1 diabetes mellitus than in the group of healthy children.

Conclusions: 1. The determination of the percentage of NK cells in peripheral blood can be an effective method for selection of a group of patients among siblings of diabetic and healthy children threatened with the development of type 1 diabetes.

2. The NK cells in children exert a probable preventive effect in the development of DM1.

P117

A study of serum betatrophin levels in children with type 1 diabetes mellitus

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Introduction: Betatropin was recently described as a potent stimulator of mouse beta cell proliferation. When overexpressed in mice,a 17 fold increase in beta cell proliferation was observed.If this finding in mice was found to be fully applicable in humans, this would open up the possibility of betatrophin use in treatment of T1D.

Aim: This study therefore tested this hypothesis and evaluate Betatrophin Levels in Children With Type 1 Diabetes Mellitus and to study correlations with different parameters.

Methodology: The study included three groups; GroupI:30 children with newly diagnosed withnT1D(within 1 year), Group II: 30 children with longstanding T1D(>5 years) and Group III: 30 chidren apparently healthy, age and sex matched with the previous groups as a control group.They were subjected to history taking, examination and laboratory investigations including; fasting blood glucose,HbA1c%, lipid profile Fasting C-peptide and Betatrophin levels

Results: Diabetic group had significantly higher levels of Betatrophin than the control group. Moreover, the newly diagnosed had a significantly higher levels of Betatrophin than te old standing group.

Betatrophin had a significant negative correlation with BMI and moderate positive correlations with HbA1c%,triglycerides levels in group I and a significant strong positive correlation with HbA1c% in group II.

Conclusion: Betatrophin levels were higher in newly diagnosed as well as in the long standing diabetic children which reflects that there is already a potential stimulus for beta cell proliferation present in T1D. Also,these results may suggest that the duration of T1D affect the betatrophin levels where higher Betatrophin may have positive effect on beta cells and this may be used in the future for treatment.

P118
The prevalence of type 1 diabetes autoantibodies among patients with 18q del syndrome

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Introduction: Autoimmune phenomena and IgA deficiency are reported to be common in patients with 18q deletion syndrome (MIM#601808, 18q del). We previously reported that patients with 18q del have increased risk for type 1 diabetes (T1D).

Objectives: We sought to evaluate the prevalence of serum autoantibodies directed to β-cell antigens among Caucasian patients with 18q del syndrome.

Methods: Medical registries and social media were used to recruit patients with 18q del. Microarray oligonucleotide comparative genomic hybridization (aCGH; Agilent, USA) was performed in all 27 consented patients to identify the size and location of the chromosome 18 deletion. Islet autoantibodies (GADA, IA-2A, IAA, ZnT8A) were measured according to the IASP-validated methods in a national reference laboratory. HLA-DQA1, -DQB1 and -DRB1 were genotyped using next-generation sequencing (NGS; Illumina, USA). HLA genotyping performed in 325 pediatric patients with T1D and 103 healthy controls (CTRL) served as comparators for HLA allele distribution.

Results: Seven of the 27 patients with 18q del (29.6%) were positive for at least one islet autoantibody, including two children with 18q del and T1D. Anti-GAD was the most frequent autoantibodies detected. Interestingly, HLA risk haplotypes (*DRB1*04:01-DQA1*03:01-DQB1*03:02 or DRB1*03:01-DQA1*05:01-DQB1*02:01)* distribution differed between 18q Del, T1D and CTRL study groups (36%, 89% and 21%, respectively, $P < 10^{-5}$). The protective *DRB1*15:01-DQA1*01:02-DQB1*06:02* haplotype was present in 28%, 1.8% and 14% of each study group, respectively, $P < 10^{-5}$.

Conclusions: Although protective HLA haplotypes were frequently present in patients with 18q del, this group exhibits increased prevalence of autoimmune responses against pancreatic islets as compared to CTRL subjects and hence, may have increased risk of developing autoimmune diabetes.

Posters on Display – Diabetes Genetics, Immunology and the Environment

P119
A study of +49 CTLA 4 genetic polymorphism in type 1 diabetes of gujarat population of India

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Objective: To evaluation of allele frequency and role of cytotoxic T-lymphocyte associated (CTLA 4) gene polymorphism in type 1 diabetes with its clinical characteristics of Gujarat population.

Method: Total 66 subjects were participated in to the study with 97 first degree relative as control. From Gujarat, state of India, three different cities were selected for study population. After taking consent, subjects were enrolled as per the inclusion/exclusion criteria with the help of selected diabetologist. Blood samples were collected for genomic DNA isolation, PK based method used for DNA isolation. Quality and quantity analysed by EPOCH and agarose gel electrophoresis respectively. In CTL4, +49 A/G polymorphism analyzed by polymerase chain reaction(PCR) followed by Restriction fragment length polymorphism (RFLP). Forward and reverse primer sequence were 5'-ATGGCTTGCCTTGGATTTCA-3' & 5'-CTTTGCAGAAGACAGGGATG-3'. Above mentioned primer used to amplify a 110-bp fragment, followed by digestion by TseI.

Result: The total numbers of male and female were 29 and 37. From the collected data the age of onset of T1D in male and female was 9.5y and 10y. In this study the average Hba1c in T1D patients was 9.4%. Only 10.60% of patients showed thyroid disease with T1D and remaining patients showed only T1D. There was no single case identified with T1D in first degree relatives of T1D patients. The genotypic frequency of CTLA 4 gene were GG 21(0.31%), GA 34(0.51%) and AA 11(0.16%) and GG 18(0.18%), GA 57(0.58%), AA 22(0.22%) respectively in type 1 diabetic patients and controls (χ^2 test = 3.958; p>0.1382). Allele frequency of G 76(0.57) was prevalent compared to A 56(0.42) in T1D patients; (OR:1.3; CI 0.77,2.17)(χ^2 test=2.246; p>0.133).

Conclusion: The present study showed genetic polymorphism in CTLA4 gene is not significant. We encountered GG polymorphism is not associated with T1D of Gujarat population, the G allele was prevalent compared to A but it is not associated with T1D.

P120
Screening for islet cell antibodies in non diabetic siblings of children with type i diabetes mellitus

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Introduction: T1D is the most common chronic metabolic autoimmune disease. Several studies had shown that T1D is associated with metabolic abnormalities and alteration of immunoglobulins.

Aim of the study: was to screen for Islet cell antibodies in non-diabetic siblings of children with T1D and their correlation to different clinical and laboratory parameters.

Subjects & Methods: this study included two groups; GroupI: 60 children with a first degree relative with T1D and Group II: 60 apparently healthy children with negative history of T1D in their siblings, age and sex matched with the previous group.They were subjected to history taking, examination and laboratory investigations including; fasting blood glucose,HbA1c%,Fasting C-peptide

Results: In the current study,fasting blood glucose level and HbA1c were significantly higher in the first-degree siblings of T1D group than the control group. In addition,they had significant higher percentage of ICA positivity compared to the control subjects.Finally ICA positivity had a significant moderate negative correlation with fasting C-peptide.

P121
Detection of the diagnostic significance of autoantibodies in carbohydrate metabolism disorders in children and adolescents

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Relevance: Detection of autoantibodies in type 1 diabetes is of great interest. There is evidence of their different prevalence. This allows us to identify the diagnostic value and information content of certain types of autoantibodies and their combinations, to differentiate between “immune” and “non-immune” forms.

Objectives: The purpose of our research is to study the prevalence of autoantibodies in children and adolescents with carbohydrate metabolism disorders in order to choose a therapeutic strategy.

Methods: 86 patients with type 1 diabetes at the age from 1 to 18 years with a disease duration up to 8 years were included: 15 people with a disease duration up to 1 year, 7 people with newly diagnosed type 1 diabetes. 48 people with disease duration from 1 year to 4 years and 23 people - from 5 to 8 years. All patients underwent an immunological study with the definition of autoantibodies to cytoplasmic structures: ICA, GADA, IA2A, IAA, ZnT8A.

Results: 87% patients showed positive autoantibodies. The autoantibodies of ZnT8A prevailed in 64% of patients, of which 58% of these autoantibodies were detected at the age of 1 to 7 years, 70% at the age of 8-14 years and 60% at the age of 15-18. IA2A identified in the group from 1 to 7 years (75%). IAA in 14%, ICA detected in 2.4%, GADA in 1.2%. More often met combinations ZnT8A with IA2A. In isolation ZnT8A was detected in 16 (18.6%) patients in whom no other autoantibodies were detected.

Conclusions: The presence of two or more types of autoantibodies indicates a greater likelihood of the disease than the presence of one type of antibodies. In our study the most common ZnT8A in

combination with IA2A. As you can see the definition of only GADA and ICA for diagnostic purposes is not enough because are much rarer and can only serve as additional markers.

P122
Antiviral treatment of newly diagnosed children and adolescents with type 1 diabetes. The DiViD Intervention trial

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Introduction: There are several studies suggesting that virus play a role in the pathogenesis of Type 1 diabetes (T1D). In the Diabetes Virus Detection-study (DiViD), we demonstrated a low-grade, persistent enterovirus infection in the pancreatic islets at onset of type 1 diabetes (T1D). In the DiViD Intervention trial we will therefore examine the effect of antiviral treatment on disease progression.

Objectives: The main objective of the study is to describe the influence of antiviral treatment on progression of disease and residual insulin secretion. Primary endpoint is change in stimulated

C-peptide Mixed Meal Tolerance Test (MMTT) two-hour area under the curve from diagnosis to 1 year after diagnosis. In addition, there are several secondary, clinical and mechanistic endpoints.

The patients will be followed for three years. The study is done in affiliation with the INNODIA-consortium and with support from JDRF.

Methods: 96 children and adolescents aged 6.0-15.9 with newly diagnosed T1D (< 3 weeks after diagnosis) will be randomized into a double-blind, placebo-controlled (1:1), 6 months treatment study combining Pleconaril and Ribavirin versus placebo. There are 9 study visits over three years, including 6 MMTTs. Fasting and meal stimulated C-peptide from blood sampled on filter paper at home is collected monthly throughout the study, as well as the presence of enteroviruses in nose, blood, stool and urine.

Results: By May 2019, 44 patients (24 boys, 20 girls) have been enrolled in the study. Mean age is 11.2 (6.7-15.9) years. 13 have fulfilled the 6 months treatment period. No Serious Adverse Events have been observed. Three patients have left the study during treatment period, either due to disliking the taste of the study drug or high total disease burden.

Conclusions: Our experience shows that the study is feasible and seems safe. We estimate that primary endpoint will be reached in 2021.

P123
A case of Wolfram syndrome with thyrosine phosphatase antibody

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Objectives: Wolfram syndrome is an autosomal recessive genetic disorder, which minimum clinical criterion is the coexistence of juvenile-onset diabetes and optic nerve atrophy. Diabetes in Wolfram syndrome is associated with non-autoimmune pathogenesis by mutations in *WFS1*, a gene implicated in endoplasmic reticulum and mitochondrial function.

Case report: A 13,5-year-old girl was admitted to our clinic because of unstable blood glucose levels from 4.6 to 17 mmol / l, weakness, reduced visual acuity. She had been diagnosed with diabetes mellitus at 7 years of age. Glycosylated hemoglobin value ranged from 7 to 7.8% throughout the course of the disease. Family history disclosed that her grandmother suffer from type 2 diabetes mellitus. Bilateral optic nerve atrophy was diagnosed at age 13. The girl did not complain of hearing loss, thirst, polyuria and other urinary disorders.

During the examination, the hemoglobin level was 7.5%, the values of creatinine, urea nitrogen, sodium in the blood were within the normal range. The urine specific gravity was 1.017 g/ml. Thyrosine phosphatase antibody was 234.2 U/ml (0-10), GADA, ICA, ZnT8 antibody was negative. Fundus examination had demonstrated bilateral optic atrophy and no sign of diabetic retinopathy. According to the ultrasound of the kidney, no pathology was detected. Heterozygous mutation (c.2205C>G:p.Y735X; c.2104G>T:p.G702C) in WFS1 was found.

Conclusion: Review of the literature suggests that many cases of Wolfram syndrome may misdiagnosed as type 1 diabetes mellitus. This clinical case demonstrates the necessity of genetic analysis WFS1 in patients with a combination of diabetes mellitus and optic nerve atrophy, even if patients are antibody possitive. Although there is currently no effective therapy, multidisciplinary care with the Wolfram syndrome reduces the rate of progression of complications and improves the quality of life of patients.

Poster Tour 1 - Diabetes Acute and Chronic Complications

P124

Study of characteristics of children with diabetic ketoacidosis admitted to Intensive care unit in Alexandria University Children's Hospital

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Introduction: Diabetic Ketoacidosis (DKA) is a major cause of morbidity and mortality in children with Type 1 Diabetes mellitus (T1DM). Frequent causes of DKA include stress and infections in a new diabetic or a missed insulin dose in known diabetic children. Complications of DKA include brain edema, electrolyte disturbance, and renal complications.

Objectives: The aim of this work is to study the clinical characteristics, precipitating factors, common presentations, and complications of DKA in children admitted to Pediatric Intensive Care Unit in Alexandria University Children´s Hospital (AUCH).

Methods: The study included all children admitted to Pediatric Intensive Care Unit (PICU) in AUCH, Egypt with DKA from 2009 to 2018. Thorough history taking and clinical examination were done with emphasis on age and duration of diabetes, precipitating factors for DKA, complications during admission (cerebral edema, need for ventilation), length of stay in PICU and their fate. Laboratory investigations were done including renal functions tests, serum electrolytes, venous blood gases, HbA1C, and cultures.

Results: We studied 256 patients with DKA admitted in PICU, their age ranged from 2 months to 15 years. 57% of them were females. The mean HbA1c level was 9.7%. In 164 cases (64.1%), DKA was the first presentation of T1DM while 92 cases (35.9%) were known diabetic patients. About 22.7 % had family history of diabetes. Infection was the precipitating factor for DKA in 115 cases (44.9%) while insulin omission was found in 7 % of the cases. Cerebral edema was observed in 21.1 % of the cases. There were 12 cases (4.7%) needed mechanical ventilation and only one case had renal failure. There were 8 cases (3.1%) died during PICU admission.

Conclusions: Better understanding of risk factors, clinical presentations, and complications of DKA admissions in PICU can guide healthcare improvement efforts and leads to better patient outcomes and lower costs.

P125

Are we administering adequate fluids to children and young people in diabetic ketoacidosis (DKA)? An audit of management of DKA at the Children's Hospital for Wales

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Introduction: DKA is a potentially life-threatening complication of type1 diabetes mellitus (T1DM) in children and young people (CYP). An Integrated Care Pathway (ICP) for management of DKA is established in Wales which is based on the 2015 British Society for Paediatric Endocrinology and Diabetes (BSPED) and NICE guidelines. The BSPED guidance deemphasises fluid boluses and recommends reduced maintenance fluids rates to minimise risk of cerebral oedema.

Aims: To audit the management of DKA in a teaching hospital following the introduction of the current BSPED and NICE guidance, with focus on fluid therapy.

Methodology: Retrospective case note review of all CYP admitted in DKA to the Children's Hospital between June 2016 and June 2018.

Results: A total of 24 episodes of DKA were recorded in 23 patients. The median age was 11 years (range 1 to 16 years). 9 of the episodes were in newly diagnosed CYP.

11 patients presented with a pH of < 7.1, of whom 10 received a 10ml/kg fluid bolus of 0.9% saline, 6 of whom required a further fluid bolus following clinical assessment. Of the 13 patients with a pH ≥7.1, 6 required 10ml/kg of 0.9 % saline fluid boluses, 2 of whom required the bolus 2-3 hours of initiation of DKA management, and 1 required a further bolus. The maintenance fluid rate was increased in 1 episode.

Hypoglycaemia was documented in 10 of the 24 episodes, despite having dextrose in their fluids.

Conclusion: A significant proportion of CYP being treated for DKA needed an increase in their fluid therapy when treated in accordance with the current guideline. These changes were made based on ongoing clinical assessments. No adverse outcomes were identified.

There was an increased incidence of hypoglycaemia despite a reduction in the rate of insulin in the current guideline.

Following this audit and the recent evidence from PECARN fluid study, The CYP Wales Diabetes Network are updating their ICP based on the ISPAD Consensus Guidelines 2018.

P126

Conversation and Reactions Around Severe Hypoglycemia (CRASH Study): pediatric caregiver results

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Objectives: The CRASH study was developed to understand the severe hypoglycemia (SH) experiences of caregivers (CG) of and persons with diabetes (PWD).

Methods: The cross-sectional survey was conducted in 8 countries. Here we report on CGs of persons ≥4 to < 17 yrs old with type 1 diabetes (T1D) or type 2 diabetes (T2D) from 6 countries. The PWD had to be on insulin therapy and had ≥1 SH event in the last 3 yrs. A SH episode is defined as low blood sugar associated with severe cognitive impairment requiring external assistance to recover. Analyses were descriptive.

Results: There were 137 T1D and 15 T2D CGs; 84% T1D and 87% T2D PWD they cared for had a SH event in the past year. At the time of the most recent SH event, 68% of PWD (T1D and T2D) had a CG or parent present; 17% had a teacher/school staff present. Actions taken during the SH event included ingesting oral carbohydrates (86% T1D, 87% T2D), injecting glucagon (17% T1D, 20% T2D), calling emergency services (18% T1D, 27% T2D), and/or going to hospital (9% T1D, 13% T2D). The main reasons reported for not using glucagon included not having a prescription (27% T1D, 83% T2D) and glucagon not being readily available (21% T1D, 17% T2D). Actions taken after the SH event included obtaining glucagon (13% T1D, 13% T2D), checking blood glucose more often (44% T1D, 40% T2D), and carrying sugar/sweets (49% T1D, 73% T2D). Some CGs (25% T1D, 13% T2D) did not discuss the SH event with the PWD's healthcare provider. Most CGs reported they felt helpless (66%) and unprepared (62%) for the SH event.

Conclusions: Most CGs of youth with T1D or T2D on insulin therapy reported that the most recent SH event occurred in the presence of a CG or parent. Most T2D CGs did not use glucagon because they did not have a prescription. Moreover, very few CGs obtained glucagon after the event. Most CGs reported feeling unprepared for the SH event.

P127
Utility of plasma ß-hydroxybutyrate for predicting diabetic ketoacidosis in the pediatric emergency department

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Introduction: Diabetic ketoacidosis (DKA) is a common emergency department (ED) presentation of new onset (NODM) and established diabetes mellitus (DM). Insulin deficiency and elevated counterregulatory hormones cause unregulated ketoacid production; acidemia, however, is not specific to DKA. Although assays for β-hydroxybutyrate (BOHB) are increasingly available, there are sparse data defining the relationship between plasma BOHB and DKA in pediatric patients.

Objective: To establish a plasma BOHB level to accurately diagnose DKA.

Methods: We identified ED patients with DM who had a simultaneous venous pH and plasma BOHB over a 33 month period. Analyses were performed on each patient's initial studies. Electronic medical records were reviewed for details including whether the patient was NODM and/or transferred from an outside hospital.

Results: Among 594 children with DM, 176 (29.6%) had DKA. Median age was 12.3 years (IQR 8.7, 15.9). There were no significant demographic differences between patients in DKA and patients not in DKA. Patients in DKA were more likely to have been transferred from an outside facility and have NODM. The inclusion of age, transfer status, and NODM in the model did not improve the prediction of DKA beyond that of BOHB alone. BOHB showed strong discrimination for DKA with an area-under-the curve of 0.95 (95% CI 0.93, 0.97). A BOHB value of 5.3 mmol/L predicted DKA with optimal accuracy, correctly classifying 90.6% of patients with hyperglycemia. The sensitivity, specificity, positive and negative predictive values of this cutpoint were 76.7% (95%CI 69.8%, 82.7%), 96.4% (94.2%, 98.0%), 90.0% (84.0%, 94.3%), and 90.8% (87.7%, 93.3%), respectively.

Conclusion: Because it is a biomarker specific to DKA, we propose measurement of plasma BOHB should be used to define this condition. A value of 5.3 mmol/L provides the best cutpoint for accurate diagnosis of DKA in children and adolescents.

P128
Study of frequency and risk factors for Cerebral edema in 256 children with diabetic ketoacidosis

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BOHB (mmol/L)	Sensitivity %	Specificity %	Positive Predictive Value %	Negative Predictive Value %	Correctly Classified %
≥ 1	98.3	47.6	44.1	98.5	62.6
≥ 2	96.6	65.3	54.3	97.9	74.6
≥ 3	94.3	79.9	66.4	97.1	84.2
≥ 4	86.9	89.0	77.3	94.2	88.4
≥ 5	77.3	94.5	85.5	90.8	89.4
≥ 6	64.8	97.9	92.6	86.7	88.1
≥ 7	48.3	99.0	95.5	81.8	84.0
≥ 8	30.7	100.0	100.0	77.4	79.5

[Test characteristics across a range of cut-points of plasma β-hydroxybutyrate concentrations for predicting DKA in pediatric ED patients]

Objectives: Cerebral edema (CE) - one of the most devastating complications of diabetic ketoacidosis (DKA), is the main cause for mortality and residual morbidity in children with DKA. We analyzed the biochemical and therapeutic risk factors for CE in our patients, aged from 8 months to 18 years, with DKA.

Methods: A retrospective review of all 256 children, hospitalized for DKA during the last 12 years at the University Pediatric Hospital - Sofia, Bulgaria, was performed. The demographic characteristics, biochemical variables and therapeutic interventions were compared between the patients with and without cerebral edema.

Results: Cerebral edema was observed in 22 (8.6%) of the 256 subjects studied. One of the patients (5%) had died and 2 (9 %) had survived with neurologic consequences. Cerebral edema was significantly associated with severe DKA: lower initial pH ≤ 7,0 (p< 0,001) and bicarbonate < 4 mmol/L(p< 0,001), higher initial blood glucose (p=0,003), higher urea level (p=0,036) and higher baseline serum osmolality (p=0,036). Low serum phosphate level during the treatment of DKA was found significantly associated with cerebral edema formation (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 iatrogenic cerebral hypervolemia.

P129
Glycemic variability identified with continuous glucose monitoring (CGM) relates to hypoglycemia time < 70 mg/dL (3.9 mM) in children and adolescents with type 1 diabetes (T1D)

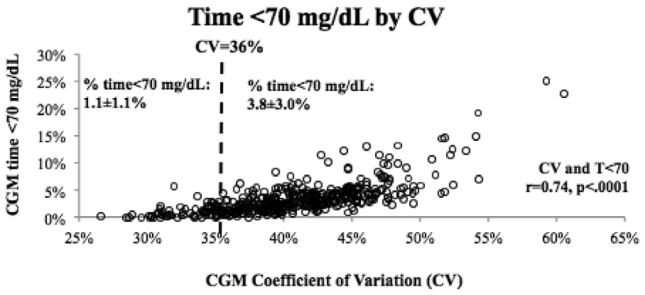
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Objective: Hypoglycemia is a concern for families of youth with T1D. Glycemic variability, defined as CGM coefficient of variation (CV), has been related to hypoglycemia risk in adults. We examined the association of CV with percentage of time < 70 mg/dL in a sample of youth with T1D using CGM.

Methods: This analysis included 93 young persons aged 8-17 years with T1D for ≥1 year. HbA1c and CGM (Dexcom G4) data were collected every 3 months for 2 years, with up to 4 weeks of CGM data preceding each visit. CV, defined as CGM glucose SD/mean (%), and percentage of time with CGM glucose values < 70 mg/dL (T< 70) were derived from 453 visits over the 2 years. Associations between CV and T< 70 were assessed overall and according to baseline age, sex, 2-year mean HbA1c, and MDI vs. pump treatment.

Results: Youth (52% male, 85% pump-treated) were aged (M±SD) 12.9±2.6 years with T1D duration 6.2±3.5 years and HbA1c 7.9±0.9% (range 6.2-11.1%) at baseline. There were 5±3 visits/person. Mean CV 40.6±5.2% (range 27-61%) and mean T< 70 3.3±3.0% (range 0-25%). Overall, CV was highly correlated with T< 70 (r=0.74, p< .0001). CV and T< 70 were also highly and similarly correlated according to baseline age < 12 vs. ≥12 (r=0.76 vs. 0.74) and mean HbA1c < 8 vs. ≥8% (r=0.72 vs. 0.76) (all correlations p< .0001). CV and T< 70 were highly but variably correlated according to male vs. female sex (r=0.67 vs. 0.81, p< .05) and MDI vs. pump treatment (r=0.60 vs. 0.76, p< .1) (all correlations p< .0001). T< 70 was significantly higher when CV was >36% vs. ≤36% (3.8±3.0% vs. 1.1±1.1%, p< .0001) (see figure).**Conclusions:** Some youth spend up to 6 hours per day with glucose < 70 mg/dL. Glucose variability by CGM CV predicts hypoglycemia; on average, those with CV>36% vs. ≤36% spend ~4-fold more time with glucose < 70 mg/dL, ~1 hour vs. ~15 minutes daily. Caregivers of young persons with T1D can use this CGM metric to help inform management.



[Percentage of Time < 70mg/dL by Coefficient of Variation]

P130
Impaired hypoglycemia awareness in children and adolescents with type 1 diabetes

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Objectives: Impaired Hypoglycemia Awareness (IHA) is associated with an increased risk of Severe Hypoglycemia (SH) in adults with diabetes but less known in youth. The purpose of this study was to determine the prevalence of IHA and its clinical characteristics in a cohort of children and adolescents with type 1 diabetes.

Methods: This prospective observational study of two month duration included all eligible subjects with type 1 diabetes attending our center, aged from 4 to 20 years. IHA was defined by a score ≥ 4 on the Gold scale. SH were collected by reviewing the patients' logbook and adjudicated by an endocrinologist.

Results: On the 404 subjects included, 128 (31.7%) were diagnosed with IHA. Among these, 21% experienced at least one SH vs 11% of patients without IHA during the study period (p=0.009). Subjects with IHA were younger (median [IQR]) (12.9 [10.4-16.3] vs 14.2 [11.7-16.9] years; p=0.025), younger at diabetes diagnosis (6.2

[3.5-9.3] vs 8.0 [5.0-11.2] years; p=0.001), more often c-peptide negative (78 vs 67%; p=0.037), female (57 vs 44%; p=0.014) and performed more glucose controls (7.0 [4.0-10.0] vs 6.0 [4.0-8.5] per day; p=0.046) than subjects without IHA. There were no differences in diabetes duration (5.3 [2.8-8.5] vs 6.2 [3.6-8.6] years), in HbA1c (7.6 [7.0-8.5] vs 7.7 [7.1-8.6]%) or in nocturnal occurrence of SH (8.7 vs 5.7%). Subjects who experienced at least one SH were 2.9 times more likely to exhibit IHA (p=0.008).

Conclusions: A significant proportion of youth with type 1 diabetes have IHA. Screening for IHA should be an important part of routine diabetes care in children, as IAH is associated with SH.

P131
Safety and efficacy of subcutaneous insulin for treatment of diabetic ketoacidosis in children - a systematic review

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Objectives: Standard treatment of diabetic ketoacidosis (DKA) uses intravenous (IV) insulin infusion which carries significant risks without sophisticated equipment and a high-dependency unit. Alternative treatment protocols are needed for low-resource settings.

Methods: We systematically searched PubMed (MEDLINE), EMBASE, Cochrane and searched the grey literature for studies evaluating subcutaneous (SC) or intramuscular (IM) insulin administration for the treatment of pediatric DKA published before June 4, 2018. No study design, language or publication time restrictions were applied.Two independent reviewers screened abstracts and full text papers, extracted data and assessed risk of bias.

Results: Of 2934 abstracts, 137 qualified for full text review, and 24 for data extraction. Study design, population characteristics and main protocol elements are shown in the table. Based on a historical shift in the DKA management from high-dose to low-dose insulin protocol, studies were grouped into those conducted before 1990 (n_1=19 [79%], "*past*") vs. thereafter (n_2=5 [21%], "*recent*"). Thirteen *past* studies combined IV+IM or IV+SC administration for the initial bolus while none of the *recent* studies did. Bolus dose and frequency ranged widely, especially in *past* studies. Death (n=10) and cerebral edema (n=2) occurred in 3 studies from India, Ethiopia and Sudan in patients who were severely ill at presentation. Recurrence of DKA occurred in 1 study, and mild but not severe hypoglycemia occurred in 8 studies, which corresponds to 24 (13%) episodes in *past studies* and 5 (2%) in *recent* studies. Risk of bias was overall assessed as high, mainly as a result of study design and limited outcome reporting.

Conclusion: Emerging evidence suggests that low-dose SC insulin may be a safe and effective treatment of all severities of pediatric DKA. More high-quality studies are needed.

P132
A single-center study of initial clinical presentations affected by type 1 diabetes in Japan: severe DKA that was caused by delayed diagnosis, but was difficult to detect at the first visit

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Introduction: Patients with type 1 diabetes mellitus (T1DM) may present with diabetic ketoacidosis (DKA) at diagnosis. Young age (especially < 2 years), diagnostic error, delayed treatment, and residence in a country with low T1DM prevalence are DKA risk factors.

Objectives: We studied the initial clinical presentations and DKA prevention in T1DM patients.

Methods: We accessed medical records of T1DM patients who were treated in our hospital in July 2018. We noted their age at diagnosis, symptoms, and duration of symptoms. We then classified patients according to DKA severity and noted their chief complaints at the first visit percentages of patients who had symptoms characteristic of T1DM, and blood glucose, glycated hemoglobin (HbA1c), and blood C-peptide levels.

	All Studies	Publication Date: 1953-1988	Publication Date: 1994-2018
Randomized controlled trials	4	2	2
Cohort studies: Prospective / Retrospective	9 / 7	8 / 6	1 / 1
Case Series / Reports	2 / 2	2 / 1	0 / 1
Episodes of DKA / DKA severity reported	402 / 245	180 / 54	222 / 191
DKA severity: Mild / Moderate / Severe	52 (21%) / 138 (56%) / 55 (22%)	7 (13%) / 24 (45%) / 23 (43%)	45 (24%) / 114 (60%) / 32 (18%)
Insulin type: Regular / Ultrarapid	22 / 2	19 / 0	3 / 1
Mode of administration: IM / SC / IM+SC	9 / 13 / 2	9 / 8 / 2	0 / 5 / 0
Insulin bolus [U/kg]: Initial / Subsequent	0.06 - 2.2 / 0.06 - 1.25	0.06 - 2.2 / 0.06 - 1.25	0.1 / 0.17
Dosing interval [hrs]	1 - 6	1 - 6	2 - 4

[Table 1: Study Designs and Main Protocol Elements]

Results: We treated 49 patients (aged 14.2±5.9 years; 18 male, 31 female). We assessed initial clinical presentations in 45 patients, who were diagnosed at 7.7±4.5 years of age, had a symptom duration to diagnosis of 36.5±37.6 days, and polydipsia (91.1%), polyuria (88.8%), and weight loss (60.0%). Meanwhile, 4 patients detected through an annual urine test in their schools were asymptomatic. Thirty-three patients were divided based on DKA severity: 17, not affected; 7, mild; 5, moderate; and 4, severe. Six patients were younger than 2 years, and 3 patients had severe DKA. The chief complaints in the severe group were not characteristic of T1DM and did not lead to T1DM suspicion initially. However, all patients in the severe and moderate groups had polydipsia, polyuria, and weight loss. Blood C-peptide levels significantly decreased when DKA severity worsened, but blood glucose and HbA1c levels were not different.

Conclusions: Severe DKA patients may exhibit symptoms not characteristic of T1DM, but characteristic symptoms may be revealed through careful medical interviews. Thus, T1DM patients must be identified before they develop severe DKA. Regular urine tests may also help identify T1DM patients.

P133
First description of LADY with DKA and in a male adolescent

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Introduction: Latent Autoimmune Diabetes of the Young (LADY) has been described in 7 female patients so far, with a slowly progressive beta-cell destruction with complete remission up to 4 years.

Objectives: To describe cases of LADY followed in our Institute.

Methods: Data on onset and follow-up were collected for patients with LADY, defined as diabetes mellitus with the presence of at least 1 autoantibody against beta-cell, absence of known genetic variations causative for MODY (Maturity Onset Diabetes of the Young) and a remission period (IDAA1C< 9) >18 months.

Results: Out of 67 patients < 18 years with type 1 diabetes mellitus, 2 fulfilled the criteria for LADY.

Case 1 was a normal weight 13-year-old female with severe ketoacidosis (DKA) at onset (pH 6.85), positive autoantibodies (IA2, ICA, ZnT8, GAD, insulin). She was discharged with am insulin daily requirement (IDR) of 0.05 U/kg/day. IDAA1C was < 7 in follow-up visits, C-peptide was normal (1.62 ng/ml). Family did not agree to had a trial off insulin. After 6 years there was an increase in A1c (9.4%) and IDR (0.29 U/kg/day) with IDAA1C 10.9.

Case 2 was an overweight 14-year-old male with moderate DKA at onset (pH 7.17), positive autoantibodies (IA2, insulin). He was discharged with an IDR of 1 U/kg/day. After 3 months his DAA1c was 7. After 2 years, due to a very low IDAA1c (4.4) with C-peptide 5.43 ng/ml, he stopped insulin and started metformin with a good control (A1c < 6%). After 4 years his A1c increased to 10.7% and insulin had to be started again with IDR of 0.38 U/kg/day (IDAA1C 14.4).

Genetic tests excluded mutations in HNF4A, GCK, HNF1A, PDX1, HNF1B/TCF2, NEUROD1, KLF11, CEL, PAX4, INS, BLK, ABCC8/SUR1, KCNJ11, APPL1 and WFS1 for both patients.

Conclusions: Differently from previous report, our patients had both DKA at onset and one of them is male. The remission period was longer than 4 years. LADY represents a model that could help understand how to preserve the pancreatic reserve from autoimmune insult.

Posters on Display – Diabetes Acute Complications

P134

Review of high dose insulin injection treatments for diabetic ketoacidosis occurred to type 1 diabetes patients in our hospital

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Introduction: Diabetic ketoacidosis (DKA) is a fatal and frequent acute complication for type 1 diabetes(T1D) patients. ISPAD updated guideline for DKA recommends low dose insulin injection at initial treatment. However, each referring RCT was performed in the 1970s and comparing only between intravenous and intracutaneous infusion. Currently, few reports have researched high dose insulin infusion for DKA treatment. Some T1D patients with long disease duration frequently suffer DKA for various reasons. The safety and early recovery from DKA are required for the social-economical reasons. In our experience, the high dose of insulin (0.3-0.5 U/kg per hour) is efficient to shorten the treatment duration.

Objectives: Our primary objective is to review the relationship between initial insulin infusion rate and complication incidence rate such as brain edema. Secondary we access DKA treatment duration who undertook high dose insulin infusion.

Methods: We retrospectively reviewed our chart data of T1D patients who admitted by DKA from 2008 November and 2018 October. We defined DKA as ISPAD 2018 DKA criteria, which consist of Hyperglycemia (blood glucose >11 mmol/L [≈200 mg/dL]), venous pH < 7.3 or serum bicarbonate < 15 mmol/L, and ketonemia (blood ß-hydroxybutyrate ≥3 mmol/L) or moderate or large ketonuria. We excluded following patients who don't meet the criteria; no type1 diabetes evidence; the lack of necessary data; no need to admission; a recent history of heart disease, renal failure, and any other severe disease.

Results: Study patients consisted of 778 Japanese T1D patients and total 69 events were detected. Most patients received early insulin venous infusion within 1 hour. Initial insulin infusion rate ranged from 0.01 to 0.5 unit/kg/hour and no severe complication such as brain edema occurred.

Conclusions: High dose initial insulin infusion caused no severe complications in this study.

P135

Successful treatment outcome of invasive mucormycosis in diabetes children by conventional antifungal therapy in resource constraint situation

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Mucormycosis is a rare, fatal complication seen in immunocompromised and diabetes patients. Objective of study is to devise a multidisciplinary approach for successful treatment of mucormycosis with less popular non-liposomal amphotericin B as drug of choice due to non-availability of other choices of antifungal therapies. We report our experience of using conventional amphotericin B in the management of two cases of rhino-orbital and one of rhino-orbital-cerebral mucormycosis in uncontrolled Type1 diabetes children.Mucormycosis was diagnosed by the specific clinical picture of black eschar formation with extensive necrosis, superadded pyogenic inflammation and histopathological non-septating fungal hyphae but without positive yield of fungal growth. Further MRI was performed for detecting extent and nature of disease. Multidisciplinary team care approach involved a combination of optimizing blood glucose control, aggressive surgical debridement, antifungal therapy, appropriate antibiotics, fluid and electrolyte care, and nutritional rehabilitation.Treatment started with 0.25 mg/kg intravenous infusion of non-liposomal amphotericin B and the dose stepped up to 1.0 mg/kg infused in 2-6 hours with prior maintaining good hydration and electrolyte care to minimize the risk of drug complications. Serum creatinine level and serum electrolytes, magnesium, calcium was vigilantly monitored during therapy.Treatment duration was 8 and 12 weeks for rhino-orbital and rhino-orbital-cerebral mucormycosis respectively with no mortality but variable morbidity.It is concluded that aggressive and vigilant treatment outcome is encouraging in this devastating condition. It is, therefore, recommended that prompt and aggressive multidisciplinary management can lessen the untoward effects of non-liposomal amphotericin B with taking care of fluid and electrolyte balance and frequent monitoring of renal function. Nutritional support plays a pivotal adjunct component in treating such cases.

P136

Emerging phenotypes of the hyperosmolar hyperglycaemic state (HHS) in the paediatric population

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Introduction: The hyperosmolar hyperglycaemic state (HHS) is a rare complication of diabetes mellitus in the paediatric population. However, it can coexist with DKA and the different management strategies for each condition make early recognition important as there is a higher mortality rate for HHS.

Objectives: To further establish clinical characteristics shared between paediatric patients with HHS to aid early recognition by clinicians. Typically it is associated with adolescents with type 2 diabetes

mellitus or those who have consumed large volumes of sugary drinks prior to the illness presenting.

Methods: A network wide survey was sent to diabetes clinical leads for all units in the South London (and South East coast) paediatric diabetes network, UK. Clinical casenotes were reviewed and characteristics collected.

Results: 6 cases were reported (one fatality) if severe HHS (osmolarity >370 mosm/kg), of which 4 patients had complete casenotes available. These 4 patients were characterised by either neurodisability and/or very low body mass index. Ages varied from 8 months to 18 years.

Conclusions: Severe HHS remains rare in the paediatric population. We propose that children at greatest risk of HHS may be those who either have reduced mobility (and difficulty accessing free water to maintain fluid homeostasis) or abnormally body fat composition (and potentially reduced ketone response so they do not develop the symptoms of ketoacidosis and present later than otherwise expected).

P137
A case of diabetic ketoacidosis associated with severe hyperosmolar hypernatremic state and thrombosis in type 2 diabetes mellitus

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Diabetic ketoacidosis (DKA) associated with severe hyperosmolar hypernatremic state (HHS) and thrombosis is rarely reported. We reviewed a case of type 2 DM patient who was diagnosed as DKA combined with severe HHS at first visit and underwent amputation on the left leg because of femoral arterial thrombosis. A 14-year-old Asian girl had polyuria and polydipsia for 2 weeks and weight loss for a month. She visited a local clinic due to lethargy and was administered IV fluids and diazepam for 2 days. Her mental status aggravated to semi-coma, and she was transferred to our institution. Initial biochemical findings were as follows: plasma glucose 1265mg/dL, serum sodium 160mmol/L, serum osmolality 405mmol/kg, arterial blood pH 7.25, and urine ketone 3+. She was treated with intensive fluid resuscitation and continuous insulin infusion. Plasma glucose level became stable on the second day of admission, but a change of color above left knee was observed. CT scan was performed and a thrombus on the left femoral artery was found. Abnormalities of platelet activation, coagulation factors, vascular reactivity, blood volume, and blood flow are known to elevate thrombotic risks during DKA. After diagnosis of arterial occlusion of left femoral artery, she received thrombectomy and percutaneous transluminal angioplasty. Despite our effort, her left leg could not be salvaged and she underwent below knee amputation. Her plasma glucose level is well controlled with metformin only, without insulin. To the best of our knowledge, this is the first case of Asian adolescent with DKA combined with severe HHS and a serious thrombotic complication at the onset of type 2 DM. We suggest that despite rarity of the case, a suspicion of thrombotic complication is warranted when patients present with severe DKA.

P138
Association of body fat percentage by bioelectric impedance analysis with diabetic ketoacidosis in Kashmiri patients with type 1 diabetes

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Objectives: To determine the incidence rate of diabetic ketoacidosis (DKA), and to study the association of body fat percentage with DKA in patients with type 1 diabetes.

Methods: In this cross-sectional study, all consenting patients with type 1 diabetes following paediatric endocrinology clinic of a tertiary care hospital in North-India who had come to attend a carbohydrate-counting workshop were included. The data collected included clinical presentation, precipitating factors, laboratory profiles, and complications. The incidence rate of DKA was calculated at events per 100 patient-years. Body composition was assessed with bioelectrical impedance analysis.

Results: Of 53 subjects studied, 32 (60.4%) were females (Table 1). The mean age was 19.4 years (range: 4.1 - 36.2). The age of onset was 13.5 (2.6 - 24.40) years and disease duration 5.9 (0.1 - 23.2) years. Overweight-obese patients accounted for 25.0% (95% CI, 14-39); only 16.3% patients reached the target HbA1c of < 7%.

Characteristic	Subjects with DKA (n=15)	Subjects without DKA (n=38)	P Value
Gender (Male: Female)	4:11	17:21	>0.2
Mean [SD] Age (years)	16.9 [8.9]	20.3 [6.6]	>0.1
Mean Age at onset (years)	10.4 [6.0]	14.7 [5.2]	0.01 (S)
Duration of diabetes (years)	6.5 [6.5]	5.6 [5.5]	>0.6
Family history of diabetes	6/15 [40%]	11/38 [29%]	>0.4
Mean Weight (Kg)	45.8 [15.7]	53.4 [12.0]	0.06
Mean waist circumference (cm)	69.7 [10.3]	76.1 [6.1]	>0.3
Mean BMI (Kg/m2)	20.0 [5.2]	19.2 [3.0]	>0.1
Mean Body Fat Percentage	22.0 [5.9]	26.4 [6.1]	0.027 (S)

[Table 1. Characteristics of subjects with DKA versus those without DKA]

Overall 17 episodes of DKA (15 patients) were reported with an incidence rate of 54.6 episodes per 1000 patient-years (95% CI, 32 - 64). Significant predictors of DKA were younger age at onset, previous hospitalization, use of alternative medicine, hypothyroidism and low-normal body fat. Body fat percentage was inversely correlating with history of DKA (r, -3.2; P, 0.03).

Conclusions: There is a relatively higher incidence of DKA in Kashmiri population particularly those with low-normal fat percentage. Interventions targeting adherence to insulin therapy, and not falling prey to false claims of alternative medicine could help reduce the incident rate of DKA in Kashmiri patients with type 1 diabetes. Clinicians should be aware of the potential risk of DKA in undernourished patients at young age of onset falling prey to alternative medicines, and utilize appropriate clinical and laboratory monitoring to prevent serious adverse outcomes.

P139
Severe hypertriglyceridemia shadowing diabetic ketoacidosis in type 1 diabetes mellitus

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Background: Diabetic ketoacidosis (DKA) is a common presentation of type 1 diabetes mellitus (DM). Severe hypertriglyceridemia (triglyceride[TG]>1gm/dl) is a rare complication, increasing the risk of acute pancreatitis. It occurs mainly due to insulin deficiency, but a primary lipid disorder might co-exist.

To our knowledge, our case is the youngest newly-diagnosed type 1 DM to present with DKA, complicated by severe hyperTG.

Case presentation: A 2-year-old girl presented to us with refusal of feeding, difficulty breathing, and drowsiness. She had been complaining of polyuria, polydepsia, weight loss, and recurrent attacks of abdominal pain 2 months before presentation. On admission, our patient was lethargic, severely dehydrated with Kussmaul breathing, cold extremities and weak peripheral pulsations. Her abdomen was not tender.

She presented with DKA (blood sugar 600mg/dl, pH 6.92, HCO3 2mmol/l, and ketonuria). She received normal saline bolus, was started on insulin infusion and intravenous fluids according to ISPAD guidelines. Mannitol was given for cerebral edema. Her blood samples were lipemic. Serum TG was 1.5g/dl, total cholesterol 286mg/dl, amylase and lipase were normal. Her glycated hemoglobin was 13.7%, C-peptide was low, antiGAD antibodies were positive. Abdominal sonography was free.The lipid profiles of her father, and mother were normal.

Her general condition, and conscious level gradually improved and DKA resolved in 72 hours. Serum TG decreased to 229mg/dl within 7 days of admission.

Conclusions: Severe hyperTG can be seen in DKA children as young as 2 years old, reflecting the severity and the prolonged duration of the disease. It maybe asymptomatic, but screening for acute pancreatitis is essential. Management mainly consists of intravenous fluids, and insulin infusion, while lipid-lowering drugs are not always needed suggesting that hyperTG maybe transient.

P140
The Management of Diabetic Ketoacidosis (DKA) in a district general hospital in the UK

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Introduction: Diabetic ketoacidosis (DKA) can have significant morbidity and mortality in children and young people (CYP).

It's management is very well standardised, based on National Guidance (National Institute of Clinical Excellence - NICE).

In the UK, CYP DKA Guidelines have been reviewed in 2015 in order to reduce risks of cerebral oedema. There have been concerns that the new recommended fluid management has the potential to increase the risk of acute kidney injury (AKI) or other complications due to significantly reduced fluid management volumes.

In our Trust, the 16-18 year olds are managed by adult physicians but based on CYP guidelines.

Aim: We wanted to review the practice in our hospital and to establish any compliance and deviations from the guidelines and if there have any significant complications in our patients.

Methods: We looked at the notes,discharge letters and lab reports.

Results: Over 11 months (October 2017-September 2018) we had a total of 17 episodes of DKA in 0-19 year old.

3 episodes were of severe and 14 of mild/moderate DKA. 12 patients received fluid boluses. In 13 cases the ongoing fluid prescription was correct. In all patients insulin was started 1 hour after the initial fluids were given.

8/17(47%) of our DKA episodes occurred in patients with known T1DM.The guideline was not appropriately used in 2/11episodes.

12/16(75%) received fluid boluses. 2 patients with altered GCS (14/15) received fluid boluses.

2/17 patients were in mild AKI at presentation.

Conclusions: In our cohort majority of patients received fluid boluses, despite this not being the recommended measure on the current guideline.DKA still occurs in patients with known diabetes.Fluid management in DKA still remains a topic of some controversy.

The British Society of Paediatric Endocrinology (BSPED) is currently reviewing the fluid management. There is national interest and participation. The 16-18 year old patients could be managed on adult protocols in the future.

P141

An unusual case of an exclusively vegan child with diabetic 'ketoacidosis'

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Objectives: We present a vegan child with newly diagnosed T1D with severe DKA, lack of severe ketonoruria, cerebral edema, polyorganic failure and thrombocytopenia.

Case presentation: A 17month old female child was admitted to the intensive care unit due to DKA coma. On admission she was unconscious with dilated pupils and no reaction to painful stimuli. She had severe DKA (Glucose=391mg/dl, ph=6.85, HC03=5mmol/l, osmolality=303 mosm/kgr), cerebral edema (before initiation of medical treatment) and polyorganic failure. She had fever, polyuria, polydipsia and vomiting 4 days before admission. Her personal history was unremarkable with no vaccinations and exclusively vegan diet (except from breast feeding). Her body weight was 9 kgr(< 3rd percentile).) Despite the severe DKA she had only minimal ketonuria (1+) which turned negative after 8 hours. The 2nd day she presented with thrombocytopenia (PLT=35000/μl), anemia (required 7 blood transfusions), renal failure requiring dialysis (urea 104 mg/dl, creatinine 2.86 mg/dl) hypertransaminasemia- hyperamylasemia (SGOT 480 mg/dl, 171mg/dl, amylase 629 U/L), hypoalbuminemia (albumin=2.4mg/dl), thrombosis of right femoral artery, and extended skin edema with epidermal necrosis. Total cholesterol=67mg/dl, triglycerides=329mg/dl. HbA1c= 9.4%, C-peptide =0,4 ng/ml, anti-GAD=38U/mL, anti-IA2=373 U/mL, ICA(-), anti-ZnT8 (-). DKA was treated according to protocol. She was initially intubated due to cerebral edema. She was started on insulin. She showed gradual improvement. She grows normally ever after continuing the vegan diet with good glycemic control.

Conclusion: Consumption of vegan diet has been associated with low lipid storage which could possibly explain the minimal ketonuria and the low lipid levels due to the poor lipid substrate. Thrombocytopenia associated multiple organ failure is within a spectrum of microangiopathic syndromes. DKA preceding this condition is extremely rare.

P142

The frequency of diabetic ketoacidosis at type 1 diabetes onset in a national incident cohort over a 5 year period

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Introduction: Diabetic ketoacidosis (DKA) is a severe life-threatening complication of T1D with significant morbidity and persisting longterm adverse effects on metabolic control. The frequency of DKA at diabetes diagnosis varies widely in different populations, with estimates ranging from 12-80%. However, comparability between studies is challenging due to different methodologies. Preventing DKA at diagnosis is the most important therapeutic target in new onset diabetes second only to preventing diabetes itself. Effective prevention requires an understanding of DKA at diabetes diagnosis and a measure of its frequency.

Objectives: To define and monitor the national frequency of DKA at diabetes onset over a 5 year period.

Methodology: An established national prospective T1D incidence register with ascertainment levels in excess of 95%, was employed to monitor the frequency of DKA in children and adolescents aged under 15 years in the period 2011-2015, in Ireland. The ISPAD definition of DKA and its severity was employed.

Results: In the period there were 1208 incident cases of T1D nationally, with detailed demographic data, of whom 31.6% were in DKA. The frequency of DKA remained relatively stable over the 5 year period as did DKA severity with 11.5%; 7.2%; and 12.9% presenting in severe, moderate and mild DKA respectively. There was no significant difference in DKA severity in the three age categories, namely: 0-4.99; 5-9.99; and 10-14.99 years. Of those presenting in severe DKA, 3.6% had a family history of T1D in a first degree relative.

Conclusions: The frequency of DKA at diabetes diagnosis is unacceptably high in Ireland and its reduction is an important therapeutic target. These data will provide guidance for targeted interventions and serve as a baseline to monitor the effectiveness of interventions to reduce DKA rates such as health promotion campaigns which have been largely effective in other jurisdictions.

Poster Tour 9 - Diabetes Acute and Chronic Complications

P143

The homozygous status of polymorphism Z-2/Z-2 of aldose reductase gene(AKR1B1) in the polyol pathway increases the prevalence of autonomic and peripheral neuropathy in children and adolescents with type 1 diabetes mellitus(T1D)

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Objectives: Diabetic neuropathy(DN) is the least recognized microvascular complication of T1D. Peripheral and autonomic DN affect more than 60% of T1D patients. Development of DN may start early in the course of diabetes, even in childhood and adolescence. Z-2/Z-2 polymorphism of aldose reductase (*AKP1B1*) gene increases the expression of the relative enzyme in the polyol pathway and is likely to contribute to DN. Our purpose was to study the prevalence of autonomic and peripheral DN in T1D children and adolescents and its associations with the homozygous state of the Z-2/ Z-2 polymorphism of the *AKR1B1* gene.

Methods: We evaluated 106 T1D children and adolescents(mean±SD age:13.5±3.46 years, T1D duration: 5.3±3.4 years) and 100 healthy controls(11.9±2.7 years). Pupillary dilation(PD) in darkness was assessed as an index of autonomic neuropathy(DAN). Nerve conduction studies(NCS) were performed with a standard technique using surface electrodes. The polymorphisms of *AKR1B1* were evaluated using microsatellite sequence Z.

Results: PD impairment was more frequent in the T1D group compared to controls (31.6% vs 3.3%,p< 0.001), while 39.6% of T1D patients exhibited NCS abnormality. PD was associated with age (r=0.16, p=0.038), HbA1c (r=0.23, p=0.048) and T1D duration (r=0.20, p=0.022), while NCS and NCS abnormality were not associated with those parameters. There was a strong correlation between PD and NCS impairment in T1D patients (r=0.34, p=0.008). Patients homozygous for Z-2 polymorphism of the *AKR1B1* gene had higher prevalence of NCS (21.7% vs 2.8%, p=0.032) and PD abnormality(62.5% vs 37.5%, p=0.023) compared to controls.

Conclusions: Impaired indices of peripheral and autonomic DN were present in a significant proportion of young T1D patients, although asymptomatic. Indices of DAN were associated with age, diabetes duration and glycemic control, while NCS were not. PD and NCS impairment were associated with the homozygocity of Z-2 polymorphism of *AKR1B1* gene.

P144

The relationship of sclerostin levels with diabetes duration and bone mineral density in adolescents with type 1 diabetes

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Objective and aims: Osteopenia due to poor bone formation is common among patients with Type 1 diabetes (T1DM), even in adolescents. Sclerostin is produced from osteocyte, promoting osteoblast apoptosis and is a negative regulator of bone formation. In this study, we investigated whether sclerostin levels and bone mineral density (BMD) change according to the duration of diabetes in adolescents with Type 1 diabetes and the relationship between sclerostin level and BMD.

Participants and methods: Ninety one adolescents with T1DM aged 15 to 23 years were included in this study. The patients were stratified according to the duration of diabetes as follows: 12 to 60 months (Group 1); >60 to 120 months (Group 2); and >120 months (Group 3). Sclerostin levels were assessed by ELISA. BMD was obtained by dual-energy X-ray absorptiometry (DXA) scan (Lunar DPX series).

Results: Although sclerostin levels increased as duration of diabetes is prolonged, no statistically significant difference was found between the three groups (p>0.05). Age-adjusted BMD Z score at lomber spine was significantly higher in group 1 than group 2 and group 3 (p< 0.05). No significant difference was found between the groups 2 and 3 (p>0.05). Although osteocalcin levels decreased as the duration of diabetes increased, there was no statistically significant difference between the groups. (p=0.259). When all patients were evaluated, there was a moderate positive correlation between sclerostin and osteocalcin levels (r=0.335, p=0.01). There was no correlation between sclerostin levels and BMD and BMD Z score (p>0.05).

Conclusion: Although sclerostin levels increase in the first 10 years of the disease in adolescents with type 1 diabetes, this increase is not significant. However, there is a significant decrease in bone mineral density of the patients after the fifth year of the disease. Increase in sclerostin levels was not associated with BMD decrease.

P145

The obesity paradox: retinopathy in youth with T2D in the TODAY study

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Objectives: We have reported an "obesity paradox" in development of nonproliferative diabetic retinopathy (NPDR) in youth with T2D.

Risk Biomarker (RB)	BMI Tertile 1	BMI Tertile 2	BMI Tertile 3	p-value
TNF-R1 (pg/mL)	1227.9 (336.6)	1310.6 (338.5)	1479.5 (370.7)	.0001
TNF-R2 (pg/mL)	5617.6 (1880.6)	6231.5 (1914.7)	7135.6 (1771.5)	.0001
PAI1 (ng/mL)	17.0 (10.5)	22.2 (12.5)	29.4 (13.9)	.0001
E-Selectin (pg/mL)	38967 (14708)	41516 (17250)	47132 (18575)	.0002
IL6 (pg/mL)	1.8 (1.23)	2.2 (1.01)	2.9 (1.29)	<.0001
VEGF (pg/mL)	46.7 (44.2)	63.8 (65.6)	63.6 (65.5)	.0040
Adiponectin(ng/mL)*	7066 (3693)	6107 (3078)	5790 (2748)	.0098
IGFBP1 (pg/mL)*	9771 (10496)	7001 (10252)	5193 (5664)	<.0001
VCAM-1 (ng/mL)*	729.4 (223.2)	654.1 (181.3)	638.6 (225.2)	.0001

[BMI Tertile 1: 21.6-31.45 kg/m2; BMI Tertile 2: 31.46-37.86 kg/m2; BMI Tertile 3: 37.87-68.7 kg/m2. Summary statistics displayed as Mean (SD)]

Youth in the highest obesity tertile had less NPDR (9.3% in tertile 3 v 16.3% in tertile 1) (Diabetes Care 36:1772, 2013). We hypothesized that levels of inflammatory, cardiovascular, and other circulating risk biomarkers (RB) in different obesity tertiles might correlate with this finding and illuminate it.

Methods: In the TODAY study, 699 participants with T2D between 10 and 17 yrs of whom 517 had retinal photographs were randomized to treatment with metformin alone (M), M + rosiglitazone or M + lifestyle modification. We calculated mean RB values in subjects before retinal photographs. Associations between NPDR and BMI tertile with mean RB values was examined using generalized linear mixed models, adjusting the NPDR models for diabetes duration, age, mean HbA1c, and elevated UACR.

Results: NPDR prevalence did not correlate with treatment group but increased with age, diabetes duration, mean HbA1c (p< .0001). Prevalence correlated with mean BMI (p< .0156) and mean height/waist ratio (HWR) (p< .0142). Means of 27 RB were measured. BMI tertile directly correlated with 11 RB including LDL-C, ApoB, hsCRP, fibrinogen and homocysteine (not shown in table), and inversely correlated with 4 RB (*), including HDL-C (not shown).

Presence or absence of NPDR did not correlate with RB, even when corrected for diabetes duration, age, HbA1c, and microalbuminuria.

Conclusions: Adjusted RB are correlated with obesity tertiles, confirming that obesity itself is a likely driver of inflammatory processes, but RB did not correlate with NPDR. Future studies should focus on relationship of RB to retinopathy progression, and examine other RB including those specifically associated with circulating growth factors like IGF1 and binding proteins previously shown to associate with retinopathy.

P146
Do the years with type 1 diabetes before puberty matter for development of microvascular complications?

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Introduction: There is prevailing view that the years spent with diabetes prior to puberty do not matter for development of microvascular complications in type 1 diabetes(T1DM). We wished to test this hypothesis.

Objective: To study the microvascular complications in T1DM with onset of diabetes < 12years and T1DM with onset of diabetes ≥12years.

Methods: From 1992 to 2017, we retrieved medical records of 2644 T1DM participants with onset below the age of 20 years. T1DM was defined by abrupt onset of symptoms, diabetic ketoacidosis, absent beta cell reserve requiring insulin treatment for survival. Using 12 years as a rough age for onset of puberty, the T1DM participants were categorized into Group 1-T1DM with onset of diabetes < 12years (1 to12years,n=1328) and Group 2-T1DM with onset of diabetes above 12years (≥12 to< 20years,n=1316) matched for duration of diabetes. Data on microvascular complications - retinopathy (defined by presence of at least one definite micro aneurysm by retinal photography), nephropathy (by urinary albumin excretion ≥30µg/mg of creatinine) and neuropathy (by vibration perception threshold ≥20V on biothesiometry) were obtained.

Table 1: Prevalence of microvascular complications stratified according to duration of diabetes in T1DM participants

Duration of diabetes at the time of complications	Retinopathy n (%)		Nephropathy n (%)		Neuropathy n (%)	
	Group 1 <12 years	Group 2 ≥12years	Group 1 <12 years	Group 2 ≥12years	Group 1 <12 years	Group 2 ≥12years
≤5 years	1/146(0.7)	29/282(10.3)*	54/417(12.9)	130/492(26.4)*	0/145	2/365(0.6)
≥6 to ≤10yrs	43/100(43.0)	88/147(59.9)**	33/124(26.6)	40/27(31.5)	0/63	3/74(4.1)
≥11 to ≤15yrs	64/94(68.1)	62/95(65.3)	24/63(38.1)	18/65(27.7)	3/46(6.5)	3/61(4.9)
≥16 to ≤20yrs	48/56(85.7)	43/63(68.3)**	19/43(44.2)	15/45(33.3)	3/30(10.0)	9/50(18.0)
>20yrs	49/57(86.0)	31/37(83.8)	16/47(34.0)	20/46(43.5)	10/55(18.2)	15/44(34.1)
TOTAL	205/453(45.3)	253/624(40.5)	146/694(21.0)	223/775(28.8)	16/339(4.7)	32/584(5.5)

*p<0.001;** p<0.05

[Prevalence of microvascular complications stratified according to duration of diabetes in T1DM]

Results: The prevalence of microvascular complications were stratified according to duration of diabetes in both the groups. Up to 10 years duration, the prevalence rates of retinopathy, nephropathy and neuropathy were slightly lower in the pre-puberty onset T1DM

group. However, after 10 years duration there were no significant differences in prevalence of complications between T1DM with < 12 years compared to those with onset ≥12 years and in fact those with < 12 years had higher retinopathy rate.

Conclusion: This study shows that the years before puberty also do matter with respect to risk of complications of diabetes in T1DM. Thus achieving the best glycemic control should be the goal in all patients with T1DM, irrespective of the onset before or after puberty.

P147
The value of serum cystatin C versus creatinine as a biomarker for diabetic nephropathy in young type 1 diabetes patients

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Objective: To compare estimated glomerular filtration rates (eGFR) calculated using serum cystatin C (eGFRcys) and serum creatinine (eGFRcrea) in young type 1 diabetes (T1D) patients as a biomarker of early kidney damage.

Methods: For study participants HbA1c, 24-hour albumin excretion rate (AER), serum cystatin C and creatinine were assessed. The normal range for cystatin C was 0.52-0.97 mg/L. eGFRcys and eGFRcrea were calculated using formulas from National Kidney Foundation guidelines. Renal function was classified by GFR stages using KDIGO 2013 guidelines.

Results: We included 781 subjects, 66.5% (n=519) children (< 18 years) and 33.5% (n=262) young adults (18-25 years) with T1D; 51.9% (n=405) were females. In the whole cohort the median of age was 16.2 [7.7] years, diabetes duration - 5.3 [6.8] years. The median HbA1c was 8 [2.4]% (63.9 [2] mmol/mol). 23.4% of participants had HbA1c < 7% (53 mmol/mol).

Elevated AER was found in 9.1% of subjects. The mean of cystatin C was 0.8±0.2 mg/L, the median of creatinine - 59 [20] μmol/L. Females had significantly lower levels of cystatin C and creatinine compared to males, 0.78±0.13 vs. 0.84±0.13 mg/L, p< 0.001, and 58 [17] vs. 63 [26] μmol/L, p< 0.001, respectively.

In the whole cohort median of eGFRcys was lower than eGFRcrea, 85 ml/min/1.73m^2 vs. 96 ml/min/1.73m^2, p< 0.001, respectively.

Wilcoxon rank test showed significant difference (p< 0.001) for estimating GFR based on serum cystatin C vs. creatinine. eGFRcys indicated worse kidney function with age median of 12.7 years and there was a significant difference compared to older patients, p< 0.001.

Conclusions: This study showed that cystatin C can be used as an early biomarker of diabetic chronic kidney disease for young patients with T1D, moreover, it is especially valuable for adolescent diabetic patients.

P148
P_{100} latency of visual evoked potentials in children with type 1 diabetes mellitus

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Our aim of this study is to compare P_{100} latency of visual evoked potentials (VEP) in type 1 diabetes mellitus (T1DM) children with the control group. A cross-sectional study was conducted in the pediatric outpatient clinic of Dr. Soetomo Hospital, Surabaya from March 2017 to April 2018. Children with T1DM aged 4-18 years old and equal age and sex-matched healthy children were enrolled in this study. Measurement of VEP was done by stimulation of retina with a flashlight emitting diode (LED) goggle recording. The latency of P_{100} was measured and compared between T1DM and control group. Twenty-one children of both T1DM and control group were enrolled in this study. There were significant differences between mean P_{100} latency of VEP of right, left, and both eyes in T1DM and control group (p=0.000; p=0.000; p=0.000, CI 95%). Mean of P_{100} latencies value (in milliseconds) of right, left, and both eyes in the patients were 108.08±10.47; 109.10±10.86; and 108.59±9.95, respectively. Meanwhile, the control group was 96.27±8.55; 94.84±8.58; and 95.56 ±7.90, respectively. There were no significant differences between gender with mean of P_{100} latencies of right, left, and both eyes in T1DM (p=0.202; p=0.436; p=0.266, CI 95%) and control group (p=0.959; p=0.537; p=0.718, CI 95%). In conclusion, the mean P_{100} latency of VEP is found significantly higher in the T1DM children. Visual evoked potential could be helpful for the early detection of diabetic retinopathy.

Keywords: type 1 diabetes mellitus, child, diabetic retinopathy, visual evoked potential.

Stage	Description	GFR (ml/min/1.73m2)	Frequency of stage based on eGFRcys (%)	Frequency of stage based on eGRFcrea (%)
1	Kidney damage with normal or increased GFR	>90	52.3	67.6
2	Kidney damage with mild decrease in GFR	60-89	46.9	32.2
3	Moderate decrease in GFR	30-59	0.6	0.2
4	Severe decrease in GFR	15-29	0.1	0
5	Kidney failure	<15 (or dialysis)	0	0

[Frequency of GFR [Glomerular filtration rate] stages based on eGFRcys and eGFRcrea]

P149

Changed body composition and affected bone parameters in young women with Type 1 Diabetes

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Objective: The risk of fractures is increased in adult individuals with T1D. The aim of this study was to investigate bone health and body composition in young females with a long T1D duration compared with an age-, gender- and geography-matched healthy control group.

Methods: Twenty-three young women, aged 19.2-27.9 years, with long-term T1D duration (mean 18.9 years), were recruited from the Swedish National Diabetes Registry. Exclusion criteria were body mass index (BMI) ≥30 kg/m^2, pregnancy, current breastfeeding, coeliac-, thyroid- and known metabolic bone disease. The average HbA1c since 18 years of age and the HbA1c levels for the three age intervals, 0-8.9, 9.0-13.9 and 14.0-18.0 years were retrieved. Information on current diseases and medical treatment, use of supplements, tobacco, and physical activity was collected. Body composition and bone mass were assessed by dual-energy X-ray absorptiometry and peripheral quantitative computed tomography (pQCT). The polar strength index (SSI) was calculated, which represents an estimation of the mechanical strength of the cortical bone.

Results: No differences were found between the groups for age and BMI SDS. Women with T1D had a lower total lean mass and a higher total fat mass (adjusted P = 0.012 and 0.016, respectively). No differences were shown for trabecular density, cortical area, cortical thickness, or endosteal/periosteal circumference. A higher cortical density (P = 0.020) was observed for the T1D group. SSI was lower amongst women with T1D (P = 0.0049, adjusted for BMI, physical activity and height). No correlation was observed between the duration of diabetes and total areal bone mineral density, pQCT trabecular and cortical density.

Conclusion: Young women with long-term T1D duration showed altered body composition with more fat, decreased bone strength and altered cortical bone parameters. Preventive interventions to improve bone health are of great importance.

P150

CHiC- D - Cardiovascular Health in Children with type 1 Diabetes - early detection, cardiovascular prevention and treatment monitoring

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Objectives: CVD mortality in adulthood is still more than 4 times higher among people with T1D than in the general population. The CHIC-D study is an ongoing project that aims to determine the time course of vascular changes in children with T1D, the impact of the degree of metabolic control and blood pressure on changes in the different layers of the arterial wall and the time course of autonomic neuropathy. Our objective is to establish a novel, highly sensitive, clinically applicable method of cardiovascular risk evaluation and treatment monitoring for paediatric patients with T1D.

Methods: Children (6-15,99yr) with T1D duration of 5 years are randomly selected from the SWEDIABKIDS registry and asked to participate in the study. We plan to enrol 50 children with T1D and 50 healthy controls. Ultra-high frequency ultrasound (UHFUS) that enables visualisation of the separate layers of the arterial wall combined with measurements of vascular and endothelial function as well as metabolic and inflammatory profile have been collected in 9 patients and 7 controls so far.

Results: The preliminary result implies higher blood pressure among the children with T1D, however not statistically significant when using non-parametric tests. No difference in pulse wave velocity or endothelial function was observed. UHFUS measurements suggests an

Results n= 16 The results are shown as median (range)	**T1D children n=9 (4F/5M)**	**Healthy controls n=7 (5F/2M)**
Age (years)	12.2 (8.6-13.7)	11.1 (6.7 -15.8)
HbA1c; IFCC (mmol/ mol) , DCCT (%)	49 (43-59), 6.63 (6.09- 7.55)	30 (27-33), 4.90 (4.62-5.17)
Blood pressure BP (mmHg); SBP, DBP	105 (96-120), 64 (58-72)	98 (95-117), 59 (55-72)
Pulse wave velocity PWV (m/s)	5.3 (4.9-6.3)	5.3 (4.5-6.6)
Reactive hyperemia RHI; RHI, lnRHI	1.59 (0.99-2.18), 0.46 (0.26-0.78)	1.62 (1.1-2.07), 0.48 (0.09-0.73)
UHFUS (mm)	n=5	n=3
Carotid artery; Diameter, Intima, Media	5.76 (5.11-6.35), 0.10 (0.09-0.14), 0.20 (0.18-0.21)	5.89 (5.72-6.40), 0.11 (0.09-0.12), 0.12 (0.10-0.19)
Radial artery; Diameter, Intima, Media	1.85 (1.10-2.46), 0.07 (0.07-0.08), 0.11 (0.07-0.13)	0.89 (0.79-1.41), 0.07 (0.05-0.09), 0.06 (0.03-0.06)
Dorsal pedal artery; Diameter, Intima, Media	1.84 (1.52-1.86), 0.07 (0.06-0.08), 0.06 (0.05-0.07)	1.65 (1.41-1.76), 0.07 (0.06-0.07), 0.04 (0.02-0.12)

[Chic-D results shown as median (range) n=17]

increased media thickness in T1D patients compared to healthy controls.

Conclusions: The tendency of media thickening and increased blood pressure among T1D patients is an interesting indicator of cardiovascular impact in this yet small cohort where the children with T1D shows a median HbA1c 49 mmol/mol (6.63%). It is possible that the impact on the arterial wall and on vascular and endothelial function is undetectable in such a well-treated small sample.

P151
Impact of obesity on markers of cardiovascular function in youth with type 1 diabetes as compared to youth with type 2 diabetes

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Insulin resistance (IR) and obesity are independently associated with type 1 diabetes (T1D) and are known risk factors for cardiovascular (CV) disease, the leading cause of mortality in T1D.

We evaluated the impact of BMI on CV outcomes within youth with T1D and also compared obese youth with T1D (OT1D) to youth with type 2 diabetes (T2D).

Pubertal youth aged 12-21 years with T1D or T2D were recruited from the RESistance to InSulin in Type 1 ANd Type 2 diabetes (RESISTANT) and Effects of MEtformin on CardiovasculaR Function in AdoLescents with Type 1 Diabetes (EMERALD) cohorts. Participants were stratified as lean (LT1D), overweight, or obese T1D or as T2D (Table). CV outcomes included resting heart rate (HR), systolic and diastolic blood pressure (SBP, DBP), leptin, hsCRP, and adiponectin. T1D participants underwent bicycle ergometry to assess peak oxygen consumption (VO_2peak), Dynapulse to assess peripheral brachial artery (BA) distensibility, and aortic MRI to assess central arterial stiffness and shear.

HR, SBP, DBP, mean arterial pressure, leptin, hsCRP, and prevalence of hypertension were significantly higher and BA distensibility, descending aorta oscillatory shear index, and VO_2peak were worsened in OT1D vs. LT1D. Beyond hypertension prevalence, which was worse in OT1D vs. T2D, the OT1D and T2D groups did not differ significantly.Higher BMI, which is increasingly prevalent in T1D, is associated with a worsened CV profile in T1D youth, nearly approximating the CV phenotype of T2D youth. Closer attention to lifestyle management in T1D youth is critically needed to help reduce CV risk.

Table: Comparison of CV measures between lean, overweight, and obese subjects with T1D vs. T2D

	Lean T1D	Over-weight	Obese T1D	T2D
Demographics				
Number	82	28	25	59
Age (yr)	15.7 (2.5)	16.2 (2.3)	15.6 (2.1)	15.4 (2.3)
Sex (% girls)	50%	79%	32%	71%[f]
Caucasian	71 (87%)	26 (93%)	20 (80%)	11 (19%)[f]
Hispanic	6 (7%)	0 (0%)	3 (12%)	34 (57%)[f]
BMI (kg/m²)	20.8 (2.2)	26.3 (2.7)	31.1 (3.1)	33.6 (5.9)[e]
Diabetes duration (yr)	7.2 (4.2)	7.3 (4.0)	5.5 (3.6)	2.1 (1.9)[f]
HbA1c (%)	8.5 (1.4)	8.6 (1.6)	8.7 (1.5)	8.1 (2.4)
Laboratory Measures				
Adiponectin ** (µg/mL)	10.7 (9.6, 11.8)	9.7 (7.7, 12.3)	8.6 (7.2, 10.4)	5.1 (4.4, 5.9)[f]
Leptin** (ng/mL)	7.7 (6.3, 9.5)	21.5 (16.3, 28.3)[b]	25.9 (21.1, 31.9)[b,d]	28.0 (23.3, 33.5)
hsCRP** (mg/L)	0.4 (0.3, 0.5)	1.0 (0.6, 1.6)[a]	1.8 (1.2, 2.8)[b,c]	2.7 (1.9, 3.7)
Cardiovascular Measures				
HR (BPM)	67.9 (12.8)	77.3 (13.2)	77.8 (10.2)[a]	72.4 (13.4)
SBP (mmHg)	114.4 (10.9)	123.1 (9.2)[b]	124.2 (9.2)[b]	121.1 (11.8)
DBP (mmHg)	67.5 (7.9)	72.6 (7.9)[a]	72.6 (6.9)[a]	70.5 (10.5)
SBP %ile	56.9 (29.4)	81.6 (16.8)[b]	81.3 (18.5)[b]	75.6 (21.9)
DBP %ile	54.3 (24.7)	69.9 (20.9)[a]	71.7 (19.2)[b]	63.9 (26.8)
Prevalence of HTN*	10%	26%	44%[b]	12%[e]
Pulse pressure (mmHg)	46.9 (10.0)	50.6 (10.9)[a]	51.6 (11.9)	50.6 (10.3)
MAP (mmHg)	83.1 (7.7)	89.4 (6.6)[b]	89.8 (5.3)[b]	87.3 (9.8)[e]
BAD (%/mmHg)	6.26 (1.19)	5.94 (0.90)	5.36 (0.61)[a]	N/A
VO_2 peak (mL/kg/min)	31.4 (7.2)	24.3 (5.2)[a]	22.6 (3.9)[b,c]	N/A
VO_2 peak (mL/lean kg/min)	43.2 (8.1)	38.8 (6.9)	35.7 (11.1)[a]	N/A
MRI Measures				
DA PWV (m/s)	3.9 (1.2)	4.9 (1.6)[a]	3.6 (1.1)[c]	N/A
DA OSI	0.04 (0.05)	0.02 (0.01)	0.01 (0.02)[a]	N/A

*n (% of total); **Geometric mean (95% confidence interval); [a] P < 0.05 vs lean T1D; [b] P < 0.001 vs lean T1D; [c] P < 0.05 vs overweight T1D; [d] P < 0.001 vs overweight T1D; [e] p < 0.05 vs obese T1D; [f] p < 0.001 vs obese T1D. Lean=BMI <85%ile, overweight=BMI 85-<95%ile, obese=BMI ≥95%ile. Data are expressed as mean (SD) unless otherwise specified. Key: BMI=body mass index; hsCRP=highly sensitive c-reactive protein; HR=heart rate; SBP=systolic blood pressure; DBP=diastolic blood pressure; HTN=hypertension; MAP=mean arterial pressure; BAD=brachial artery distensibility; VO_2 peak=peak oxygen consumption; DA=descending aorta; PWV=pulse wave velocity; OSI=oscillatory shear index.

[Comparison of CV measures between lean, overweight, and obese subjects with T1D vs. T2D]

P152

Assessement of platelet morphology in children with type 1 diabetes mellitus (T1D)

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Background: Type 1 diabetes mellitus(T1D)is the most common metabolic disease among children, adolescents and young adults.As the onset of the disease occurs in early life, the afflicted are at great risk of developing cardiovascular disease as a complication of diabetes. The majority of ischemic events - occur due to intravascular thrombosis.This is a state which favour platelet aggregation and adhesion. Mean platelet volume (MPV) and platelet distribution width (PDW) are morphometric indices reflecting the size of distribution of the peripheral platelet population.

Aim: To investigate whether platelets' morphology is altered in children with T1D and its relation to disease duration and metabolic control of the disease.

Methodology: This was a case-control study included 75 children with T1D.They were divided into 3groups,group I;25 children recently diagnosed with T1D,group II;25 children with T1D for duration(1-5) years and group III;25 children with duration ≥ 5 years.Another, 25 apparently healthy children age and sex matched served as a control group and classified as Group IV.The studied groups were subjected to:Thoroug history taking, clinical examination and laboratory investigations included:Random blood sugar, Complete blood count, Platelets study(platelet count, mean platelet volume(MPV), platelet distribution width(PDW) and platelet large cell ratio(P-LCR),HbA1c % and Fructosamine.

Results: Diabetic group had significant platelet morphological indices changes than the control group.Duration of diabetes had significant positive correlation with mean MPV,PDW and P-LCR. BMI had significant fair correlations with PDW and P-LCR.Finally,-Fructoseamine had significant positive correlations with MPV &PDW and P-LCR.

Conclusion: Platelets in T1D show morphological evidence of hyperreactivity which may predispose the patients to future cardiovascular events.So, proper weight and glycemic control may have impact on future complications.

Poster Tour 17 - Diabetes Acute and chronic complications and Late breakers

P153

Thrombin generation in children and adolescents with type 1 diabetes at type 1 diabetes onset

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Introduction: Atherosclerosis is a major complication in adult patients with all types of diabetes. Hypercoagulability is an important etiological factor of atherosclerosis. Hyperglycemia is known to contribute to endothelial lesions and hypercoagulability. Hemostatic balance can be evaluated by thrombin generation and seems to be influenced by glycemic control.

Objectives: Aim of this study was to explore early changes in thrombin generation in children with type 1 diabetes (T1D).

Methods: We compared thrombin generation in 24 children between 2 - 17 years with[FE1] T1D at onset and after introduction of insulin therapy. Measurements were performed with platelet poor plasma using calibrated automated thrombography. In addition, we quantified prothrombin fragments F1+F2, thrombin-antithrombin complex, prothrombin, tissue factor pathway inhibitor, antithrombin, and tissue factor activity.

Results: Lag time in patients with T1D was significantly shorter at T1D onset with frequent hyperglycemic episodes than after initiation of insulin therapy and improvement of glycemic control [2.53 ± 0.60 vs. 2.93 ±0.54 mean ± SD[FE2]]. Accordingly, tissue factor activity decreased after insulin treatment [3.97 (0-17.0) vs. 2.67 (0-16.1) median (ranges)]. No significant changes were observed in other coagulation parameters.

Conclusions: The shorter lag time and high tissue factor activity in children with T1D at T1D onset can be interpreted as an indicator for an activated clotting system, which is potentially attributable to endothelial damage. Glycemic control ameliorates these effects arguing for endothelial stabilization.

P154

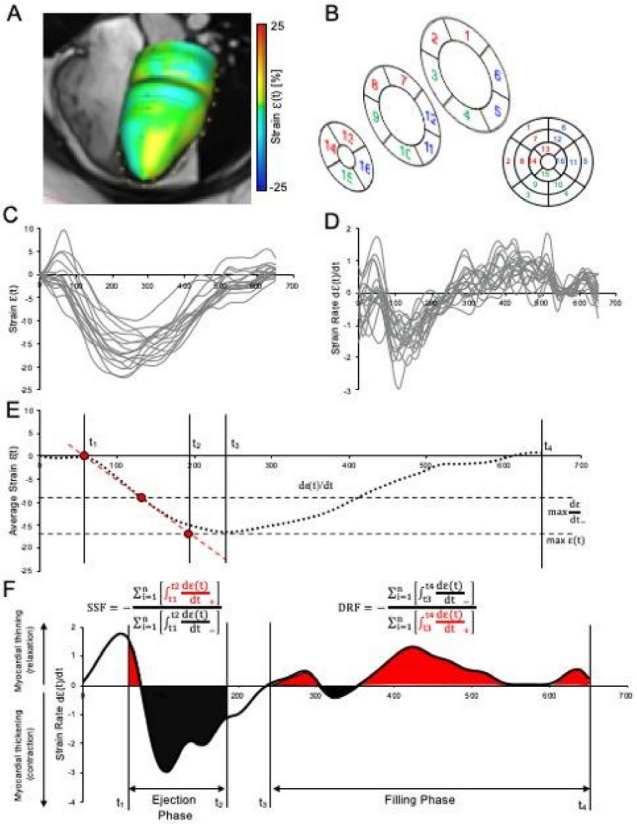
Adolescents and young adults with type 1 diabetes have increased left ventricular electro-mechanical discoordination: cardiac MRI report from emerald study

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Objectives: Cardiomyopathy is a major concern for people with type 1 diabetes (T1D) and often is not diagnosed until late in the disease process. The objective of this pilot study was to examine left ventricular (LV) function in asymptomatic adolescents with T1D using MRI-derived ventricular electro-mechanical discoordination indices including systolic stretch fraction (SSF) and diastolic relaxation fraction (DRF).

Methods: Adolescents with T1D (n=16) and healthy controls (n=20) of similar age and BMI underwent MRI for standard volumetric and functional analysis. Segment-specific circumferential strain and strain rate indices were evaluated along with standard mechanical dyssynchrony. SSF and DRF were calculated from the strain rate data (-**Figure 1**). MRI hemodynamic and functional indices were correlated with HbA_{1C} and diabetes duration.



[Discoordination Analysis]

Results: In the T1D group, mean HbA1c was 87mmol/mol and mean T1D duration was 7.9 yrs. Participants with T1D and controls had similar standard LV volumetric and functional hemodynamic indices. There were no global or regional group differences in the LV circumferential strain, systolic strain rate or standard mechanical dyssynchrony. Subjects with T1D had lower diastolic strain rate around the inferior septal and free wall regions (all $P < 0.05$). Moreover, participants with T1D had higher SSF (3.6 vs. 2.0, $P = 0.030$) and DRF (0.36 vs. 0.30, $P < 0.001$) when compared to controls. None of the MRI indices correlated with HbA_{1C} or diabetes duration.

Conclusions: Our results suggest the novel finding that adolescents with T1D have LV electro-mechanical systolic and diastolic discoordination,

providing early evidence of cardiomyopathy despite their young age. The presence of discoordination in the setting of normal LV size and function may imply that the proposed discoordination indices could serve as sensitive early markers of cardiomyopathy in T1D.

P155
TNF alpha and VEGF as predictors of diabetic retinopathy

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Introduction: Diabetic retinopathy (DR) is a microvascular disorder characterized by microaneurysms, capillary perfusion disorders, intraretinal hemorrhages, intraretinal microvascular abnormalities, and neovascularization. Neurodegeneration is an early event in the pathogenesis of diabetic retinopathy (DR). Inflammatory cytokines, including interleukin 1 beta (IL-1β), interferon gamma (IFN-γ), and TNF-α, increase the secretion of vascular endothelial growth factor (VEGF) A and C by human retinal pigment epithelial (RPE) cells and choroidal fibroblasts, with VEGF being the most important factor for initiation of pathological ocular neovascularization.

Current findings suggest that the upregulation of VEGF in the vitreous fluid from patients with PDR reflects angiogenesis and vasculogenesis in DR.

Patients and methods: 240 children aged 2-18 years were investigated: 80 with diabetes mellitus type 1 (DM1), 88 with obesity, and 72 healthy children as a control group. Tumor necrosis factors alpha (TNF alpha) and VEGF levels were measured in serum using ELISA Qantikine kits.

Results:

	TNF alpha (pg/ml)	VEGF (pg/ml)
Obesity	9,62±2,59	356,44±169,44
DM1	4,42±1,28*	249,13±86,56*
Healthy children	6,41±3,80*	160,9±140,4*

[TNF alpha and VEGF in helty, DM1 and obese children]
*p< 0,05

DR development is often diagnosed as the first symptom of diabetes mellitus type 2. Probably, the early phases of this process can be observed during the obesity phase before development of glucose intolerance and DM2. In DM1, this process can be predicted on the basis of TNF alpha and VEGF measurement.

Conclusion. From the clinical point of view, early identification of retinal neurodegeneration will be crucial for implementing an early treatment based on drugs with a neuroprotective effect. In this situation, the investigations of cytokines (TNF alpha) and growth factors (VEGF) have important practical aspects.

P156
Visfatin level and its relationship to subclinical atherosclerosis in children with type 1 diabetes

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Introduction: Type 1 Diabetes is an important risk factor for the development of cardiovascular diseases. Visfatin has insulin mimetic effects, and emerge as a player in the development and progression of atherosclerotic lesions by directly promoting smooth muscle cell proliferation.

Objectives: To assess relationship between visfatin level and subclinical atherosclerosis in children with type 1 diabetes.

Patients and methods: A cross sectional study carried out on 74 children with type I diabetes mellitus (40 female and 34 male). children with T1DM their age were from 11-19 years were subjected to assessment of blood pressure, height, weight, BMI and waist circumference; investigations including HbA1c, lipid profile and serum visfatin. Carotid artery wall intima media thickness was measured by ultrasound. The mean Visfatin level was 16.7±7.8 ng/ml in children with type 1 diabetes.There was significant high mean carotid intima thickness was (0.044±0.006 cm) in those children. There was a positive correlation between visfatin and HbA1c, BMI, carotid intima media thickness (P=0.00).

Conclusion: Visfatin concentration is high in children with type 1 diabetes mellitus. Visfatin concentration is significantly positively correlated to carotid intima -media thickness.

Posters on Display – Diabetes Chronic Complications

P157
A case of Mauriac syndrome

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Background: Glycemic control is important in children with type 1 diabetes to prevent microvascular and macrovascular complications. Poor control of type 1 diabetes mellitus (T1DM) in adolescents may lead to Mauriac syndrome which is characterized by dwarfism, obesity and hepatomegaly and elevated transaminases. Here we report a 12 years old boy with poorly controlled type 1 diabetes and hepatomegaly.

Case report: 11.5 years old boy with poorly controlled type 1 diabetes (since 3 years) with no regular follow-ups. Patient was on basal bolus 1.2 unit/kg of body weight per day. There was 4 times history of diabetic ketoacidosis, and multiple episodes of documented hypoglycemia were reported.

He complained of abdominal distension and vomiting.

Examination: anthropometric data revealed weight :34.5 (0.6 SD), height :134.5 (-1.8. SD), there was hepatomegaly.and ALT: .228 (up to 40) AST: 146 U/L (up to 32) Serum bilirubin :0.5 mg/dl (up to 1) Albumin :4.6 mg/dl (3.2-4.8) Hb A1 C: 10.98

Total cholesterol: 200 mg/dl (100-200) Serum triglycerides : 190 mg/dl (0-150).

Negative celiac screen.

Investigations were done to exclude viral hepatitis and autoimmune hepatitis: Hepatitis B surface antigen, HCV antibody and markers for autoimmune hepatitis (Anti-liver Kidney microsomal (LKM) and ANA were negative.

Ultrasound examination Ultrasonography revealed fatty change.

Liver biopsy revealed moderate glycogenesis and mild macrovesicular steatosis

Mauriac syndrome was suspected. We educated the father and the patient about insulin doses and diet, correction doses and gave him liver support medication.

Conclusion: Mauriac syndrome is a rare complication of poorly controlled DM in adolescence, but the paediatrician and endocrinologist should keep a high index of suspicion for this so that proper growth can be accomplished with timely intervention.

P158
Type 1 diabetes mellitus: a missed diagnosis

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Introduction: The prevalence of diabetes-related cataracts during childhood is less than 1% whereas, peripheral neuropathy, and specifically distal peripheral neuropathy, is one of the most frequent and troublesome complications of diabetes mellitus.

Case: 15y6m old boy with history of delayed puberty, not gaining height, bilateral diminution of vision since1 year and on repeated probing gave history of polyuria, polydipsia and weight loss since 4 years. Height and weight were less than the 3rd centile. Tanners stage: P2A2Tv-6cc each, SPL-6cm, balanitis and bilateral posterior polar cataract. Investigations showed high blood glucose, HbA1c:18.5%, GAD antibodies positive with ketosis but no acidosis. Ultrasound abdomen showed multiple renal calculi measuring 5mm. Other biochemical parameters (TFT) were within the normal range. Child was started on insulin therapy and was followed up periodically for plasma glucose levels. After a month of starting the treatment, the child complained of severe pain in the lower limbs. Vitamin B12 levels being normal, a nerve conduction study was done which revealed motor axonal polyradiculoneuropathy. A diagnosis of type 1 diabetes mellitus with diabetic cataract and diabetic neuropathy was made and was started on vitamin B12 supplements, gabapentin and insulin was continued.

Conclusion: Early therapy and maintenance of blood glucose level may reverse acute diabetic cataract. From our experience of early cataract formation in an adolescent with prolonged history of symptoms of polyuria and polydipsia, diabetes has to be considered and the insulin therapy should be initiated immediately to avoid complications of diabetes.

References:

1. Wilson ME, et. al. Cataract associated with type-1 diabetes mellitus in the paediatric population.
J AAPOS. 2007; 11(2):162-5.

2. Nery Ferreira B.E, et. al. High prevalence of diabetic polyneuropathy in a group of Brazilian children with type 1 diabetes mellitus. J Pediatr Endocrinol Metab. 2005; 18: 1087-1094.

P159
Bilateral cataract as the first feature of type 1 diabetes in a 12 year old girl: a case report

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Background: Diabetic cataract is a rare early ocular complication of type 1 diabetes (T1DM) in pediatrics patients with an estimated prevalence of 0.7% to 3.4%. It is mostly seen in adolescent patients. Activation of the polyol pathway and acute osmotic stress due to hyperglycaemia are implicated in the opacification of the lens in patients with diabetes.

Case report: We present a case report a 12 year old girl with progressive deterioration of vision in both eyes during one month. She was initially diagnosed with bilateral cataract but a medical examination confirmed new onset T1DM with mild ketosis. The HbA1C value was 179 mmol/mol, plasma glucose level was 15 mmol/l, bicarbonate

16 mmol/l and base excess - 8 mmol/l. She started on a basal and bolus insulin regimen before surgical correction of her cataract.

Conclusions: We suppose that cataract development is associated with longer prodromal period and high level of HbA1C on diagnosis. All pediatric patients presenting with bilateral cataract should be examined to determine the etiology of their cataract before surgical correction.

P160
An old syndrome in modern times: a case of Mauriac syndrome

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Mauriac syndrome is a rare complication of poor control and insufficient management of diabetes mellitus type1 that may present as hepatomegaly,delayed puberty and growth failure. Nowadays incidence of this syndrome with use of basal insulin and better control of diabetes has decreased significantly, however we´re still seeing new young patients despite these advancements. We report here the symptoms and laboratory findings of an 18- year old shepherd boy who lives in a village up in the mountains of northwest of Iran with Mauriac syndrome. An 18-year-old boy with uncontrolled diabetes mellitus (T1DM) duration of 14 years was referred to us by an adult endocrinologist in university hospital endocrine clinic for evaluation of short stature and better controlling his diabetes. As hepatomegaly, cushingoid features and prayer sign were seen in the physical examination, the diagnosis of Mauriac syndrome was suspected.By reviewing his examinations we realized that he had a HbA1C of 15/8 and elevated liver enzymes.We also found that he was suffering from some of the diabetic complications such as early proliferative diabetic retinopathy(PDR), macular edema and diabetic nephropathy. Finally,-based on biochemical analysis and clinical signs,Mauriac Syndrome was diagnosed. Although Mauriac syndrome is a rare situation, it should be noted in any type 1 diabetic youth with growth failure, protuberant abdomen and prayer sign. Intensive glycemic control and regular follow up may reduce the risk of such an occurrence.

P161
Necrobiosis Lipoidica - a rare complication in a young diabetic

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An 18-year-old girl with type1 diabetes developed skin lesions on her left leg last year. The lesions were shiny, reddish brown with irregular shape and sizes and non-tender She was diagnosed with diabetes 8 years ago. Her GAD65 and IA2 antibodies were positive. Currently she is on basal bolus insulin treatment for diabetes. Her last HbA1C was 61 mmol/mol (7.7%) and she does not have retinopathy.

She noticed the skin lesions a year ago for which she was seen by the dermatologist. A clinical diagnosis of Necrobiosis Lipoidica (NL) was made and topical 0.1% Protopic (Tacrolimus) was commenced. Recently she is receiving PUVA therapy in addition to protopic resulting in some improvement.

Necrobiosis Lipoidica (NL) is a rare chronic granulomatous dermatitis usually seen in lower extremities. The incidence is about 2.3%. Rarely does it involve hands, fingers, face, and scalp. One case of NL in interscapular area has been reported. Many studies suggest microangiopathy as a pathophysiology. Diagnosis of NL is mainly clinical. The differential diagnosis includes erythema nodosum, lupus paniculitis, granuloma annulare, sarcoidosis and amyloidosis. Ulceration is the most frequent complication and rarely squamous cell carcinoma may develop.[1] A recent study of 52 patients suggests a possible association of NL and thyroid disease.[2]

Various treatments are being tried which include topical steroids, topical tretinoin and oral steroids, intravenous methylprednisolone, topical calcineurin inhibitors/infliximab/anti-platelet agents, PUVA/ CO2 laser.[3]

References:

Bonura C, Frontino G, Rigamonti A, et al. Necrobiosis lipoidica diabericorum: a pediatric case report. Dermatoendocrinol 2014; 6: e27790.

Erfurt-Berge C, Seitz AT, Rehse C, et al. Update on clinical and laboratory features in necrobiosis lipoidica: a retrospective multicentre study of 52 patients. Eur J Dermatol 2012; 22:770.

George S, Walton S. Necrobiosis Lipoidica. Br J Diabetes 2016; 16:6-9.

P162
Amputation in a Ghanaian teenager with type 1 diabetes mellitus: a case report

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Abstract

Introduction: With good control of blood glucose acute and chronic complication of diabetes can be avoided or minimized in children and adolescents living with diabetes.

Objectives: To present a 17 year old female who developed left leg ulcer which resulted in left lower leg amputation. Children and adolescents with diabetes in Africa usually died early before complications could set in. This was due to the fact there was no enough support for such patients in Africa such as organized pediatric clinics and expertise to managed them. Under the auspices of the World Diabetes Foundation, European Society for Pediatric Endocrinology and International Society for Pediatric and Adolescent Diabetes pediatric endocrinologist are being trained in Kenya and Lagos for the African Subregion. Ghana has trained three pediatric endocrinologists through this program. As a result awareness about diabetes among children and adolescents has significantly improved across African including Ghana. These patients are being diagnosed, managed and followed up. However, comprehensive care for these patients pose a great

challenge due to a multiple factors such as lack of continuous supply of insulin from the local governments, laboratory support and non compliance with medication and appointments on the side of patients due to extreme poverty. This predisposes these children to complications rather than early mortality.

Method: Case description of a 17 year old type 1 diabetic patient who developed a bad ulcer that resulted in amputation.

Results: As a result of non compliance from the patient resulted in ulcer on the left leg that worsened and resulted in amputation.

Conclusion: Strict control of blood glucose is important among children and adolescents diagnosed with type 1 diabetes to avoid or minimize complications. Local governmental support to children with diabetes is essential.

P163
Longitudinal follow up for the association of microvascular complications in type 1 diabetes (T1DM)

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Objective: The aim of our study was to examine glycemic trends of T1DM patients consistently under standard care in limited resource setting with predominantly conventional insulin formulation. We explored association with the microvascular complications like nephropathy and retinopathy

Methods: Evaluation was through the point specific survey which explored the reasons for unsatisfactory outcomes in a cohort of 125 T1DM (75 males and 50 males), with regular spaced -periodic follow up consistently for eight years (2011-2018). All patients had received structured education once in four months. Regular monitoring included HbA1C evaluation atleast once in every six months. At end of eight years we conducted a point specific survey to explore reasons for poor outcomes

Results: Mean age was 12.73 (min 3 years, max 17 years). Mean duration of diabetes was 7.65 years (min 2.5 years, max 11 years). Study revealed impact of glycemic control early in disease on association of occurrence of incipient diabetic nephropathy and background retinopathy. None had retinopathy in their first visit but over eight years 12 patients developed diabetic retinopathy. Prevalence of nephropathy increased over years with 29% at the 1st visit, followed by 23%, 38% and 40% at 2nd, 3rd, and 4th visit, respectively. HbA1c initially reduced then increased to finally reach mean value of 10 %. Deterioration of glycemic control were predominantly attributed to the gaps in efforts needed for discipline and real-life management, dose titration and lack of correction bolus and irregular SMBG

Discussion: Type1 management in resource constrained setting is challenging. We need to evolve a structured program to be tailored according to local logistics, which must comprehensively include motivation, education, regular clinic visit and lab Investigations. Available resources need to be optimally utilized to improve the glycemic care and minimize the complications and further improve the clinical outcomes

P164
Lipid profile, glycemic control and nutrition status in children with type 1 diabetes

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Objectives: To determine lipid profile and nutrition status in children with type 1 diabetes along with the correlation of lipid status and metabolic control in children with type 1 diabetes.

Methods: A prospective cohort study, conducted at the University Children´s Hospital in Belgrade included 128 patients of both sexes, aged up to 18 years. We divided them into three groups according to the age. The data were obtained from the history, clinical examination (weight, height, blood pressure, assessment of nutritional status) and blood samples (HbA1c, liver function and lipid profile).

Results: The body mass index was in desired range for the age and gender and lipid status was normal in majority of our patients. Metabolic control was sub optimal, average Hb A1c (8.30%), while the lipids and liver enzymes were within the normal range. Cholesterol and LDL were higher in patients with poor metabolic control, p< 0,05.

Conclusions: This study showed the favorable body mass index and lipid profile in this cohort of children with type 1 diabetes.

Age group N(%)	Diabetes duration (y)	Age (y)	Gender (N)	HbA1c (%)	HDL (mmol/L)	LDL (mmol/L)	Cholesterol (mmol/L)	Triglyceride (mmoll/L)
3-6.9: 15 (11,7)	2,6 ± 1,4	5,1 ± 1,1	8 M/7 F	7,6 ± 0,9	1,6 ± 0,8	2,8 ± 0,2	4,5 ± 1,0	1.2 ± 1.4
7-11,9: 41 (32,0)	4,7 ± 2,8	10,1±1,4	25M/16 F	8,4 ± 1,3	1,9 ± 0,5	2,4 ± 0,7	4,5 ± 1,0	0.6 ± 0.3
12-18: 72 (56,3)	5,5 ± 3,3	15,0±1,9	28M/44 F	8,4 ± 1,6	1,7 ± 0,5	2,8 ± 0,9	5,0 ± 1,2	1.0 ± 0.7
Whole group 128	4,9 ± 3,1	12,3±3,9	61M/67F	8,3 ± 1,4	1,7 ± 0,5	2,6 ± 0,9	4,7 ± 1,1	0.9 ± 0.7

[Table 1. Patient characteristics. (Data are expressed as mean ± SD)]

Unfortunately, metabolic control is not acceptable, especially in the adolescents with type 1 diabetes.

P165
Is menarche in type 1 diabetes still delayed?

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Objective: Several studies have described a delayed onset of puberty in girls with type 1 diabetes (T1D). The recent advance of therapy improved glycemic control and quality of life in TID patients dramatically. Therefore, menarche age in recent-onset patients might improve. The aim of this analysis is to clarify whether menarche and growth were affected by disease onset and glycemic control in females with T1D.

Methods: We surveyed menarche age of 88 girls with T1D in the outpatient clinic of Osaka City University Hospital in Japan using the questionnaire between April and May 2019. And we conducted a retrospective study using their electrical medical records.

Exclusion criteria of subjects: Coexist with another chronic disease. Disease duration below one year. Age onset of T1D below 1 year old. The duration between menarche age and diagnosed age of T1D was within one year.

Results: 68 subjects occurred menarche after diagnosis of T1D (after diagnosis group: AG). 20 subjects occurred menarche before the onset T1D (before diagnosis group: BG). The median of onset age was 6.5 years (1-12.7 years) in AG and 16.3 years (10.9-44.3 years) in BG. Median disease duration was 16.9 years (2.3- 49.3 years) in AG and 13.7 years (1.3-25.3 years) in BG. Median menarche age was 12.5 years (9-15.3 years) in AG and 11.8 years (10-14.7 years) in BG (p=0.056).

Conclusions: This study showed T1D still might make delayed the menarche age of girls.

Poster Tour 4 - Diabetes Care and New Therapeutics

P166
Body composition and metabolic control in young womenwith type 1 diabetes (T1D) using long-acting reversible contraception (LARC) and combined oral contraceptive (COC)

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Introduction: The metabolic impact of LARC compared to COC in young women with T1D is unknown.

Objectives: Toevaluate the effect of three months of use of the implant, a type of LARC (I) and a COC on glucose profile, as assessed with a CGM system, and body composition in T1D women compared to a healthy control group (C).

Methods: We recruited young women (age=15-24 years) with T1D (n=30) and C (n=40). The subjects chose to use an implantable rod with etonogestrel (68mg) or COC with ethinyl estradiol (30ug) and desogestrel (150ug). The evaluation was performed at baseline and three onths. Body composition was assessed with the Tanita® system. HbA1c and daily insulin dose (TDD) were assessed with DCA-2000® and by self-report, respectively. Freestyle Libre® was used during the luteal phase before the start of the contraceptive and immediately before the three months control. Statistics: ANOVA for repeated measurements using a mixed model.

Results: BMI increased in T1D and C using I (Table), in spite of similar fat and lean mass. Blood pressure was higher in T1D than in C, and SBP decreased in both groups using COC. Median glucose level and median fasting glucose (Freestyle Libre), HbA1c, and TDD didn't change after three months of either treatment.

Conclusions: Metabolic control and total daily insulin dose did not change after 3 months of I or COC. BMI increased with the implantable rod in T1D and C groups. In contrast, blood pressure decreased in both groups using COC.

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P167
Glucose-independent racial disparity in HbA1c is present at onset of type 1 diabetes (T1D)

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Hemoglobin A1c (HbA1c) is an important guide for management, diagnosis and prediction of complications in diabetes. We previously showed that young black patients with established T1D have higher HbA1c than white patients even after adjustment for mean blood glucose, RBC indices, age,and gender. We hypothesized that glucose-independent racial disparity in HbA1c would also be present at diagnosis of T1D.

Data was collected by chart review for self-identified white and black patients who presented between January 2012 and November 2018 to Children's Hospital of New Orleans with untreated new onset T1D.

Data was collected for DOB, gender, race, weight, height, glucose, HbA1c, pH, Hco3, insulin, C-peptide, pancreatic autoantibodies,RBC indices.

Simple correlation and comparison of means between groups was performed. Multiple variable regression modeling to test the statistical effect of race, gender, age, glucose, and other variables on HbA1c was also performed.

We included 191 children with newly diagnosed T1D (69 Blacks and 122 Whites; 116 males, 75 females). HbA1c was correlated with glucose, insulin, c-peptide, age, RDW-CV, Hb, HCO3. Blacks had higher HbA1c 11.9 ±1.9 vs whites 11.04±2 (P=0.004), higher glucoses 530.6 ±230.4 vs 441.9±211.3 mg/dL (P=0.0075), lower C-peptides 0.57 ± 0.42 vs 0.76±0.61 ng/mL (P=0.019) and lower pH 7.28±0.15 vs 7.33±0.12, (P=0.02). There was no statistical difference in age, BMI-z, Hco3 or insulin between the groups. After adjusting for age, gender, glucose, C-peptide and RDW-CV, HbA1c is still higher in blacks,

	T1D-COC (n=16)		C-COC (n=20)		T1D-Implant (n=14)		C-Implant (n=20)	
	basal	3 months	basal	3 months	basal	3 months	basal	3 months
Age (years)	20.1		21.7		18.1		16.8	
BMI (Kg/m2)	23.8	24.35	22.9	23.3	23.8*	24.55	21.8*	23.55
Fat mass (%)	27.8	29	26.4	26.8	29.55	30.55	29.1	26.4
SBP (mmHg)	117+*	113+	109*	106	109.5	111	108	108
DBP (mmHg)	76+	72.5+	64	67	73+	74+	60	66
HbA1c (%)	8.3+	8.3+	5.3	5.3	7.55+*	7.65+	5.2	5.2
TDD (IU/Kg)	0.845	0.895			0.91	0.955		
Median glucose (mg/dl)	167	170			150	162.5		

*[+p<0.05 T1D vs C, *p<0.05 basal vs 3 months]*

P=0.037. Females had higher HbA1c than males, P=0.02. Age, gender, glucose, C-peptide and RDW-CV were also significant covariates in the model.

HbA1c at presentation is influenced by Race, glucose, age, gender, RDW-CV, and c-peptide

Even after adjustment for glucose blacks have higher HbA1c than whites Glucose-independent HbA1c racial difference should be taken into account for purposes of diagnosis and management of T1D

P168
Improved quality in diabetes care for children and adolescents with type 1 diabetes (T1D) in Norway. Data from the Norwegian Childhood Diabetes Registry (NCDR)

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Background: In 2016 only 32% of children with type 1 diabetes (T1D) in Norway achieved HbA1c< 7.5% (58 mmol/mol). There were differences in mean HbA1c in different hospitals and in implementing national guidelines. The Swedish paediatric diabetes registry has shown that a systematic quality improvement in combination with national quality registers can improve clinical results.

Objectives: To improve the quality of diabetes care in children with T1D by teaching the multidisciplinary diabetes team a quality improvement method.

Methods: NCDR has conducted a quality improvement project by using the Breakthrough method, including 4 day seminars (learning-sessions), 2 follow-ups and 4 telephone meetings for a duration of 18 months. Nine of 26 pediatric departments in Norway were included, representing about 1,230 children age 2-17 years old. The number of children with T1D in the 9 departments ranged between 80-229. The methods included working with systematic improvements methods particular the plan-do-study-act (PDSA) wheel. Each team received support from an improvement coach. The method has been developed to implement changes in clinical work; to set radical goals which demands changes in structure and which cannot be achieved only by everyone "running faster". The Mann Kendall trend test was used when analyzing the change in HbA1c.

Results: All departments implemented weekly diabetes team meetings. They educated nurses and doctors working on the ward, developed new patients information. All departments achieved better mean HbA1c, increased the proportion of patients with HbA1c< 7.5% (58), reduced proportion HbA1c≥9.0% (85). The whole cohort had decreased mean HbA1c from 7.9% (63) to 7.2% (55). The trend is significant (p=0.007), with a strong negative correlation 0.905.

Conclusions: The project has founded a multidisciplinary devoted group of people across departments who has inspired each other and has competed for giving their patients the best diabetes care.

P169
Medication adherence during adjunct therapy with statins and ACE inhibitors in adolescents with type 1 diabetes

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Background: Suboptimal adherence to insulin treatment is a main issue in adolescents with type 1 diabetes (T1D). However, to date, there are no available data on adherence to adjunct non-insulin medications in this population. The aims of this study were to assess adherence to ACE inhibitors and statins and explore potential determinants in adolescents with T1D in the context of a clinical trial.

Methods: 443 adolescents (aged 10-16 years) were recruited into the Adolescent Type 1 Diabetes cardio-renal Intervention trial (AdDIT) and exposed to treatment with two oral drugs: an ACE inhibitor, a statin, combinations of both or placebo for 2-4 years. Adherence was assessed every 3 months with the Medication Event Monitoring System (MEMS) and pill count. The effect on adherence of baseline age, diabetes duration, age at diagnosis, HbA1c, method of insulin administration, country and sex were assessed.

Results: Median adherence during the trial was 80.2% (interquartile range: 63.6-91.8), based on MEMS, and 85.7% (72.4-92.9) based on pill count. Adherence dropped from 92.9% at the first visit to 76.3% at the last visit. Adherence was lower in participants with an HbA1c >85 mmol/mol (69.4 [50.8-87.1]%) vs those with an HbA1c 58-85 mmol/mol (79.5 [63.3-91.0]%) and < 58 mmol/mol (88.1 [75.5-93.9]%), p=0.001. Adherence varied across the three countries involved in the AdDIT trial: Australia (83.4[70.1-92.9]%), UK (78.9 [61.7-91.6]%) and Canada (73.8[56.8-88.3]%), p for trend= 0.001. There was also a trend for a decreasing adherence with age (p=0.07).

Conclusions: We report a good adherence rate with ACE inhibitors and statins in adolescents with T1D. Older age and higher HbA1c predicted adolescents with worse adherence, highlighting two key potential targets for strategies aiming at improving adherence. Adherence also differed by countries likely reflecting differences in practice or approaches between countries.

P170
Is effective transitional care worth investment in diabetes care?

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Background: Good transition is key to prevent long-term complications & to promote positive outcomes.A multidisciplinary (MDT) diabetes transition service was established at local hospital in June18. Prior to June18, all 16 year olds had attended a single transfer MDT clinic. This novel approach offers at least 4 clinic encounters a year via monthly MDT & annual review clinics and workshops in addition to phone calls & home visits. This is for the first time in the the trust that such robust transition service has been established that attends to the medical, psychological & educational needs of young people & the needs of their parents.

Materials and methods: A retrospective analysis of 52 young persons aged between 16-19 registered to the diabetes transition service was conducted to look at DNA, HbA1c values & number of admissions with DKA and hypoglycaemia pre (June17- March18) & post (June18 -March19) establishment of diabetes transition service.

Results: More patients are offered blood test, annual review & more clinical contacts. Before these patients were seen in transfer clinic once & then they were seen 3 times in a year in the young adult clinic. Now the number of contacts has increased to 4 clinics & 8 contacts per patient per year. We noted an improvement in the DNA from 29.2% pre service set up to 21.4% post service set up (P=0.24). Although average HbA1c values were almost the same pre & post establishment of service, individual HbA1c values for 59.6% of our patients have shown improvement after coming to the service from their previous values. None got admitted with DKA or hypos post transition service as compared to 2 admissions each with DKA and hypos before transition.

Conclusion: The transition service has improved engagement of young people with diabetes services, better glycemic control, less acute complications & adherence to the appointments. Early users' feedback is very good. We will continue to collect more data to evaluate other aspects of our service.

P171
T1D glycaemic control and complications in Caucasian and non-Caucasian youth

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Objectives: To access glycaemic control in a cohort of ≤ 18yr Caucasian and non-Caucasian T1D patients, to evaluate probable causes for found differences, and to set strategies to improve care.

Methods: 5-years retrospective study of 374 patients, ≥1yr into T1D diagnosis, followed in one tertiary paediatric diabetes centre. Evaluated variables: age, gender, ethnicity, nationality, native language, household and family educational level, diet, planned exercise, anthropometrics, Tanner stage, T1D duration, metabolic control, vascular complications, total daily insulin (TDI), estimated insulin sensitivity (eIS), and insulin delivery method. Statistical significance was set at $p < 0.05$.

Results: 12.6% of the patients were non-Caucasians (9.7% from African origin and 2.9% with Asian roots), 64% of whom were male, with median age of 9 (4-16)yr. Caucasians were 56% male, with median age of 6 (2-12)yr.

Non-Caucasians had higher: mean HbA1c (8.8% vs 7.6%), DKA at onset (56% vs 32%), mean TDI (0.93 vs 0.61 U/Kg/day), mean BMI z-score (1.2 vs 0.7), mean systolic (0.6 vs 0.2) and diastolic (0.2 vs 0.09) blood pressure z-scores, elevated albumin/creatinine ratio (11.2% vs 4.9%), and dyslipidaemia (9.4% vs 4.8%). On the other hand, they had lower: daily SMBG (3.0 vs 7.2 pricks), CGM use (1 vs 2.4%), eIS (1.3 vs 2.8 $mg.Kg^{-1}.min^{-1}$), biparental household (23% vs 64%), parents' educational level (6 vs 12 yr), and school accomplishment (1.7 vs 0.6 mean grade retention years). There were no differences in mean age at onset (11.1 vs 10.3 yr), T1D duration (4.8 vs 4.3 yr), and CSII use (25% vs 28%) between groups.

Conclusions: Non-Caucasian T1D youth have worse glycaemic control and more cardiovascular disease risk factors, linked to higher vulnerable socioeconomical minorities. It is urgent to implement a plan able to match their specific needs, in order to overcome these difficulties and to improve their care.

P172
Pubertal self-assessment as a replacement for physical examination in adolescents with type 1 diabetes

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Objective: To identify the reliability and acceptability of self-report Sexual Maturity Rating (Tanner stage) compared to physical examination in youth with Type 1 Diabetes (T1D)

Introduction: Pubertal stage is often considered when titrating insulin doses in youth. A less invasive method to stage puberty would ease data collection for clinical care and trials. No universally accepted self-report measure has been widely adopted in youth with T1D.

Methods: Youth aged 8-15.99 years with T1D were eligible. Subjects were stratified by sex into 1-year "age bands" (i.e. 8-8.99 years). Participants completed the Pubertal Development Scale (PDS), Sexual Maturity Scale (SMS), and Testicular Volume self-assessment (boys only). A physical exam using the the standards of Tanner & Marshall was performed by a pediatric endocrinologist (gold standard). Questions on comfort, embarrassment, and ability to understand each tool/exam were completed at the end of each tool/exam.

Results: Fifty-one youth (male = 26) were included in analysis. For females, 51% and 92% underestimated their breast and pubic hair stage, respectively, by at least 1stage using the SMS. Forty-four percent of males overestimated their pubic hair by at least one stage. Testicular self-assessment showed that boys overestimated, being

+2.26 beads above their true volume. The PDS score was positively correlated with Tanner stage for both males and females (r2 = 0.53 and 0.65, respectively). All tools, including physical exam, were well understood, and not perceived as uncomfortable or embarrassing by participants.

Conclusions: Scores on the PDS, but not the SMS, correlate moderately well with pubertal stage by exam. On average, girls underestimated their pubertal status by SMS, and boys overestimated. All assessment methods were well accepted and easily understood. Further investigation of the performance of SMS combined with anthropometric measures (e.g., height and height velocity z-score) is warranted.

P173
Characteristics and outcomes of youth referred to a Diabetes Transition Program (DTP): need to continue to optimize support

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Introduction: Adolescence and young adulthood are typically periods when youth with diabetes mellitus (DM) experience poor outcomes. The DTP at Children's Hospital of Pittsburgh (CHP) was created to equip patients with confidence, support and knowledge that can foster successful lifelong DM management. DTP provides care and guided peer-discussions on pertinent topics with a multidisciplinary team approach.

Objective: The purpose of this study was to characterize the population referred to DTP and evaluate adherence and outcomes.

Methods: Medical records of all subjects were reviewed. Outcomes included number of patients completing the program, transfer to adult care and change in parameters related to DM care.

Results: 115 subjects were to date referred to DTP (42% females, 99% T1DM, mean age at 1st visit 19.1±1.5 yrs, age at diagnosis 9.8 ±4.8 yrs, BMI%ile 74.6±20.6, HbA1c 9±2%, 30% meeting target for HbA1c, 40% for LDL-cholesterol, 70% for BMI). The majority (64%) completed DTP on schedule (1 year). Of these, 40% transferred to adult care, 53% continued care at CHP and 7% were lost to follow up. Of those who did not complete DTP on schedule (36%), almost half (44%) transferred to adult care before DTP completion, 33% are currently completing DTP at a slower pace, and 23% were lost to follow up. Those who transferred to adult care, compared to those who did not, had lower HbA1c at all of their DTP visits (e.g. 1st visit: 8.1 ± 1.4% vs 9.4 ± 1.7%, p=0.01). No differences were found in mean HbA1c or in the proportion of patients meeting targets for risk factors for diabetes complications from the initial to fourth visit.

Conclusions: Patients referred to DTP appear to be a high-risk population. Those with lower HbA1c seem to be more ready to transfer to adult care. Stabilization of DM control during participation in DTP in a period commonly characterized by decline in outcomes is promising and merits further investigation into additional ways to optimize support.

P174
When childcare isn't sweet: challenges for very young children with type 1 diabetes

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Objectives: Type 1 diabetes (T1D) can impact childcare options for parents of young children. The purpose of this study was to characterize diabetes care by childcare attendance status among young children in the T1D Exchange Clinic Registry.

Methods: A questionnaire was emailed to 219 parents/guardians of participants 1-6 years old, garnering a 32% response rate. Data from 71 children (mean age 5 years, mean age at diagnosis 2 years, 58% male, 93% non-Hispanic white, 80% pump users, 70% CGM users, 76% privately insured) were analyzed.

Results: Nearly 50% reported childcare attendance with median attendance of 15 hours/week. HbA1c (p=0.76) and frequency of SMBG (p=0.44) did not differ by childcare attendance. One third of respondents were denied childcare attendance due to T1D. At childcare, a staff member was solely responsible to check blood glucose in 51% and administer insulin in 34% of cases; otherwise, family members performed these tasks. While glucagon rescue kits were available for all childcare attendees, only 49% had a staff member identified to administer it. Among non-attendees, 70% reported T1D was a factor in having the child remain home. More than one-third of those surveyed experienced changes in parental employment status post-diagnosis, with 35% reporting a reduction in hours worked and 27% leaving the workforce.

Conclusions: T1D in young children potentially limits childcare options and influences parental employment status. Since much of the burden of diabetes management is still undertaken by family caregivers, even when the child attends childcare, advocacy to address this issue is needed.

	Childcare Attendees (n=35)	Non-Attendees (n=36)
Median (IQR) HbA1c	7.9% (7.4%, 8.2%)	7.4% (7.1%, 8.3%)
Mean ± StD SMBG	6.3 ± 2.5	6.5 ± 2.1
% using CGM	69%	71%
% using insulin pump therapy	79%	81%

[Table]

P175

HbA1c trajectories from time of diagnosis in youth with T1D

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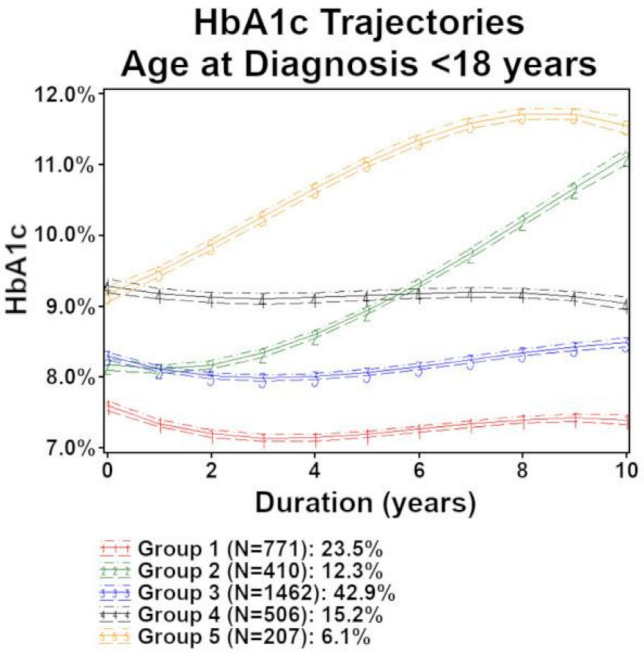
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Objectives: Most individuals with type 1 diabetes (T1D) do not achieve glycemic targets, particularly in youth. This analysis examined HbA1c trajectories of youth newly diagnosed with T1D.

Methods: T1D Exchange registry participants < 18 yrs with at least one HbA1c during the year of diagnosis and >3 duration-year aggregated HbA1c values over 10 yrs of follow up were included. At diagnosis, the 4183 participants were 48% female, 81% Caucasian, age 6 ±4 yrs, and 77% privately insured. Suboptimal control was defined as HbA1c >9%. Group-based trajectory modelling was used to identify unique HbA1c trajectories over aggregated duration years.

Results: Five trajectories emerged (Figure). The majority of youth had stable trajectories within three distinct categories: those at (1) or above (3) glycemic target and those with suboptimal control (4). Two groups showed deterioration over time, one with suboptimal control from diagnosis (5) while the other had above target glycemia that worsened with time (2). Minority status was higher in groups with upward trend in HbA1c trajectory and suboptimal but stable control. Similar trends were seen for non-private insurance.

Conclusion: Several distinct patterns of HbA1c progression exist in youth with T1D, partly dependent on HbA1c at diagnosis. Identifying characteristics of those with progressive deterioration in glycemic control and designing appropriate interventions for these groups is warranted.



Poster Tour 12 - Diabetes Care and New Therapeutics

P176
Estimating HbA1c from average blood glucose - accuracy of estimates based on paediatric clinic data

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Introduction: The concept of HbA1c is often poorly understood by children and young people (CYP). Average blood glucose (aBG) is often used as a proxy for HbA1c when discussing glycemic control. Published models enable conversion of aBG to HbA1c, derived from dat obtained from adult cohorts in study conditions. There are a lack of studies validating these models with CYP in a clinical setting. This study aimed to compare estimated HbA1c (eHbA1c) obtained from aBG, with actual HbA1c in CYP with T1D attending a pediatric diabetes clinic.

Methods: HbA1c data were retrospectively extracted for all patients attending NHS Tayside pediatric diabetes clinic over 12 months (Jan18-Jan19). aBG was calculated from historical data for 3 months prior to each HbA1c measurement. aBG was converted to eHbA1c using Nathan et al's equation. eHbA1c and actual HbA1c were compared using Pearson's correlation. The difference between eHbA1c and actual HbA1c was analysed with respect to demographic predictors (age, diabetes duration, no. of BG checks/day) using multivariable linear regression.

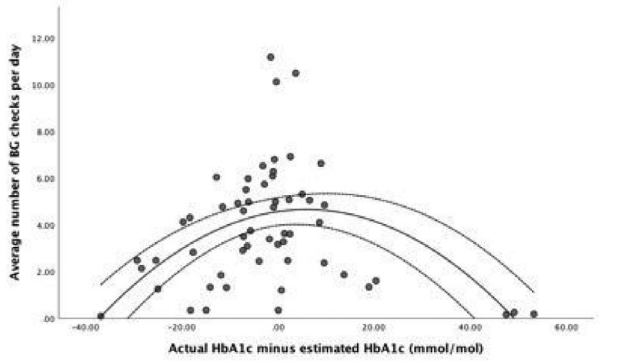


Figure 1. Actual HbA1c minus estimated HbA1c versus number of BG checks per day. Solid line shows quadratic line of best fit (y=4.57+0.03x-2.5E^{-3}x^2), dotted lines show 95%CI. Note negative x axis values were converted to positive values prior to linear regression analysis.

[Difference between actual HbA1c and estimated HbA1c, by number of BG checks]

Results: 165 patients had HbA1c measured during the study period. Of these, 60 patients had historical BG data. Mean age was 12.1 years (SD3.2), mean diabetes duration 5.7 years (SD3.2). Mean no. of BG checks/d was 3.8 (SD2.5,range 0.1-11.1). Mean aBG was 11.9mmol/l (SD3.2), mean actual HbA1c was 73mmol/mol (SD19). eHbA1c was highly correlated with actual HbA1c (r=0.677,p< 0.001). Median difference between eHbA1c and actual HbA1c was ±7 mmol/mol (IQR14). The optimum number of BG checks was 4-5/d - a lower number of BG checks/d was highly predictive of larger differences between eHbA1c and actual HbA1c (B-2.4,95%CI -3.6 to -1.2,p< 0.001).

Conclusion: Conversion of aBG to eHbA1c would appear to be an accurate proxy for actual HbA1c in this pediatric cohort. Caution should be applied when interpreting eHbA1c if average number of BG checks is < 4-5/d.

P177
Optical coherence tomography and C-peptide short-term follow-up in a child with Wolfram´s syndrome treated with Liraglutide

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Objectives: Wolfram's syndrome (WS) is an orphan disease involving diabetes insipidus, diabetes (DM), optic atrophy (OA) and deafness.

Methods: A previously healthy girl was diagnosed with antibody-negative DM at the age of 5 years. New generation sequencing showed a double heterozygous mutation of the WFS1 gene. Comorbidity screening showed initial optic nerve involvement at magnetic resonance imagine (MRI) and optical coherence tomography (OCT) evaluation. A thorough evaluation of possible drug candidates in literature was performed. Liraglutide (LG) was identified as the most promising disease-modifying candidate with the safest pediatric profile and was started at age 8 years.

Results: The child was evaluated after 3 months treatment with LG 1.2 mg/day. Basal and peak C-peptide (ng/mL) at thet mixed meal tolerance test improved from 0.14 (blood glucose 109 mg/dL) and 0.31 (blood glucose 211 mg/dL) to 0.53 (blood glucose 113 mg/dL) and 0.6 (blood glucose 145 mg/dL) respectively. Glucose time in range improved from 66% (time in hypoglycemia < 2%) to 77% (time in hypoglycemia < 1%). Daily insulin needs reduced from 0.4U/Kg to 0.3U/Kg. OCT did not show significant progression in retinal nerve fiber layer (right 71-71 microm, left 68-74 microm) and ganglion cell-inner plexiform layer thickness (right 70-68 microm, left 69-69 microm). The child weight remained stable and no significant gastrointestinal symptoms were reported.

Conclusion: GLP-1R agonists are potential drugs in WS because of their role in decreasing ER stress in both ?-cells and neurons. Only one LG-treated WS patient has been reported in literature and improvement in C-peptide has been shown. This is, to our knowledge, the first reported pediatric case of WS treated with LG with apparent improvement in C-peptide and stabilisation of OCT parameters at 3 months and no adverse events. Longer and larger population RCT studies are warranted prior to it becoming used in routine care for WS.

P178
Driving improvements in diabetes care delivery through the national paediatric diabetes audit - experience from a UK children's hospital

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Introduction: We describe the process of improvement in service delivery and clinical outcomes using data from the UK National Diabetes Paediatric Audit (NPDA). The NPDA is an annual audit to which all paediatric diabetes units in England & Wales contribute to. Units are provided with performance measures for multiple healthcare processes.

Objectives: To demonstrate the use of the UK NPDA data to drive service improvement and clinical outcomes.

Methods: Following notification that our service was a national negative outlier for the 7 key health checks a service reform was undertaken (The 7 key checks are 4 HbA1c tests per year, annual BMI calculation, Thyroid function testing, Blood pressure measurement, Albuminuria, eye and foot screening). Data from the annual NPDA report was used to highlight areas of poor data collection, issues with data reporting and areas requiring additional clinical attention.

We redesigned our clinic structure to hold an annual review block at the beginning of the audit year, with other blocks for psychology screening and education. Screening tests are performed at the annual review clinic, allowing catch up testing later in the year for non-attendees.

Frequent uploading of data to the NPDA online platform allowed a real time review of our progress. This enabled a reactive approach to areas of shortfall in order to maximise opportunistic data collection and drive the creation of data networking to streamline external data capture.

Results: In the audit year following our service redesign, completion for the 7 key health checks has improved from 17.6% (43.5% nationally) to 59.1% (49.8% nationally).

Conclusions: Unit level data collected for the NPDA highlighted areas of clinical care and data capture requiring improvement. This information was used to redesign clinic structure and refine data capture. Unit level data since these changes were made has improved signifying improved care delivery.

P179
Differences in glycemic control and disease management by age and region in adults with type 1 diabetes (T1DM): the SAGE study

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Introduction: Most people with T1DM do not achieve HbA_{1c} targets, but this may vary with age and geography.

Objective: To examine diabetes control in people with T1DM by age group in Asia, Eastern Europe (EE), Western Europe (WE), Latin America (LA) and Middle East (ME).

Methods: SAGE was a multinational, cross-sectional study using data from medical records and interviews of participants aged ≥26 years with T1DM for ≥1 year. Here we assess HbA_{1c} target achievement, hypoglycemia, diabetic ketoacidosis (DKA) and therapeutic management of T1DM, in different regions by predefined age groups (26-44; 45-64; ≥65).

Results: Overall, the number of eligible participants ranged from 1150 in WE to 444 in ME, with 24% of patients achieving HbA_{1c} < 7 %. HbA_{1c} < 7 % achievement was highest in Europe and Asia (27-32%) in the youngest age group, but highest in Europe and LA (22-30%) in the older groups. In those aged ≥45 years, target achievement was particularly low (< 18%) in ME and Asia. In the youngest group, severe hypoglycemia incidence was lowest in Asia (8%). DKA incidence was highest in the 26 to < 45 and 45 to < 65 years age groups in WE (7%

	HbA_{1c}, %, mean (SD)	BMI, kg/m², mean (SD)	Achievement of HbA_{1c} <7 %, (%)	Patients with ≥1 severe hypoglycemia, (%)[a]	Patients with ≥1 episode of DKA, (%)[b]	Pump usage, (%)	Patient-driven titration recommendation, (%)	Long-acting basal insulin use, (%)	Frequency of basal insulin titration, (%)[c]
									>1 per week / <1 per month
Age 26 to <45 years									
EE, n=418	7.95 (1.58)	24.2 (4.00)	32.1	10.8	3.8	7.4	71.3	71.3	30.7 / 10.1
WE, n=540	7.72 (1.28)	25.3 (4.57)	27.8	12.3	7.1	48.1	69.7	48.0	27.2 / 32.0
LA, n=251	8.25 (1.77)	25.0 (4.17)	23.5	13.2	5.2	16.3	47.9	66.1	16.3 / 56.5
A, n=328	7.90 (1.58)	23.0 (3.87)	27.1	7.9	2.7	22.0	47.5	59.8	10.9 / 36.1
ME, n=187	7.96 (1.53)	24.8 (4.43)	23.5	14.4	3.7	4.8	31.0	74.3	14.8 / 36.8
Age 45 to <65 years									
EE, n=391	8.10 (1.45)	25.7 (4.29)	21.7	13.3	2.6	3.3	73.9	68.5	26.6 / 11.1
WE, n=454	7.72 (1.17)	26.2 (4.59)	25.1	12.1	7.7	42.5	67.5	53.5	28.9 / 28.4
LA, n=169	8.16 (1.57)	25.6 (4.04)	22.5	16.6	3.0	13.0	47.4	63.9	22.1 / 50.4
A, n=306	8.02 (1.18)	23.5 (3.95)	16.3	8.8	2.0	18.6	44.1	65.0	11.3 / 30.8
ME, n=192	8.45 (1.57)	27.4 (4.69)	16.1	12.0	2.6	2.6	24.0	68.2	14.6 / 32.5
Age ≥65 years									
EE, n=187	7.99 (1.29)	27.3 (4.16)	22.5	10.2	2.1	0.5	65.8	62.0	28.6 / 10.4
WE, n=156	7.60 (1.07)	25.3 (4.22)	29.5	13.5	2.6	28.8	71.0	66.7	34.0 / 25.5
LA, n=68	7.77 (1.17)	27.2 (4.48)	27.9	10.3	5.9	16.2	42.4	70.6	29.1 / 45.5
A, n=146	8.05 (1.24)	23.5 (4.41)	17.8	13.0	2.1	6.2	34.2	82.9	12.6 / 22.5
ME, n=65	8.26 (1.42)	27.0 (5.18)	13.8	18.5	4.6	0	26.2	60.0	12.0 / 28.0

[a]Within the last 6 months. [b]Hyperglycemia leading to DKA within the last 6 months. [c]Percentages among patients with basal insulin.
A, Asia; BG, blood glucose; DKA, diabetes ketoacidosis; EE, Eastern Europe; LA, Latin America; ME, Middle East; SD, standard deviation; WE, Western Europe

[Table. SAGE outcomes by age group and geographical region]

and 8%), where insulin pump use was most common (48% and 43%). Patient-driven titration of any insulin was most common in Europe (66-74%) and least common in ME (24-31%), in all age groups. Long-acting insulin analog usage was common (48-83%) in all regions and age groups. Basal insulin titration was most frequent in Europe and least frequent in LA.

Conclusions: SAGE identified suboptimal glycemic control in people with T1DM across all age groups and regions analyzed. Europe and Asia had higher rates of HbA_{1c} < 7 % achievement. Europe also had higher DKA incidence, while Asia had the lowest severe hypoglycemia incidence. Differences across ages and regions could be related to variations in glycemic targets, T1DM management, as well as cultural and healthcare system-related factors.

P180
Improved average HbA1c and increased proportion of patients with HbA1c < 58 mmol/mol after 18 months of structured and focused work with simple and affordable tools in a multidisciplinary diabetes team in Oslo, Norway. Experiences from a quality improvement project

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Introduction: At the pediatric department, Oslo University Hospital (OUH), Norway, 253 patients (0-18 years) with T1D is followed by a multidisciplinary team, consisting of paediatricians, diabetes nurses, psychologist, dietician and social worker. In Nov. 2017 The Norwegian Childhood Diabetes Registry invited to a quality improvement project based on the plan-do-study-act model (PDSA), and OUH were among the teams drawn to participate. The team accepted the invitation with a desire to work structured and targeted in order for the patients to reach a better metabolic control.

Objectives: The team defined three objectives:

< 5 % of patients HbA1c > 75 mmol/mol

> 70 % of patients HbA1c < 58 mmol/mol

> 90 % of patients to use bolos-calculator as a tool when dosing insulin.

Methods: All new initiatives had to be anchored in the PDSA-model. All team-members worked with common goals and equal focus during consultations. Among the tools in use were a new treatment form used in every consultation to collect precise information, increased focus on pump-settings, CGMs and average glucose level and internal training of doctors and nurses not being direct members of the diabetes team.

Results: At baseline, the average HbA1c among all patients was 65 mmol/mol. 15 % of patients had HbA1c > 75 mmol/mol, 37 % had HbA1c < 58 mmol/mol and 19 % used bolus-calculator when dosing insulin. 18 months later (Apr. 2019), the average HbA1c had fallen to 57 mmol/mol and the proportion of patients with HbA1c > 75 mmol/mol and < 58 mmol/mol had declined to 9 % and increased to 56 % respectively. 76 % of all patients were using bolus-calculator.

Conclusions: Even though the objectives were not reached, we observed a considerable improvement in metabolic control. Our experiences show that substantial improvement of care can be reached in multidisciplinary diabetes teams with simple and affordable tools if common goals are established and the attempts to reach the goals are structured and focused.

P181
Three-variate trajectories of metabolic control, body mass index, and insulin dose: heterogeneous response to initiation of pump therapy in type 1 diabetes youth

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Objectives: Identify unique three-variate patterns of HbA1c, age/sex-standardized body mass index (BMI-SDS) and daily insulin dose among pediatric subjects with T1D after initiation of CSII.

Methods: 4,826 youths with T1D (≤20 years; 48% boys; median age at T1D onset 5.9 [Q1;Q3: 3.5; 8.4] y.) from the diabetes follow-up registry DPV with diabetes duration ≥3 y. at CSII initiation and continuously documented CSII therapy over three years were included. Measurements were aggregated quarterly. Subjects with < 7 values of aggregated HbA1c, BMI-SDS, and insulin dose during observation period were excluded. Change in HbA1c, BMI-SDS, and insulin dose were defined as the value at the respective time-point minus baseline value. We applied group-based multitrajectory modeling, a generalization of the group-based trajectory approach, to identify latent groups of individuals following similar developmental curves over time across multiple variables.

Results: Four groups of diverging HbA1c, BMI-SDS, and insulin dose patterns were identified during the three-year observation period after CSII initiation (Tab1). Group 1 (12%) was characterized by HbA1c increase, insulin dose reduction, and stable BMI-SDS. High increase in HbA1c, decrease in BMI-SDS, and stable insulin dose was found in group 2 (39%). Increasing HbA1c, highly increasing BMI-SDS and stable insulin dose were observed in group 3 (32%). Youths with highly increasing HbA1c, and both increase in BMI-SDS and insulin dose were found in group 4 (17%). Age at diabetes onset, age at CSII initiation, sex

Group [N (%)]	Group 1 [557 (12)]	Group 2 [1909 (39)]	Group 3 [1545 (32)]	Group 4 [815 (17)]	P value
HbA1c change	Increase	High increase	Increase	High increase	
BMI-SDS change	Stable	Reduction	High increase	Increase	
Daily insulin dose change	Reduction	Stable	Stable	Increase	
Boys, %	45	53	42	52	<0.001
Age at diabetes onset, years	7.7 [5.1; 10.1]	4.9 [3.0; 7.5]	6.1 [3.7; 8.7]	6.5 [4.5; 8.5]	<0.001
Age at pump initiation, years	14.5 [13.1; 15.7]	11.0 [8.9; 13.7]	12.9 [10.8; 14.4]	12.7 [11.3; 14.0]	<0.001
Baseline HbA1c, %	7.7 [7.0; 8.7]	7.4 [6.8; 8.1]	7.8 [7.2; 8.8]	7.7 [7.1; 8.6]	<0.001
Baseline BMI-SDS	0.52 [-0.06; 1.00]	0.40 [-0.15; 0.93]	-0.01 [-0.56; 0.55]	0.26 [-0.27; 0.84]	<0.001
Baseline daily insulin dose, IU	72 [60; 86]	34 [23; 50]	44 [31; 57]	39 [29; 50]	<0.001

[Group-specific characteristics of the three-variate trajectory groups]

and baseline HbA1c, BMI-SDS and insulin dose were related to group membership, while migration background did not differ.

Conclusions: Heterogeneous three-variate trajectories of HbA1c, BMI-SDS, and insulin dose change after initiation of CSII were identified in youths with T1D. Differences between groups were identified allowing a more personalized treatment recommendation.

P182
The use of alternative and complementary medicine in children with type 1 diabetes mellitus

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Objectives: The use of alternative and complementary medicine (CAM) is common among children with chronic diseases, and its utilization is probably increasing in certain cultures. The effect of CAM usage on glucose metabolism and T1D metabolic control, its efficacy and safety and possible adverse effects are mostly unknown. The aim of this research was to assess the prevalence and types of CAM therapies used among T1D children in our institution and the reasons for their use.

Methods: A cross-sectional study was conducted using structured questionnares in 150 parents of T1D patients with disease duration more than 1 year. Anonymous survey was collected in a period of 3 months during regular follow-up at outpatient clinic of Department of Pediatrics, University Hospital Center Zagreb.

Results: A total of 128 participants completed questionnaires (mean patient age 12.6±3.6 years; 79M, 49F). The use of CAM was reported in 15.6% patients (20/128; 10M/15F). No significant difference was found between CAM users and non-users regarding patients´ age (CAM 12.2±3.8 vs. nonCAM 12.6±3.6 yrs), metabolic control (average HbA1c CAM 7.6%±1.2 vs. nonCAM 7.7%±1.3), duration of diabetes (CAM 5.7±2.9 vs. nonCAM 5.7±3.8 yrs), parental educational level and average family income. None of the patient discontinued insulin therapy during CAM usage. Most patients (65%) did not report CAM usage to their diabetologist. Although only 50% believed therapy was useful, 70% reported they would use it again.

Conclusion: The frequency of CAM usage in our study was low, which might be explained with better education, empowering patients' efficacy in treating diabetes and confidence in conventional medicine, but underreporting of usage cannot be excluded. Although reported positive effect on diabetes regulation was minor, patients disclosed satisfaction with CAM usage. Diabetologists should be aware of CAM usage among T1D patients and should try to discuss it openly and give proper information.

P183
Quality or quantity? Findings from the national paediatric diabetes audit (NPDA) workforce survey show increased staff numbers are not associated with unit level improvements in glycaemic outcomes in England and Wales

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Objectives: Investment in paediatric diabetes teams has led to marked improvements in HbA1c in England and Wales over the last 8 years. The objective was to explore the influence and changes that workforce numbers might have to delivery of care and outcomes.

Methods: A workforce audit was performed from 173 centres participating in the NPDA in March 2018. Staffing ratios were calculated per MDT specialty member and univariate regression models constructed to examine associations between the mean HbA1c and total and profession specific staffing levels. Results were compared to a previous survey in 2014.

Results: Between 2014 and 2018 total staffing increased from 24.4 to 30.5 whole time equivalents (WTE) per 1000 children and from 15.5 to 33.5 in England and Wales respectively. Overall staffing increases have been accompanied by improvements in median HbA1c

from 66.5 mmol/mol in 2014 to 64 in 2018. However higher service level staffing ratios were not associated with lower HbA1c in both surveys. The numbers of diabetes nurses and dietitians compared favourably to ISPAD recommendations whereas numbers of paediatric diabetologists/endocrinologists and psychologists were below recommended levels. One in four diabetes nurses are prescribers and 54.9% of units employed at least one specialist diabetes nurse who was a nurse prescriber. There was a statistically significant difference in mean adjusted HbA1c in services where a nurse prescriber was employed - 67.1 mmol/mol vs 68.4 mmol/mol (P = 0.0209).

Conclusions: Overall staff numbers have increased and at the same time improvements in HbA1c outcome in England and Wales have occurred. However, service level workforce numbers are not correlated with HbA1c outcome. Nurse prescribers are beneficial to outcome. Other service level factors such as consistent educational messages and how services utilise their workforce needs further exploration.

P184
Associations between goal setting behavior and changes in HbA1c among youth with type 1 diabetes in the flexible lifestyle empowering change (FLEX) Intervention

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Introduction: Youth with type 1 diabetes (T1D) commonly do not meet HbA1c targets.

Objectives: To inform future trials and treatment strategies, this exploratory analysis examined how various goal setting behaviors may benefit or hinder achievement of glycemic control targets.

Methods: Detailed goal setting data were available for a random subset (N=39) of youth (13-16 years, T1D duration >1 year, HbA1c 8-13%) in the intervention arm (N=130) of the Flexible Lifestyle Empowering Change (FLEX) Intervention. FLEX was an 18-month trial that tested an adaptive behavioral intervention emphasizing motivational interviewing and problem-solving skills training to improve HbA1c. We employed inductive coding of goals set during intervention sessions, generating 8 goal categories: blood glucose, continuous glucose monitoring (CGM), insulin, carbohydrate counting, family, parent-child, other diabetes-specific and not diabetes-specific. Multiple types of goals or no goal could be set per session. Predictors included frequency, diversity, and combinations of goal types. Linear and logistic regression examined associations between goal setting and continuous (endline HbA1c, %) and binary (≥0.5% increase/decrease in HbA1c) outcomes.

Results: Adjusted for baseline HbA1c, increasing CGM goals by 1 was associated with a 0.4% decrease in endline HbA1c (p=0.02). Further, a 1 instance increase in setting CGM and insulin goals together was associated with a 0.8% decrease in endline HbA1c (p=0.01). Setting at least 1 CGM goal did not differ significantly between those who ever used a CGM (9/16) and those who never used a CGM (8/23) in the past 30 days (p=0.19).

Conclusions: Results suggest CGM goals are not just a proxy for CGM use but may also represent skills and traits developed throughout the goal setting process that may contribute to HbA1c improvement. Findings highlight the importance of further trials that test various goal setting approaches to improve glycemic control.

P185
The PolPedDiab HbA1c study: the results of the first national survey among children with type 1 diabetes in Poland

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Introduction: Despite great therapeutic advancements, majority of children with type 1 diabetes (T1D) presents unsatisfactory diabetes control. This creates a need for systemic improvements in diabetes care system.

Objective: The PolPedDiab HbA1c Study, supported by the Diabetes Poland, is the first nationwide study to evaluate glycemic control in young patients with T1D in Poland.

Methods: PolPeDiab HbA1c Study invited all pediatric diabetes care centers in Poland. During one week (March 2018), each outpatient at the age < 18 years treated for T1D ≥1 year provided capillary blood sample and had a clinical questionnaire filled by the doctor. The samples and questionnaires were blinded and sent to the coordinating center, where HbA1c was measured by HPLC.

Results: The study recruited approximately 8% of the Polish pediatric population with T1D [N= 902, 52% boys, mean age 12.3 years (95% CI: 12.1-12.6), mean diabetes duration 5.3 years (5.1-5.6)]. Majority (80%) were treated with continuous subcutaneous insulin infusion (CSII), 26.5% used some type of continuous glucose monitoring (CGM). Mean HbA1c in the studied group was 7.35% (7.27-7.42), 45.2% of the children achieved the target level according to the ISPAD Guidelines (< 7.0%). Independent risk factors for not achieving HbA1c target value included age [OR= 1.05 (1.01 - 1.10)], diabetes duration [OR= 1.09 (1.04 - 1.14)], BMI z-score [OR= 1.20 (1.02 - 1.40)] and daily insulin dose [OR= 2.09 (1.11 - 3.96)]. CGM use was the only protective factor [OR=0.36 (0.26 - 0.50)]. Among the patients who did not use CGM (N=653), number of daily measurements was associated with in-target HbA1c [OR=0.91 (0.85-0.98)]. CSII had no significant effect on metabolic control [OR=0.82 (0.59 - 1.13)].

Conclusions: Nearly half of Polish children with T1D achieved the HbA1c target level according to the ISPAD recommendation. HbA1c can be improved by reducing BMI, modifying insulin treatment and using CGM.

Poster Tour 20 - Diabetes Care and New Therapeutics

P186
Effects of switching from insulin glargine to insulin degludec in patients with type 1 diabetes, a hospital based study in Muscat, Oman

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Insulin Degludic is ultra-long acting insulin, which is known for its more stable pharmacodynamic profile.

Objective: To analyse retrospectively the self-blood glucose monitoring profile, HbA1c, and episodes of nocturnal hypoglycemia before and 6 months after switching from insulin glargine to insulin degludec (Ideg) in children and adolescents with Type1 DM.

Subjects: 36 children and adolescents, (21 females, 58%, 15 males, 42%) with age variance of 14.4 years (6.7-17.8) with diabetes duration variance of 4.9 years (2.6-9.4), managed and followed up on an outpatient basis in a hospital based paediatric endocrine clinic.

Method: A pre and post switch analysis was conducted looking into the effect of the switch, in a basal bolus regime. The basal insulin was changed for the following reasons: Either the SMBG profile showed high pre-meal BG levels (n=12, 33.3%) or the profile was high in the 6 hours prior to the next basal insulin dose (n=18, 50%) or there were episodes of nocturnal hypoglycemia, BG < 3 mmol/L, (n=6, 16.7%).

Results: There was improvement in the SBGM profile of subjects with high pre-meal BG values or high BG in the 6 hours before the next basal insulin dose. The HbA1c after the switch showed significant improvement. The mean HbA1c before was 9.3 (95 % CI: 8.8 - 9.9) vs a mean of 8.7 (95% CI: 8.3-9.2) with a P value < 0.001. Only one child had HbA1c < 7.5 g% before the switch vs 10 children after. The episodes of nocturnal hypoglycemia (1-3 episodes per weeks) resolved completely in all 6 subjects who had them.

Conclusion: Switching to Ideg from insulin glargine in children with pre-meal hyperglycemia, or hyperglycemia in the 6 hours prior to the next glargine dose or episodes of nocturnal hypoglycemia could result in better glycemic control and resolution of the hypoglycemia. In our setup, this has been associated with an increase in the total daily insulin dose 6 months later.

P187
The type 1 diabetes composite score: an innovative metric for measuring patient care outcomes beyond HbA1c

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Introduction/Objectives: Patient outcomes resulting from optimal type 1 diabetes (T1D) care has historically focused on driving a single metric, HbA1c. Our objectives were to design and test an aggregate clinical indicator that comprehensively reflects overall patient management status beyond HbA1c. This metric could also be used to focus improvement efforts within our diabetes program.

Methods: The Type 1 Diabetes Composite Score (T1DCS) aggregates multicomponent outcome indicators into a composite score that reflects overall diabetes care status for each patient. Elements of optimal diabetes outcomes, as defined by current ADA and ISPAD guidelines, were compiled into 9 indices over three categories for scoring: (1) Diabetes Care Assessment (2) Management Tool Use and (3) Complications Risk. The T1DCS aggregates these patient outcome values and tracks them over a given time period. A higher score reflects better care management and overall improved patient health. We utilized our electronic medical record (EMR)-based diabetes registry and its population health modules to design and build this diabetes care metric for our T1D population.

Results: We successfully launched this metric build in 2018, and applied the scoring to our large T1D population. The T1DCS is calculated to reflect the relative value of each clinical indicator when evaluating each patient, and the score easily provides the patient and provider a summary of current diabetes care status. Utilizing this metric we have been able to improve our care delivery system, enhance decision support, and facilitate pre-visit planning.

Conclusions: The T1DCS is a useful metric to evaluate the clinical status of our patients, assess the capability of our program to achieve optimal diabetes outcomes, identify diversity opportunities, and document outcome improvement across a broad range of domains.NT

The Type 1 Diabetes Composite Score (T1DCS)

	Definition	*Optimal Scoring/ Goal*
Diabetes Care Assessment		
• Diabetes Clinic Visits	Number of Clinic visits attended in previous rolling 12 months	At least 4 visits per year
• Acute Care Visits	Number of Emergency Department visits or Inpatient Admissions in previous rolling 12 months	No ED/Inpatient visits
Management Tools		
• HbA1c	Most recent HbA1c	ADA Goal of 7.5% or below
• Continuous Glucose Monitoring	Recent CGM use	Active regular CGM use
Complications Risk		
• Lipids: LDL	LDL value in most recent Lipid profile	LDL ≤100 mg/dL
• Urine Microalbumin Ratio	Urine microalbumin ratio value in most recent urine screening	Negative microalbuminuria (Urine microalbumin <0.030 mg/mg Cr)
• Hypertension Screening: blood pressure (BP)	Most recent blood pressure measurement	BP results <95th percentile for age, sex and height
• Severe Hypoglycemia	Episodes of severe hypoglycemia (as defined by seizures, loss of consciousness or requiring assistance with treatment) since the previous clinic visit	No episodes of severe hypoglycemia
• Overt Complication Diagnosis	ICD-10 Visit Diagnosis related to diabetes complications of retinopathy, nephropathy, neuropathy	No complication-related diagnoses

[T1D Composite Score]

P188

Basal insulin to total insulin dose proportion and glycemic control in children and adolescents with type 1 diabetes in Poland

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Introduction: Studies suggest that a lower proportion of basal insulin to total insulin dose (BD/TD) may positively impact glycemic control in patients with type 1 diabetes (T1DM).

Objectives: The aim of the study was to assess BD/TD in children and adolescents with T1DM and analyze its potential relation with chosen clinical parameters, including glycemic control.

Methods: The study retrieved records of pediatric patients from the Nationwide PolPeDiab HbA1c Study (age < 18 years old, T1DM duration >1 year, no change of treatment model during last 6 months) for whom complete information regarding BD/TD was available. The group comprised 876 patients (51.94% male) aged 12.3 ±3.7 years with T1DM duration of 5.3 ±3.3 years. In the cohort, 702 children (80.14%) were treated with personal insulin pumps, the rest used multiple daily injections. Continuous glucose monitoring (CGM) was used by 242 (27.63%) patients.

Results: Mean HbA1c in the studied group was 7.3 ±1.1%. Total daily insulin dose was 0.8 ±0.2 Units/kilogram of body weight and mean BD/TD was 36% ±11%. BD/TD was significantly higher in females than in males (38 ±11% vs 35 ±11%, p< 0.001). BD/TB was independent from treatment type (pump vs multiple injections) and use of CGM. We revealed weak correlations between BD/TD and age (r=0.18, p< 0.001), T1DM duration (r=0.13, p< 0.001), HbA1c (r=0.07, p=0.027), TDI (r=0.24, p< 0.001), and body mass index standard deviation score (r=0.12, p< 0.001). The multivariate analysis did not confirm the significant association between HbA1c and BD/TD after adjusting for these factors (p=0.1456).

Conclusions: In the investigated cohort the BD/TD met the recommendations by Diabetes Poland (PTD Guidelines). Among pediatric patients with T1DM with relatively good metabolic control the association between BD/TD and HbA1c seems to be clinically insignificant.

P189

The impact of a team based quality improvement initiative on clinic HbA1c levels in a large UK paediatric diabetes service

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Introduction: Annual audit of our clinic HbA1c in type 1 diabetes (T1DM) patients demonstrated little improvement over 3 years (median HbA1c 65mmols:2016, 65mmols:2017 and 64mmols:2018) despite increasing insulin pump and CGM use, mirroring the national trend (static median HbA1c 64mmols, 2017 and 2018, National Paediatric Diabetes Audit). Quality improvement (QI) initiatives may provide an opportunity deliver further HbA1c reductions.

Objectives: Evaluate the impact of a QI initiative on clinic HbA1c in T1DM patients in a UK children's hospital.

Methods: in January 2018 all team members were involved in a detailed review of service care delivery and outcomes with workshops to agree shared team purpose, treatment targets and areas for development. Improving HbA1c through patient education was identified as a core work stream. Annual clinic HbA1c (all T1DM patients) was measured the year before and year of the initiative. CGM and insulin pump use were also measured as potential confounding variables.

Results: Multiple enhancements to current practice were developed and implemented iteratively by the whole team through fortnightly QI meetings. Examples include clear streamlined new diagnosis education, structured insulin adjustment training and an 'information prescription' used in clinic. Impact of change was monitored through monthly median clinic HbA1c measurement. Annual clinic HbA1c in 2018 was median 64mmol, mean 67mmol (411 patients) falling by 2019 to median 61mmol, mean 64mmol (413 patients), with CGM use in 2018:16% and 2019:22% and insulin pump use in 2018:44%, 2019: 43%.

Conclusions: Embedding QI methodology in service development with interventions targeting patient education can improve clinic HbA1c. A whole team approach, clear and consistent targets and real time data review are important factors for success. Increased CGM use is unlikely to have contributed significantly as this correlation has not been observed previous years.

P190

Use of home and ambulatory blood pressure monitoring in the SWEET diabetes centers: an international SWEET database survey

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Introduction: For the accurate diagnosis and management of hypertension in adults out-of-office blood pressure evaluation using ambulatory (ABPM) or home monitoring (HBPM) is currently recommended.

Objectives: To assess the application of ABPM and HBPM in SWEET centers for hypertension evaluation in children and adolescents with diabetes.

Methods: A questionnaire was distributed in 78 centers of the SWEET international consortium (reference centers for children and adolescents with diabetes) aiming to evaluate the clinical use, indications, methodology and devices of ABPM and HBPM in children with diabetes.

Results: Fifty-one centers responded (equivalent to 50,495 diabetic patients in the SWEET database). ABPM is used in 34/51 centers (32 with easy access, 25 referring children to expert centers). Among 17 centers which do not use ABPM, 9 declared lack of insurance cover. Most common indications for ABPM were suspected hypertension, suspected white coat hypertension and microalbuminuria. Twenty-three centers performed ABPM in school days, 14 in weekends, 7 during hospital admission. Seven centers used fixed daytime and nighttime intervals and 22 the individuals' awake and sleep times. HBPM is used in 18/51 centers for diagnosis and follow-up. Of these 18 centers, 7 centers recommend 7-day HBPM (the rest 1-30-day HBPM), 12 recommend HBPM twice/day, 11 two measurements per occasion, 15 morning and evening, 16 recommend upper arm electronic devises, 4 used also manual auscultatory devices (2 did not clarify), 14 used validated devices (7 validated in children).

Conclusions: ABPM which is the gold standard for hypertension diagnosis in children is used in 2/3 of pediatric diabetes centers. HBPM which has a secondary role mainly for following children with treated hypertension is less widely used. Both methods are often inadequately applied. Wider implementation and harmonization of ABPM and HBPM methodology among centers according to current guidelines is needed.

P191
Blood pressure methodology in the SWEET Diabetes Centers: an international SWEET Database survey

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Introduction: Hypertension is a major modifiable cardiovascular risk factor and early diagnosis and management is crucial in subjects with diabetes. Accuracy of blood pressure measurement (BPM) is a prerequisite for the reliable diagnosis and management of hypertension.

Objectives: This study aims to evaluate the BPM methodology and technology used among SWEET centers according to the current pediatric hypertension guidelines.

Methods: A questionnaire was distributed in 78 centers of the SWEET international consortium (reference centers for children and adolescents with diabetes) aiming to evaluate the BPM methodology (frequency, setting, resting period, body position, talking during BPM, number of measurements) and BPM technology (device type, validation, cuff use). A grading score was developed to evaluate centers for overall BPM performance (highest score 4) representing the sum of the score for methodology (highest score 2) and that of technology (highest score 2).

Results: Fifty-one centers responded (equivalent to 50,495 diabetic patients in the SWEET database). The mean score (SD) for BPM methodology was 1.45 (0.25) and for technology 1.59 (0.33). The overall BPM performance score was 3.03 (0.42). Twenty-six centers (51.0%) had total score ≥3 and 25 ≥2. No center had score < 2. Thirty-six centers used automated BPM devices, 12 auscultatory and 3 both. Most centers (43/51) used cuff sizes properly. However, of 36 centers that used automated devices, only 14 (38.9%) used devices specifically validated in children and 15 (41.7%) used devices validated in adults.

Conclusions: The majority of the SWEET centers appear to use proper BPM methodology and technology. However, further BPM improvement and harmonization among centers is necessary.

P192
Real-world evidence in type 1 diabetes (T1D): glycemic control and disease management of persons with T1D from global registries

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Introduction: Poor glycemic control in persons with type 1 diabetes (T1D) is associated with long-term complications including retinopathy, renal disease, neuropathy and cardiovascular disease. Currently, there is limited real-world data on the characteristics, disease management and glycemic control of persons with T1D.

Objective: To provide an overview of the T1D population, based on data from global diabetes registries.

Methods: Review the characteristics (age; duration of diabetes), glycemic control (HbA_{1c} levels; proportion of people achieving HbA_{1c} target; frequency of severe hypoglycemia) and disease management of persons with T1D, from recent T1D EXCHANGE, TriNetX, TEENS and SAGE disease registries in children, adolescents and adults.

Results: Most children and adolescents with T1D did not achieve defined HbA_{1c} targets of < 7.5 % (mean HbA_{1c} 8.5-9.1 %); mean HbA_{1c} levels tended to be higher in children and adolescents compared with adults. The frequency of severe hypoglycemia and diabetic ketoacidosis (DKA) was low across all registries analyzed (3-12% and 3-6%, respectively). Insulin pump and continuous glucose monitoring (CGM) usage

was highest in the USA (63% and 30%, respectively) compared with other regions. Strategies for diabetes management appeared to vary between registries; however, this information was not reported consistently.

Conclusions: In the global T1D population, mean HbA_{1c} levels remain particularly high in children and adolescents. Target achievement is suboptimal, while the frequency of severe hypoglycemia and DKA is low. Information on management strategies was not reported consistently among these registries, highlighting that a consistent approach to data capture is needed to enable a better understanding of T1D management and find ways to improve treatment and bridge the gaps between regions across the world.

	T1D EXCHANGE USA (N=22,697)	TrialNetX USA (N=15,644)	TEENS Europe, Middle East/Africa, India, Latin America, South Africa, USA (N=5887)	SAGE Asia, Eastern Europe, Western Europe, Latin America, Middle East (N=3858)
Age, years				
Mean (SD)	26 (18)	13 (4)	15 (4)	47 (14)
Range	1 to 93	<6 to 17	8 to 25	26 to 90
Mean age at diagnosis, years (SD)	NR	10 (6)	NR	NR
Mean HbA_{1c}, % (SD)	7.7 (1.2) to 9.2 (1.9)	9.1 (2.3)	8.5 (1.8)	8.0 (1.4)
HbA_{1c} target, %	<7.5	NR	<7.5	<7.0
Proportion of people achieving HbA_{1c} target, %	~19[a]	NR	27.5[b]	24.3[c]
Diabetes management, %				
Basal bolus insulin	NR	NR	69	69
Injection/pens	NR	NR	NR	80
Insulin pump	63	17	24	20
CGM	30	4	NR	23
Incidence of severe hypoglycemia, %	6[d]	NR	3	12
Incidence of DKA, %	3	NR	6	4

[a]17% and 21% of participants aged <18 and ≥18 years achieved HbA_{1c} target <7.5 %. [b]HbA_{1c} target <7.5 % for ages 8–18 years; <7.0 % for ages 19–25 years. [c]HbA_{1c} target <7 %. [d]Subset of participants with data (n=11,061).
CGM, continuous glucose monitoring; DKA, diabetic ketoacidosis; NR, not reported; SD, standard deviation

[Table. Comparison of persons with T1D in global diabetes registries]

P193
A goup curriculum for teens with type 1 diabetes (T1D) improves transition readiness and diabetes self-efficacy: results of a pilot randomized controlled trial (RCT)

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Objectives: Inadequate preparation for transition to adult diabetes care is associated with adverse outcomes in T1D. There is need for innovative approaches for transition preparation and self-care engagement. We conducted a 9-month RCT to evaluate a group education curriculum, adjunct to standard care, on self-care adherence and transition readiness in teens with uncontrolled T1D.

Methods: Self-Management, Adherence and Readiness for Transition in T1D (SMART T1D) included 3 modules delivered in evening groups by pediatric nurses. Teens with T1D (N=40, 50% male, 85% white, age 15.7±1.2 yrs, T1D duration 6.4±3.9 yrs, A1c 9.5±1.2%; 63% pump users) were randomized to SMART T1D (n=20) or an attention control group (n=20) receiving 3 educational e-newsletters. Primary outcome was diabetes self-care adherence (SCI-R) score change from baseline to closeout; secondary outcomes included A1c, diabetes transition readiness (RISQ), self-efficacy (DMSE), burden (PAID), and quality of life (QoL, Peds-QL diabetes module).

Results: Groups were similar at baseline; 19/20 per group completed the study. In intent-to-treat analysis, paired t-tests (1-sided) showed A1c improved in SMART T1D (-0.33%, p=.06) but not controls (+0.01%, p=.45). The SMART T1D group significantly improved their transition readiness (+3.71, p=.02 vs. +1.97, p=.11 controls) and self-efficacy (+8.32, p=.02 vs. +1.04, p=.37 controls). There were no significant changes in self-care adherence, diabetes burden, or QoL in either group. SMART T1D feedback was highly positive; 88% endorsed agree/strongly agree to recommend it to other teens and 65% endorsed increased interest in transition.

Conclusions: The SMART T1D intervention improved transition readiness and diabetes self-efficacy without increased burden in teens with T1D, with a trend towards improved A1c in this pilot sample. Future longer and larger studies can assess generalizability and alternative delivery models and examine impact on self-care and A1c.

P194
What is the best approach to implementing a National Paediatric Diabetes Audit in Ireland? A realist synthesis of existing evidence

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Objectives: There is a need for a National Paediatric Diabetes Audit (NPDA) in Ireland. National comparative clinical audits improve clinical care and reduce inter-service variability. Several national adult and paediatric diabetes audits have been successfully implemented internationally. However, national audits are large-scale projects requiring a context-specific approach to implementation. To inform the optimal approach to implementing a NPDA in Ireland, we conducted a realist review of the use of national comparative audits in clinical practice.

Methods: We conducted a realist synthesis as per RAMESES guidelines. International empirical evidence, stakeholder interviews, and informal stakeholder meetings were used to develop preliminary programme theories. These were expressed in context-mechanism-outcome configurations. We tested these theories against empirical evidence, following the remaining realist review steps: searching for evidence, appraising primary studies and extracting data, synthesising evidence, sharing conclusions, and implementing recommendations.

Results: Evidence examined included six stakeholder interviews, 37 empirical studies, and policy documentation on 46 national audits. A refined programme theory explained how, why, and in what contexts national clinical audits are successfully implemented in clinical practice. Relevant contextual factors include robust governance structures, clear data feedback mechanisms, and the use of outcomes-based commissioning. Within busier clinical environments, audit tools that prioritise efficiency work well. Stakeholder engagement with the audit process is higher when distributed leadership and collaborative design are emphasised. Perceived unfair processes or lack of data credibility impede successful audit implementation.

Conclusion: This realist review provided a blueprint for paediatricians and policy-makers tasked with implementing the first national paediatric diabetes audit in Ireland.

Poster Tour 5 - Diabetes Care and New Therapeutics

P195

Glucose management indicator is individually assessed by the hemoglobin glycation phenotype using the ratio of glycated albumin to HbA1c

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Introduction: Continuous glucose monitoring (CGM) has increased to use for better awareness of glycemic control. Mean sensor glucose value (SG) from CGM may estimate HbA1c (eA1C) level with some difference from the consistently measured HbA1c, so that glucose management indicator (GMI) has been proposed for the assessment. We have recently suggested that the ratio of glycated albumin to HbA1c (GA/A1C ratio) can individually reveal a glycated hemoglobin phenotype.

Objectives: We aim to clarify that the individual discrepancy between eA1c and measured HbA1c can be assessed by the GA/A1C ratio.

Methods: Japanese pediatric participants with type 1 diabetes (T1D; n=115) using CGM more than 2 week were enrolled to measure HbA1c and glycated albumin (GA) within one month. Correlation between eA1C and glycemic markers (HbA1c and GA) was obtained, and the difference between eA1c and measured HbA1c was evaluated for the correlation with GA/A1C ratio (reference ranges in Japanese T1D children and adolescents are 6.75±0.60 in IFCC or SI unit and 2.96±0.25 in NGSP or % unit).

Results: The correlations between eA1C and HbA1c and between eA1C and GA were significant (HbA1c (mmol/mol) =0.188×SG+29.5, r=0.60, p< 0.0001) and GA (mmol/mol) =1.26×eA1C+182.8, r=0.71, p< 0.0001, respectively). GA/A1C ratio was significantly correlated with the difference between eA1C and HbA1c (r=−0.57, p< 0.0001 in IFCC unit and r=−0.39, p< 0.0001 in NGSP unit).

Conclusions: As we expected, GA showed stronger correlation with eA1C than HbA1c did because of the difference in life span between GA and HbA1c. Nevertheless the GMI, discrepancy between eA1C and measured HbA1c, may be significantly influenced by the hemoglobin glycation phenotype using GA/A1C ratio that was more accurate in IFCC unit than in NGSP unit.

P196

Improving the transition to adult care for adolescents with type 1 diabetes: effect of transition readiness, self-efficacy and diabetes distress on glycemic control during transition

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Aim: To determine whether self-efficacy, transition readiness or diabetes distress are associated with glycemic control (HbA1c) among adolescents with T1D during the transition period.

Methods: Cross-sectional study of adolescents (ages 17 years) with T1D followed at the Montreal Children's Hospital diabetes clinic. Adolescents were recruited during the year prior to transfer to adult care and completed validated questionnaires on self-efficacy, transition readiness (TRAC) and diabetes distress (T1-DDS).

Primary outcome: Mean HbA1c (%) during the year prior to transfer. To analyse the association between our exposures and HbA1c, we used Pearson correlation and Chi Square test.

Results: We recruited 74 adolescents with T1D (29 male, 39.2%). Mean age (±SD) at diagnosis was 9.1 (±4.0) years and age at transition (last pediatric diabetes visit) was 17.9 (±0.2) years. Mean diabetes duration was 8.5 (±4.0) years. Mean HbA1c was 8.88% (±1.33%). Six adolescents (8.1%) had HbA1c ≤7.5%, 39 (52.7%) between >7.5- < 9.0 % and 29 (39.2%) ≥ 9.0 %. Twenty-eight adolescents (37.8%) had TRAC scores ≥8, indicating transition readiness and 10 (13.5%) had T1-DDS total scores ≥3, indicating diabetes distress. Transition readiness was associated with lower HbA1c (r=-0.34, p=0.003). Amongst those with poor glycemic control (HbA1c >9.0), 50% were not ready for transition compared with 21% deemed ready for transition (p=0.015). 80% of adolescents with diabetes distress had poor glycemic control compared with 33% without diabetes distress (p=0.004). Higher self-efficacy scores were associated with lower HbA1c (r=-0.29, p=0.012).

Conclusion: Efforts to improve healthcare transition should focus on improving self-efficacy and transition readiness while addressing diabetes distress so as to support adolescents in developing their autonomy and in preparing them for an adult model of care.

P197

National quality indicators and surveillance of staffing levels in paediatric diabetes care: a regional UK audit 2010-2018

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Introduction: The prevalence of diabetes continues to rise worldwide placing an increasing burden on the national health service. In 2012 a Best Practice Tariff (BPT) was introduced in the UK and a National Peer Review Quality Assurance Programme was developed to drive improvements in diabetes care for children and young people. Our audit from 2010-2018 aims to explore trends in paediatric diabetic care within the North West Diabetes Network and assess the impact of national quality initiatives.

Methods: Data was collected from a national survey from each of the 24 paediatric diabetes units (PDU) in the UK north west region for staffing levels. HbA1c outcomes were extracted from the National Paediatric Diabetic Audit (NDPA) for 2010-2019. We compared staffing levels with mean HbA1c and percentage of patients with HbA1C < 58mmol/mol.

Results: There was a significant increase in staffing levels following BPT for administrative staff ($p < 0.01$), consultants ($p= 0.05$), dieticians ($p< 0.01$), specialist diabetes nursing staff ($p< 0.01$) and psychologists ($p< 0.01$) across the network from 2010 to 2014. However, between 2014 to 2019, there was only a significant increase in staffing for administrative support ($p=0.04$). The mean HbA1C and percentage of patients with HbA1C < 58mmol/mol were significantly improved each year between 2010 to 2014 but not from 2014 to 2018.

Conclusion: The audit shows that the driving force to produce better health outcomes does not solely depend on staffing levels of PDUs. In 2019, a UK National Quality Improvement Collaborative Programme was developed to support PDUs to transform their service using proven quality improvement methodologies. Tracking of national quality indicators and surveillance of staffing levels are essential in further understanding the role that quality initiatives play in driving better outcomes for diabetes care.

P198
Improving outcomes in type 1 diabetes: quality improvement [QI] the Sheffield Children´s Hospital, UK experience

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Objectives: To improve glycaemic control in the first year after diagnosis of Type 1 Diabetes and achieve HBA1c of < 48 mmols/mol at 3 and 12 months post diagnosis.

Methods: Our team provides tertiary care for approximately 240 Type 1 patients aged 0-17 years. We joined a national initiative offering training in QI methodology and over the past 18 months have planned and undertaken a number of projects all designed to help achieve our stated objective. We recognised a problem with suboptimal control in the first year after diagnosis and identified the need to implement change to be able to achieve improvement in outcomes for our patients. We also identified the need to provide our patients with bespoke education to empower them to manage their Diabetes effectively. The first project was the introduction of carbohydrate counting from diagnosis which required a significant amount of work to upskill non-specialist colleagues working on the in-patient wards. New printed information was also created to support the education of staff and patients. Subsequent projects include the introduction of Expert meters and Diasend downloading at home from diagnosis to allow team members to offer advice on blood glucose readings remotely and further empower self management. We are also delivering a package of newly developed micro-teaching topics delivered to patients in the clinic waiting room. QI methodology was used in the design of projects and metrics including; time to first carbohydrate counted meal, average blood glucose at 7 and 30 days and HBA1c which are plotted on run charts and reviewed by the team fortnightly. A knowledge survey carried out before micro-teaching was introduced will be repeated to assess effect.

HbA1c in mmol/mol	3 months	6 months
Pre-QI		
Mean (SD)	53.3 (38.5-68.5)	55 (38-72)
Median (interquartile range)	49 (44-58)	51 (55-61)
Post QI		
Mean (SD)	45.1 (33.6-61.6)	47.8 (46.8-48.8)
Median (interquartile range)	44 (40-53)	46 (43-58)

[HbA1c data Pre and Post QI intervention]

Results: The table below shows improvement in HBA1c.

Conclusions: QI has helped the team to galvanise energy and work together cohesively to focus on achievable chunks of work, analyse progress and therefore benefit our patients.

P199
Gluten-free diet in children with recent onset type 1 diabetes: a 12 months intervention trial

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Aims/hypothesis: Data on the role of gluten in type 1 diabetes (T1D) pathogenesis are scarce. We aimed to test whether gluten-free diet (GFD) can decelerate the decline in beta-cell capacity in newly diagnosed non-celiac T1D children.

Methods: Forty six children (aged 10.2±3.3 years) were recruited into this self-selected intervention trial: 26 started with GFD, whereas 20 remained on standard diet. Main outcomes were the decline in C-peptide area under the curve (AUC) in mixed-meal tolerance tests and the difference in insulin dose, insulin dose adjusted A1c (IDAA1c) and HbA1c at 12 months. The adherence to GFD was tested by immunoreactive gluten in stool and food questionnaires at every visit. The quality of life (QoL) questionnaires were given to the patients and their parents at 12 months. Data were analyzed per protocol by linear

and longitudinal regression models adjusted for sex, age and baseline HbA1c, insulin dose, C-peptide AUC and IDAA1c.

Results: The difference in trends of C-peptide decline between the groups was statistically significant at 32.6 pmol/L per month (p=0.04). The mean decrease in C-peptide AUC was 567 vs 919 pmol/L (p=0.1) at 12 months in GFD and control group, respectively. The GFD group had a lower insulin dose by 0.17 U/kg/day (p=0.04), lower IDAA1c by 1.51 (p=0.006) and lower mean HbA1c by 9 mmol/mol (p=0.004) at 12 months. There was no difference in daily carbohydrate intake between the groups (p=0.83). There was no statistically significant difference in QoL between the groups as reported by the patients nor their parents (p=0.70, p=0.59).

Conclusions/interpretation: GFD kept over the first year after T1D diagnosis shows great promise as it was associated with lower C-peptide decline, lower insulin demand and HbA1c and more pronounced partial remission period.

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P200
Efficacy, effectiveness, and tolerability of nasal glucagon in treating hypoglycemia in children and adolescents with Type 1 Diabetes

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Objective: Treatment for severe hypoglycemia (SH) outside of the hospital is currently limited to injectable glucagon (IG), which requires reconstitution. Nasal glucagon (NG) is a ready-to-use drug-device combination containing 3 mg glucagon dry powder that is absorbed through the nasal mucosa. The efficacy, effectiveness, and tolerability of NG in reversing hypoglycemia were examined in children and adolescents with type 1 diabetes (T1D) from a clinical trial (CT) and a real world study (RWS).

Methods: Post hoc analyses were performed using data from participants, 4 to 17 years old, whose insulin-induced nadir blood glucose (BG) reached ≤70 mg/dL (CT) or whose BG reached < 54 mg/dL (RWS). Treatment success in CT was defined as ≥25 mg/dL increase in BG from nadir within 30 min of glucagon treatment (NG vs weight-based IG), while in RWS success was defined as return to normal status from neuroglycopenic symptoms within 30 min of NG treatment.

Results: In the CT, NG (n=16) and IG (n=12) achieved treatment success in 100% of participants. Nadir BG was 63 mg/dL for NG and 62 mg/dL for IG, and the mean time to treatment success, not including glucagon preparation, was 14 min and 13 min, respectively. Incidences and severities of NG and IG adverse events (AE) were similar for nausea and vomiting; headache and nasal discomfort occurred more frequently with NG vs IG. The AEs were mild and moderate in severity and most resolved within 24 hours. In the RWS, NG resolved all 17 events with BG< 54 mg/dL (mean baseline BG=49 mg/dL) within 30 min (mean time=14 min). The most common symptoms reported for NG were nasal discomfort, headache and watering eyes. Nausea and vomiting were reported with similar frequency as in the CT. NG administration was considered easy or very easy during most events.

Conclusions: NG appears to be an effective, well-tolerated and easy-to-use treatment for SH in children and adolescents with T1D.

P201
To participate in an improvement collaborative in a neighboring country - excellent results in metabolic control of pediatric type 1 diabetic patients

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Introduction: Many pediatric diabetes centers fail to reach HbA1C target levels. In Sweden data from a national pediatric diabetes quality registry, SWEDIABKIDS, was used to analyze factors that affect the diabetes control. Centers with better metabolic outcome showed higher compliance with guidelines, aimed at a lower HbA1c, teams were more devoted, and had a positive attitude. Based on these findings a quality improvement collaborative (IQ) was conducted in Sweden 2011. The IQ had duration of 18 months, including learning-sessions with lectures on improvement methods, teamwork, and sharing experiences. Between the learning sessions, the teams identified improvement areas at their centers, and started interventions. Since the start of IQ mean HbA1c in Swedish pediatric T1D patients has decreased from 62,6 mmol/mol to 56,6 mmol/mol. Almost all Swedish pediatric diabetic centers have participated to one of the three IQs.

Objectives and results: Our pediatric diabetes team from Helsinki University Hospital, Jorvi, participated to IQ3 (2014 - 2016) as a first team from another country. We are the second largest pediatric diabetes center in Finland, taking care of approximately 400 children (0 - 15,99 y) with T1D. Before the IQ3 start mean Hba1c in Jorvi pediatric diabetes population was 64 mmol/mol, and only 27 % of the patients reached Hba1c target (< 58 mmol/mol). As IQ3 ended at April 2016, mean HbA1c was 62 mmol/mol, and 34 % reached HbA1C < 58 mmol/mol. The improvement work has continued after participation to IQ3, and currently mean HbA1c in our clinic is 58 mmol/mol, and 52 - 56 % of the patients now reach HbA1c target < 58 mmol/mol.

Conclusions: To participate in a quality improvement collaborative facilitates pediatric teams to improve local care, even over borders.

P202
Assessment of efficacy of elective hospital admissions for stabilisation of glycaemic control in children and adolescents with type 1 diabetes mellitus

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Introduction: Elective in-patient admission for "stabilisation" of glycaemic control in type 1 diabetes mellitus is an intervention used in an effort to identify and address barriers to optimal metabolic control which have been unsuccessfully managed on an outpatient basis. The Endocrinology team at the Royal Children's Hospital Melbourne typically arrange 1-2 elective admissions per month for this purpose where intensive input from the diabetes medical and allied health teams is provided to individuals with HbA1c ≥10% (86 mmol/mol).

Objectives: This retrospective clinical audit aimed to assess the efficacy of elective admissions for stabilisation of T1DM to the Royal Children's Hospital and to identify personal or clinical factors which may contribute to a more successful outcome in terms of short and medium-term metabolic improvement. We hypothesised that there is a sustained clinical benefit of elective admissions for stabilisation overall.

Methods: Data pertaining to all T1DM elective admissions to the Royal Children's Hospital between January 2016 and May 2018 was analysed. The outcome measures assessed were the change ('delta') in HbA1c 3, 6 and 12 months post-elective admission from baseline pre-admission HbA1c.

Results: The average length of stay was 3 days (range 2-6). Mean (SD) age at the time of admission was 15 (2.5) years, at a mean of 7.0 ±3.6 years post diagnosis with T1DM. The median [IQR] HbA1c at time of admission was 10.7% [9.9, 11.5] (93mmol/mol [85, 102]). The median [IQR] delta HbA1c at 3, 6 and 12 months post-admission was -1.35% [-1.9,-0.5], -1.4% [-2.2,-0.8] and -1.1% [-1.95,-0.6] respectively.

Conclusions: Our review suggests an overall improvement in HbA1c following elective admissions that is sustained at 12 months post-admission to hospital. It is unclear whether this improvement can be achieved in other patients with comparable diabetes control with alternative interventions such as intensive allied health input on an outpatient basis.

P203
Glucose response curve (GRC) shapes in mixed meal tolerance tests (MMTTs) and prediction of response to intervention in the trialNet new-onset clinical trials

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Introduction: Autoantibody-positive at risk relatives of people with type 1 diabetes with a biphasic (BiP; two peaks) GRC during 2-hr oral glucose tolerance tests are at lower type 1 diabetes (T1D) risk than those with monophasic (MoP; one peak) and monotonic (MoT; continuous rise) GRCs. We hypothesized that GRC shapes during MMTTs in persons with newly-diagnosed T1D can predict response to intervention and that the shape may change in response to therapy.

Objectives: We performed an analysis to 1) Determine if the baseline GRC shape can predict response to intervention, and 2) Evaluate GRCs changes in responders (R) vs. non-responders (NR) to interventions; response=AUC C-peptide (C-P) at 12 months not < 5% of AUC C-P at baseline.

Methods: Those with complete MMTT data at baseline (within 3 months of diagnosis) and at 12 months were included (n=389, median (IQR) age 14.6 (8.1) BMI-z 0.6 (1.4), 56% male). Logistic regression analyses were used. Adjustments made for Age at treatment allocation, sex and BMI-for-age z-score.

Results: At baseline, R had higher BiP GRCs [NR: 9.4% (25/227) vs. R: 20.6% (13/63); adjusted OR 2.92 (1.36-6.27); p=0.006)]. The overall shape distribution was not different at baseline between R and NR but was significantly different at 12 months (p=0.036) with a notable higher frequency of MoT GRCs [NR: 30.1% (68/226) vs. R: 15.5% (9/58), p=0.031] *. There were no differences between R and NR in the odds of changing from one GRC to another (p>0.05 for all).

Conclusion: The finding that a BiP GRC at baseline was more common in R than NR suggests that MMTT GRCs can be used to predict responses to interventions in those newly diagnosed with T1D. Further, the higher proportion of MoT GRCs in NR at 12 months suggests that MMTTs with MoT are indicative of metabolic decline.

P204
Insulin degludec is safe and effective in children with new-onset type 1 diabetes

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		HbA1c %			Insulin Degludec dose U/kg/day		
	Age/y	Diagnosis	3 months	6 months	Diagnosis	3 months	6 months
DKA	7.50	13.60	7.40	7.60	0.30	0.26	0.30
No DKA	8.50	10.55	7.80	7.55	0.23	0.16	0.23
Overall	8.00	11.20	7.50	7.60	0.25	0.19	0.23

[Table 1. Results of HbA1c and total basal insulin degludec dose at diagnosis, 3, and 6 months. Results expressed as medians.]

Objectives: to assess the effectiveness of insulin degludec in children with newly-diagnosed Type 1 Diabetes (T1D) by analysing HbA1c and total basal insulin dose after 3 and 6 months.

Method: Retrospective chart review of 16 patients (11 girls) presenting to our institution, between November 2017 and February 2019, age 3 to 10y with confirmed T1D. 4 children had Diabetic Ketoacidosis (DKA). All received multiple daily injections using basal insulin degludec and bolus insulin aspart or lispro.

Results: Median HbA1c reduced from 11.20% to 7.5% by 3 months and 7.6% by 6 months after diagnosis. Patients with DKA had a higher median HbA1c at diagnosis but achieved similar glycemic control at 3 and 6 months. Their basal insulin dose remained unchanged throughout 6 months' follow-up. Children without DKA had a marked reduction in basal insulin dose by 3 months, which was partly sustained at 6 months. There were no episodes of DKA or severe hypoglycaemia following institution of treatment.

Conclusion: Clinical studies of insulin degludec have typically been performed in children with an established T1D diagnosis. Accordingly, there is a dearth of data on use of degludec in newly-diagnosed children. Our data confirms apparent safety and effectiveness of insulin degludec at diagnosis in children with T1D. There was a notable drop in basal insulin dose at 3 months in patients not in DKA at diagnosis reflecting the “honeymoon”. There were no recorded episodes of severe hypoglycaemia or DKA after institution of treatment. These data require corroboration in larger studies.

Posters on Display – Diabetes Care

P205
Individualized patient centered multidisciplinary care approach for adolescents with diabetes in reducing readmission

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Introduction: Type 1 diabetes is a chronic disease that requires constant monitoring with careful coordination and titration of insulin doses based on blood glucose levels, food intake, exercise and other activities. These tasks are more challenging in the adolescents with different needs and psychosocial changes leading to diabetes-related readmissions. Although diabetes and its demands affect the adolescents' sense of self among peers, a patient-centered approach showed positive relationship with medication adherence and empowerment.

Aim: The study aims to explore the influence of individualizing multidisciplinary patient-centered care for adolescents with known diabetes who were readmitted in 2014.

Methods: 15 adolescents contributed to a total of 23 readmissions in 2014 and these teenagers were followed up until 2017 and their readmissions were monitored. Data was collected and included the events, frequency of readmissions and the number of outpatient visits with or without transition to adult care.

Results: Total number of readmissions in 2014 was 23. 15 adolescents (5 relapsers) contributed to these 23 readmissions and these patients were followed through to 2017. There was a declining rate of readmissions observed over the three year period. Regular clinic attendances and successful planned transition were tracked with an average of four per year and observed to be relatively consistent. A total of 3, 1 and 5 adolescents were transited in 2015, 2016 and 2017 respectively.

Conclusion: Individualizing patient centered multidisciplinary approach promote patient-provider interactions and influence patients' self-care behaviors, considering their personal preferences, values and family situations. The shift from authoritarianism to shared decision-making is strengthened by patient empowerment. This is observed when the adolescents utilize their knowledge, skills, attitudes and self-awareness as necessary for effective long-term self-management.

P206
Optimal endocrinology and psychology care across the first seven years of type 1 diabetes diagnosis: a retrospective study of electronic health record data

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Objective: The 2018 International Society of Pediatric and Adolescent Diabetes Clinical Practice Consensus for optimal care for pediatric and adolescent patients with type 1 diabetes (T1D) state that patients should attend at least quarterly ambulatory endocrinology visits and have regular psychosocial care; however a dearth of research has examined the integration of these guidelines into standard practice. The current retrospective chart review study address this research gap at a children's hospital where integrated psychological care is the standard.

Methods: Based on data extracted from electronic health records between January 2009 and December 2016, 1,062 patients with T1D (average age=10.84 yrs, SD=4.24; 46% female, 74% Caucasian) attended at least one ambulatory endocrinology clinic visit in their first year of T1D diagnosis and 653, 393, and 181 patients continued to attend at least one clinic visit per year in their third, fifth, and seventh years of diagnosis, respectively.

Results: Only 32% of patients attended quarterly visits in the first year of diagnosis and 18% or fewer attended quarterly visits at consecutive study time points. Less than 10% of patients attended at least one ambulatory psychology visit in one year. Higher proportions of patients who had Medicaid insurance ($\chi^2(1)=14.52$, $p< .001$), were African-American ($\chi^2(1)=8.63$, $p< .01$), and had higher average hemoglobin A1c results ($t(1003)=2.28$, $p< .01$) were more likely to discontinue care at this institution compared to patients who had private insurance, were Caucasian, or had lower average A1cs, respectively.

Conclusions: A select population of pediatric patients with T1D receive optimal medical care over time and remarkably few receive optimal psychological care, despite the standard care at this institution including psychosocial services. Disparities in healthcare use and outcomes are notable. Studies aimed at improving implementation of care that is consistent with guidelines are needed.

P207
Insulin port: experience in a chilean state hospital

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Introduction: In some children insulin therapy through multiple daily injections (MDI) is a major limitation due to fear of needles. The insulin ports have been an important help in overcoming this limitation. In our public health system these devices are not guaranteed.Our center acquired insulin ports for those children under 6 years of age in transition to CSII.

Aim: To know the degree of satisfaction of the parents of type 1 diabetic patients who use the I-port Advance device controlled in our pediatric service.

Method: A satisfaction questionnaire was applied to 10 parents of children with type 1 diabetes users of iport advance at least for 3 months. The children were between 1 and 6 years old and controlled in the outpatient clinic of a state hospital. The study was done from September to November 2017.

Results: An important proportion of parents were satisfied with the use of the device (70%). One of the most important aspects was the perceived pain, it was mild or absent (90%), it was easy to use (70%) facilitating insulin administration compared to subcutaneous injections. Another positive aspects was its small size and easy to handle (60%). The most appreciated characteristics were the feeling of the better control of diabetes 90% and the feeling of security with its use 100%.

Conclusion: The insuline injection ports are a beneficial alternative to promote a better control in young children fearful of neddles, thus increasing the parents and patient´s sense of well-being. Unfortunately these devices are expensive and not accessible to all who need it. Given these results we propose in our country, extend its routine use to all children under 6 years and those older with fear of needles.

P208
Clinical profile and outcome of type 1 diabetes mellitus in a tertiary care centre of Nepal

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Introduction: There is paucity of data regarding the clinical profile and outcome of patient admitted with Type 1 Diabetes mellitus (DM) in children between 1-18 years of age in Nepal. We analysed the data of children managed by us at a tertiary care centre of Nepal, admitted with Type 1 DM with or without ketoacidosis.

Objective: To study the clinical profile and outcome of patients admitted with Type 1 DM at a tertiary care hospital of Nepal.

Method: This prospective observational study was carried out in the Department of paediatrics and Adolescent medicine, at BPKIHS, Dharan, which is a tertiary care teaching hospital in Eastern Nepal from January 2017 to February 2018. The details of sociodemographic, clinical, laboratory, treatment and outcome parameters of the 34 patients treated by us during this period were recorded using a pre-designed Performa. The data was analysed using SPSS version 21.

Results: The median age at presentation was 11.5 years (ranged 4-18). Females were 58.3%. Among them 66.7% were admitted with DKA. Most patients were from lower socioeconomic status and rural background. The classical symptoms of polyuria, polydipsia and polyphagia were present in all cases. 46% were newly diagnosed cases while 37.5 % presented with DKA at onset. Mild and moderate DKA were most common. On an average the glycemic control was poor and there was evidence of infection in most cases. The mean duration of hospital stay was 9.5 days. Two patients died because of cerebral oedema arising out of DKA. On regular follow-up after discharge most of them achieve good glycemic control and there were very few recurrent DKA cases.

Conclusion: Type 1DM though not curable is a treatable condition. Besides compliance to insulin, self monitoring of blood glucose, dietary restrictions and regular follow-up, compassionate counselling plays a major role in achieving good glycemic control. Good glycemic control is important to avoid life threatening complications like DKA.

P209
Keeping the ship on course: assessing a transition program model

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Introduction: Transition of medical care from parents to children with chronic diseases has always been a challenge, especially in the care of Diabetes Mellitus (DM). Proper glycemic management is necessary to prevent diabetes-related health complications, and less than a quarter of adolescents meet Hemoglobin A1c goals. Consequently complications are frequent in this growing, high risk cohort associated with deteriorations in health, loss to follow-up, and increases in complications and comorbidities. As a result, there is a need to develop transition programs to deliver strong medical care and foster patient engagement.

Objectives: To assess whether our diabetes transition program is helping adolescents, ages 18-22 years old, improve their diabetes health outcomes.

Methods: We have developed a transition program that involves: a nurse CDE seeing patients with a pediatric provider for 2 visits, the patient is introduced to the adult provider on the second visit; and then for 2 additional appointments with the CDE and adult provider. Social services, diabetes education, and nutritionists are available. We believe this approach will promote wellness and reduce loss to follow up between the pediatric and adult healthcare settings. We will be looking at outcomes for patients who participated in the transition program vs those who did not, specifically age, sex, HBA1c, number of visits to the program, number of emergency room visits for diabetic care, admission to the hospital for diabetic care or Diabetic Ketoacidosis, and attended follow up appointment with an adult endocrinologist.

Results: Currently in the process of data acquisition.

Conclusions: Our hope is to find better health outcomes for those who attend the transition program including, lower HBA1c, reduction in diabetes-related ED visits and DKA admissions in comparison to adolescents who did not participate in a transition program.

P210
Fifty years of impressive growth and development of T1D care

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Objectives: Tracing and designating T1D care evolution over the past 50 years from that of a rare pediatric disease to an epidemic and a fascinating medical field, Diabetology.

Methods: In his ADA Presidential Address (1984), Alan Drash, characterized children with diabetes as orphans of medical care, since adult diabetologists ignored how to treat children and pediatricians didn´t know how to treat diabetes! This was a turning point for diabetology; from elementary to advanced clinical care stage. A survey at this early period revealed the existence of only a few expert pediatricians in the

US and Europe. Boiling glass syringes and needles for once daily bovine insulin injections were universally practiced, strips for urine glucose and acetone testing were used and a limited special literature for physicians (Priscilla White´s) and for patients (Luther Travis´) was available. Nonetheless, maturity of T1D care was achieved following the establishment of ISGD (later ISPAD), the contribution of Guidelines and our journal "Pediatric Diabetes". JDRF led the way to research funding, while TRIGR, EURODIAB, DCCT, Hvidoere, ENDIT, VirDiab, DIPP, TEDDY, and other NIH and EU funded studies, united research efforts of the international community.

Results: Diabetes care centers spread worldwide. Research contributed to improved human insulins, measuring techniques, HbA1c, from reflectometers to sensors and finally insulin administration through smart pumps, leading to the closed loop systems, making care and life of patients more comfortable and secure.

Conclusions: Amazing progress in T1D care was achieved, particularly over the past three decades. Pioneers from both sides of the Atlantic succeeded in creating improved treatments, better management and education and an impressive decrease rate of complications. How close are we to the Cure?

P211
A trend of a higher percentage of total basal insulin dose to total daily insulin dose and worse glycemic control in younger-onset patients with type 1 diabetes

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Objectives: Total basal insulin dose (TBD) and total daily insulin dose (TDD) influence glycemic control of patients with type 1 diabetes (T1D). A low ratio of TBD to TDD (%TBD) is associated with better glycemic control in adult patients. The present study evaluated how % TBD reflected glycemic control in pediatric patients with T1D.

Methods: The inclusion criteria were

1) pediatric patients with T1D and

2) outpatients of Shiga University of Medical Science Hospital in June 2018.

Age, recent glycated hemoglobin (HbA1c) level, age at onset, HbA1c level at onset, duration of diabetes, TDD per kg of body weight (TDD/BW), and %TBD of patients with T1D were examined retrospectively from medical records.

Result: This survey included 28 patients, seven of whom were treated with multiple daily insulin doses and the others by insulin pump. Their mean (standard deviation) age, recent HbA1c level, age at onset, HbA1c level at onset, duration of diabetes, TDD/BW, and %TBD were 11.80 (4.63) years, 7.6% (1.1%), 7.19 (4.68) years, 11.8% (2.2%), 4.61 (3.20) years, 0.93 (0.38) U/kg, and 38.4% (10.2%), respectively. TDD/BW was positively related to the duration of diabetes (0.056 [U/kg]/year, 95% confidence interval [CI] 0.014-0.099, p=0.01). %TBD was positively related to recent HbA1c level (+0.0337/%, 95% CI 0.0003-0.0670, p=0.048) and negatively related to age at onset (-0.010/year, 95% CI -0.018--0.003, p=0.01). TDD/BW and %TBD were not related.

Conclusions: TDD/BW and %TBD were comparable to those in previous reports. Increased TDD/BW with time since onset may reflect decreasedinsulin secretion. Recent HbA1c level may be a confounding factor for %TBD and age at onset. Patients with younger age at onset might be continuously administered a lower-bolus insulin dose for the prevention of hypoglycemia. Thus %TBD tended to be lower and glycemic control was worse. The administration of a bolus insulin dose should be considered carefully in younger patients.

P212
Audit of glycemic control in patients with type 1 diabetes referred to a pediatric clinic in a specialized center in Kuwait

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Introduction: Intensive glycemic control reduces the risk of microvascular and macrovascular complications. Furthermore, optimal glycemic control is essential for normal growth and development. Thus, there is a need to monitor and evaluate glycemic control in patients with type 1 diabetes (T1D). Our aim was to audit glycemic control in patients with T1D in a specialized center as per the Society of Pediatric and Adolescent Diabetes (ISPAD) Hemoglobin A1C (HbA1C) target recommendations published in 2014.

Methods: This is a retrospective cross-sectional study reporting on glycemic control (HbA1C) of patients younger than 21 years of age and with T1D treated at Dasman Diabetes Institute (DDI) between January 2013 and December 2015.

Results: A total of 470 patients with T1D (250 males and 220 females) were included. Only 53 (11.3%) patients met the ISPAD target for optimal glycemic control with HbA1C < 7.5% (58 mmol/mol). Older age was positively associated with poor glycemic control (p=0.001) while Continuous Subcutaneous Insulin Infusion (CSII) therapy was negatively associated with poor glycemic control, adjusted Odds Ratio (OR) 0.33 (95% confidence interval (CI): 0.16-0.66) for CSII and adjusted OR 0.42 (95% CI: 0.27-0.64) for shifting to CSII (p< 0.001).

Conclusion: Achieving optimal glycemic control is a significant challenge for young patients with T1D. Glycemic control goals should be individualized to achieve such goals safely, realistically and with a better quality of life for patients with T1D.

P213
Testing an audit and feedback intervention to improve glycemic control after transfer to adult diabetes care: protocol for a quasi-experimental pre-post design with a control group

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Objectives: Despite the existence of tools and guidelines to optimize paediatric to adult care transitions, there are gaps in diabetes care delivery and implementation of best practices during this vulnerable time. Audit and feedback (AF) interventions have a positive but variable effect on implementation of best practices. We aim to test an AF intervention designed using recommendations about how to optimize effectiveness to improve transition practices and glycemic control in the year after transfer from pediatric care.

Methods: This is a pragmatic quasi-experimental study; a series of three cohort studies (pre-implementation, early-implementation, and post-implementation) to compare the baseline adjusted hemoglobin A1c (HbA1c) 12 months after the final pediatric visit in five pediatric diabetes centres in Ontario, Canada. The intervention includes three components: 1) centre-level feedback reports compiling data from chart abstraction, linked provincial administrative datasets, and patient-reported experience measures; 2) webinars for facilitated conversations/coaching about the feedback; and 3) online repository of curated transition resources for providers. The primary outcome (HbA1c) will be analyzed using a multivariable linear regression model. We will conduct a qualitative process evaluation to understand intervention fidelity and to provide insight into the mechanisms of action of our results.

Discussion: There is an urgent need to develop an innovative, scalable, and system-level approach to improve outcomes and the quality of transition diabetes care. Our research team is designing, implementing, and evaluating an AF intervention using recommendations about how to optimize effectiveness. This knowledge will be generalizable to other care networks that aim to deliver uniformly high quality diabetes care in diverse care settings. We will have baseline data for the pre-implementation cohort to present at the conference.

P214
A National Children and Young People's Diabetes Quality Programme - The quality assurance picture so far

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The National Children and Young People's Diabetes Quality Programme for Wales and England was established on behalf of the National Children and Young People's Diabetes Network by the Royal College of Paediatrics and Child Health in April 2018. As part of the Programme, participating teams undergo annual self-assessment with external verification and a peer review visit over 3 years.

The aim of the Programme is to combine a quality assurance process alongside a national quality improvement collaborative to close the audit loop and drive accelerated improvements in paediatric diabetes services.

Self-assessment opened in May 2018 for 6 weeks to allow 118 MDTs in England and Wales to self-assess their units against measures agreed by the National Network with support of NICE and NHS England. The measures build on Diabetes Quality Indicators used in 2 previous NHS England QA programmes 2013-2016 to maintain consistency, demonstrate longer term progress and enable teams to provide up-to-date evidence of compliance and identify service gaps where resources are required.

The measures were structured into 3 groups - Network measures comprising 34 elements in 12 measures, Hospital Trust/Health Board measures with 25 elements in 6 measures and MDT measures with 95 elements in 27 measures.

Self-reported mean compliance with Hospital and MDT measures were 93% and 89% respectively. Least compliance was reported in 24-hour telephone advice and patient/carer experience of transition/transfer with 89.4% and 49.63% reporting they fully met these measures. Mean compliance with Network measures was 85.3% with the patient experience measure met by the fewest Networks at 61.4%.

Average self-reported compliance across Network, Hospital and MDT measures were above 80%. Key themes for improvement were in 24-hour telephone advice, transition and patient experience measures. This provides an indication of where services need to focus to elevate current levels of care.

P215
Usage and usefulness of insulin pumps for pediatric patients with type 1 diabetes in the real world

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Objective: Currently in Japan, many pediatric patients with type 1 diabetes (T1D) use continuous subcutaneous insulin infusion (CSII), continuous glucose monitoring (CGM), and sensor augmented pump (SAP). We investigated the usage of these devices in our practice, and assessed their usefulness.

Methods: Types of treatment, characteristics, and reasons for discontinuing use of CSII/SAP were examined retrospectively from the medical records of patients with T1D treated in our department between 2010 and July 2018.

Results: 49 subjects were included in the study (20 males, 29 females). Age, duration of diabetes, and HbA1c level (average ± SD) were 14.3 ± 5.9 years, 6.1 ± 4.8 years, and 7.8 ± 1.2%, respectively. CSII/SAP were used by 34 patients (9 male, 25 females, age 9.9 ± 5.6 years).

Two of them (1 male, 1 female) used CSII alone, and around half (19/34, 56%) changed from multiple daily injections (MDI). Most of them (16/19, 84%) started using SAP when it was initially approved (2015). The HbA1c levels of patients with and without CSII/SAP were 7.9 ± 1.0% and 7.6 ± 1.5%, respectively, and did not differ statistically. The continuation rates of CSII and SAP were 94% (32/34) and 66% (23/32), respectively. The reasons for discontinuation of CSII were difficulty of handling a pump by a guardian, and insertion troubles in adolescent patients with low motivation to continue CSII contrary to the guardians. The reasons for discontinuation of SAP were skin disorders (3 cases), complexity of wearing and using CGM (2 cases), ending of medical expenses support for pediatric patients (2 cases), and unknown (2 cases).

Discussion: Despite the high rate of SAP/CSII use when it was introduced, the continuation rate of CSII was high, in agreement with previous reports. This fact may indicate that patients' preference for CSII is higher than expected. Moreover, skin problems seem to be a serious issue, which result in a low continuation rate for CGM, and require careful management.

P216
Changes in body mass index and hemoglobin A1c over 5 years after diagnosis of type 1 and 2 diabetes mellitus in children and adolescents: observational study using common data model

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Objectives: We investigated changes in body mass (BMI) and hemoglobin A1c (A1C) over 5 years after diagnosis in childhood type 1 diabetes (T1D) and type 2 diabetes (T2D) patients from South Korea.

Methods: Anonymized data were collected from common data model database of three centers. Patients diagnosed as T1D or T2D < 15 years were included. Data about age, sex, anthropometric parameters, and A1C at 0, 3, 6, 9, 12, 24, 36, 48, and 60 months after diagnosis were collected. BMI z-scores (BMIz) were calculated using Korean national growth charts. Linear regression analysis was performed to evaluate predictors of BMIz or A1C changes.

Results: Among 98 patients (male, 32), 72 (74%) was diagnosed as T1D, and 26 as T2D. T1D patients were younger (10.6 vs. 12.1 years) and had lower BMIz (-0.43 vs. 1.31) than T2D at diagnosis. T1D group showed gradual increase in BMIz for 60 months after diagnosis, which was dominant in girls and patients with diagnosis age of 10 - 14 years. T2D group showed gradual decrease in BMIz after diagnosis, however, T2D girls showed increase in BMIz over 60 months of follow-up. Female was independent risk factor for increase in BMIz between 3 - 60 months (β = 0.93, p = 0.04) in both groups. Initial A1C was similar between T1D (10.9%) and T2D (11.8%) patients, however, T1D patients had higher A1C after 3 months. A1C was rapidly decreased during first 3 months and increased after 6 months in both groups. T1D girls had higher A1C than T1D boys from 6 months after diagnosis. Initial A1C was associated with higher A1C at 60 months (β = 0.84, p = 0.01), however, sex or BMIz were not associated with A1C at 60 months.

Conclusions: Childhood T1D and T2D patients showed different BMIz trends characterized by gradual increase in T1D and decrease in T2D, which were varied with sex and age. A1C was gradually increased over 5 years after initial rapid decrease in T1D and T2D patients. Girls were more likely to show increase in BMIz or A1C during follow-up.

P217
Carb counting and expert meters from diagnosis - using QI to improve outcomes for children diagnosed with type I diabetes

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Improving outcomes for children and young people newly diagnosed with Type I diabetes at Royal United Hospital Bath NHS Foundation Trust by participating in a National Quality Improvement Collaborative.

Background: Early glycaemic control improves long-term outcomes in children with Type I diabetes. The NICE target for children with T1DM is HbA1c ≤ 48mmol/mol. 2018 data from our newly diagnosed patients (pre- QI) demonstrated mean HbA1c 50mmol/mol at 3 months and 62mmol/mol at 12 months.

Aims and methods: Our aim is to improve mean HbA1c and average blood glucose levels for newly diagnosed children at 3 and 12 months post diagnosis.

Drivers for improvement included:

1) Implementing Carbohydrate Counting and bolus advisor meters from diagnosis

2) Intensive inpatient management with multiple insulin correction doses

3) Setting up home downloading of blood glucose meters prior to discharge.

We used Fishbone analysis to undertake a needs assessment for project implementation. The main barriers were ward staff training and communicating key changes to the wider paediatric team. ´Tea Trolley´ training and ´Newly Diagnosed Packs' helped facilitate change. Outcome data on average blood levels, HbA1c, days to carbohydrate counting and balancing measures including length of stay were collected.

Results: 10 new patients have been managed along the new care pathway. Mean average blood glucose at D28 post diagnosis has

improved from 8.0mmol to 5.9mmol. Mean HbA1c at 3months post QI is now 45.9mmol/mol (n=7).

Conclusions: Weekly QI meetings and maintaining run charts of average blood glucose and HbA1c for new patients has been a powerful team motivator. Collaborative working with other teams has made us braver to implement change and initial project results are encouraging. We are now using QI methodology to improve clinic experience and education around download interpretation.

P219
Trends in prevalence of pediatric diabetes in in developing countries: the case study of Nepal

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Diabetes is a major lifestyle disorder, the prevalence of which is increasing globally. Childhood diabetes care imposes a heavy economic burden on the patient's family and all those involved in the provision of this care need to be aware of what factors drive cost Socio-economic growth and industrialization are rapidly occurring in many of these countries. The urban-rural divide in prevalence is narrowing as urbanization is spreading widely, adversely affecting the lifestyle of populations. Nepalese have a strong ethnic and genetic predisposition for diabetes and have lower thresholds for the environmental risk factors. As a result, they develop diabetes at a younger age and at a lower body mass index and waist circumference when compared with the Western population. The adverse effect of physical inactivity and fatty food are manifested as the increasing rate of overweightness and obesity, among children. The health care budgets for the disease management are meager and the health care outcome is far from the optimum. As a result, complications of diabetes are common and the economic burden is very high, especially among the poor strata of the society. National endeavors are urgently needed for early diagnosis, effective management and for primary prevention of diabetes. This editorial aims to highlight the rising trend in prevalence of diabetes in Nepal, its causative factors and the urgent need to implement national strategies for primary prevention of type 2 diabetes.

P220
Evaluating a multidisciplinary Chronic Illness Management Program for children and adolescents with type 1 diabetes

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Introduction: Among youth with Type 1 Diabetes Mellitus (T1DM), older adolescents have demonstrated decreased compliance to treatment adherence, resulting in unfavorable disease control. Poor disease management established in this population can continue into adulthood, perpetuating the health and economic burden to the individual and society.

Objective: This study aims to evaluate the effectiveness and sustainability of an inpatient multidisciplinary approach to treating children and adolescents with T1DM.

Methods: Patients with a diagnosis of T1DM admitted to the Chronic Illness Management Program (CIMP) between 1/1/2016 and 12/31/2017 were eligible for inclusion. Data related to physiological and psychosocial outcomes were compared between admission and discharge and differences were assessed by two sample t-tests. Outpatient providers were contacted at 3, 6 and 12 months following discharge from the CIMP for A1C and health care utilization data.

Results: Fifty-seven inpatient admissions of children and adolescents with T1DM were included in the analysis sample. On average, there was a significant reduction in A1C values from admission (11.1%) to discharge (9.1%). Patients improved significantly ($p < 0.01$) in all psychosocial outcome measures during their inpatient stay. While patient's A1C values returned to admission levels by 6 months post discharge, more than 60% of providers reported no emergency department visits, hospitalizations or DKA events within the 12 months following their patient's discharge from the CIMP.

Conclusions: The inpatient setting allows for an intensive multidisciplinary treatment model for T1DM management that demonstrates clinical improvements post discharge and may reduce utilization of costly health care services. This program model should be considered for adolescents who have been unable to successfully manage their T1DM with outpatient treatment alone.

P221
Parental anxiety about hypoglycemia of children and adolescents with type 1 diabetes mellitus (T1DM) and the associated factors

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Introduction: The anxiety for hypoglycemia is a major stress factor for parents of children with T1DM and has been associated with poor diabetic control, reduced insulin doses and school-age children.

Purpose: To determine the frequency and severity of parental anxiety for hypoglycemia and the associated factors.

Patients and methods: The study included parents [21 (23.9%) fathers and 67 (76.1%) mothers] of 88 T1DM patients, with a mean±SD age of 12.6±3.6 years and disease duration of 4.5±3.6 years. Questionnaires, such as the HFS-P Worry (anxiety scale) and the HFS-P Behavior scale, were used and analyzed by single-factor analysis.

Results: From the parents of T1DM children, 21.6% frequently experienced and 26.1% almost always experienced anxiety for hypoglycemia. Parental anxiety for hypoglycemia showed a linear correlation with the presence of specific behaviors to avoid it ($r=0.421$, $p< 0.001$). Anxiety for hypoglycemia mainly occurred in parents aged

	Pre-Admission n (%)	3 Months Post n (%)	6 Months Post n (%)	12 months Post n (%)
No ED Visit	15/31 (48.4)	27/32 (84.4)	23/29 (79.3)	18/28 (64.3)
No Hospitalization	8/50 (16.0)	31/32 (96.9)	27/30 (90.0)	22/31 (71.0)
No DKA Event	15/56 (26.8)	31/32 (96.9)	26/29 (89.7)	23/30 (76.7)

[Proportion of sample reporting no adverse health care utilization from pre-admission through 12 months follow up among patients with T1DM]

between 26-35 years (p< 0.036) and mothers with the lowest educational level (p < 0.039). The use of insulin pen (p< 0.034), younger patients' age (p < 0.001) and early diabetes diagnosis (p=0.007) were associated with a higher rate of specific behaviors to avoid hypoglycemia. Parental anxiety for hypoglycemia was significantly associated with poor glycemic control (HbA1c>8.5%) (p=0.039). Multiple linear regression analysis, with parental behavior to avoid hypoglycemia as the dependent variable, revealed that the behavior of mothers who were retired was better than those who were civil servants.

Conclusions: Parents of T1DM children always or almost always have anxiety for hypoglycemia in a significant percentage (57.5%). Fear for hypoglycemia is mainly experienced by the parents of younger children, of those who were diagnosed at a young age, of children using insulin pen, and by mothers with low education. Parental anxiety of hypoglycemia seems to significantly affect the children's quality of glycemic control.

P222
Starting benchmarking in Canada: which benefits for type 1 diabetes care?

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Objectives: We proposed to explore outcomes of diabetes care for children with type 1 diabetes in 3 Canadian tertiary centers.

Methods: Each center collected parameters in registered children with type 1 diabetes of more than 1 year duration at one visit spanning from 2017 to 2018. Mean HbA1c values were compared according to age at visit (< 6, 6-11 and 12-18 years), use of insulin pump, diabetes duration. Frequencies of attaining HbA1c goals (< 7.5%, CDA guidelines 2018) were reported. Presentation at onset, severe hypoglycemic events and ketoacidosis during follow-up were examined.

Results: Mean HbA1c values were significantly lower in Center C compared to the 2 other centers in most analyzed categories, except for pump users. HbA1c was lower in the youngest age group, except for Center B. In all 3 centers, pump users had better metabolic outcome, as well as if diabetes duration was less than 5 years. 19% of patients attained HbA1c goals in Center A and B, whereas 50% were recorded in center C (p< 0.001). Presentation at onset with ketoacidosis was 42%, 47% and 35% for Center A, B, C respectively. Hypoglycemic events per 100 patient-years were 0.81, 4.66 and 9.68 in each center respectively, whereas ketoacidosis events were 0.54, 3.99 and 3.4. Finally, percentage of pump usage by age group showed that it was lower in the < 6 years group in centers A and B, whereas it was the highest in center C.

Conclusions: This represents the first benchmarking effort in Canada. We identified differences related to glycemic control and pump usage in pediatric patients across the 3 centers. Differences in acute complications could be attributed to data collection pitfalls. Sampling bias may also be a limitation as ethical consent was required. Efforts will continue to improve data quality and enroll more centres with the overall goal of achieving equitable care and optimal outcomes for all Canadian children living with diabetes.

P223
Family involvement in the care of preteens with type 1 diabetes

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Introduction: Family involvement (FI) in the care of preteens with type 1 diabetes (T1D) holds a great potential in improving the treatment goals and the family quality of life.

Objectives: To inform future research, we aimed to generate and compile shared insights of expert knowledge and clinical experience to suggest a common path for practice and research on FI in the care of preteens with T1D.

Methods: We designed a two-day workshop focusing on FI and psychosocial support in the care of preteens with T1D. In total, 24 researchers and clinicians from Denmark, Scotland, England and Ireland, with preteens with T1D as their area of expertise, participated. Four focus areas including FI were addressed. Participants were split in groups across professions and asked to collaborate on answering four questions about each focus area in terms of the importance, the current knowledge, what we need to know more about and what should be the next step. The outputs of the group discussions were debated in plenary and subsequently the shared insights of FI were compiled by two researchers from Steno Diabetes Centre Copenhagen.

Results:

1) Research on FI in the care of preteens with T1D was found to be important because the level of FI profoundly influences the development of the child and can support parents facilitate the emerging autonomy of their preteen.

2) We need to know more about which guidelines/tools/interventions can be used to enhance FI and

3) to obtain this knowledge we should investigate the perceptions and needs of all involved.

	Center A (Calgary)		Center B (Sherbrooke)		Center C (Vancouver)		p values (multiple comparison using t-test with Bonferroni correction)		
	n	HbA1c (mean ± SD)	n	HbA1c (mean ± SD)	n	HbA1c (mean ± SD)	A vs B	A vs C	B vs C
all patients	797	8,58 ± 1,39	134	8,47 ± 1,26	382	7,9 ± 1,51	1,000	< 0,001	< 0,001
< 6 years	33	8,04 ± 0,86	13	8,31 ± 0,73	29	7,4 ± 0,80	0,972	0,011	0,004
6-11 years	244	8,23 ± 1,11	42	8,12 ± 0,89	122	7,6 ± 0,96	1,000	< 0,001	0,007
12-18 years	520	8,77 ± 1,5	79	8,69 ± 1,45	231	8,2 ± 1,77	1,000	< 0,001	0,082
pump users	340	7,97 ± 0,91	82	8,26 ± 1,06	170	7,9 ± 1,51	0,038	1,000	0,161
injection users	452	9,02 ± 1,52	95	8,80 ± 1,47	212	8,0 ± 1,51	0,593	< 0,001	< 0,001
diabetes duration < 5 years	370	8,43 ± 1,47	65	8,35 ± 1,03	177	7,7 ± 1,48	1,000	< 0,001	0,004
diabetes duration ≥ 5 years	426	8,89 ± 1,54	69	8,58 ± 1,45	205	8,2 ± 1,50	0,356	< 0,001	0,201

[Comparison of HbA1c in three Canadian centers]

Conclusions: We found that experts in the field of preteens with T1D perceive development of new guidelines/tools/interventions as the next step to continue the endeavors to enhance FI in the care for preteens with T1D. When embarking on these future projects it is important to bear in mind that although FI holds great potential in enhancing the treatment of preteens with T1D, it can be exaggerated and hence result in adverse outcomes.

P224
Uptake of flash glucose sensor technology within a specialist paediatric diabetes service

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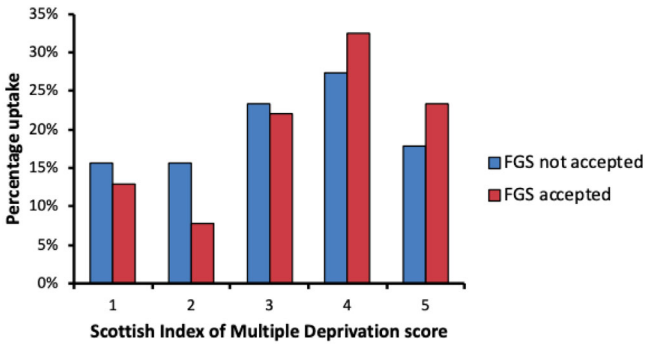
Background: A flash glucose sensor (FGS) sits underneath the skin and measures glucose levels in interstitial fluid. Readings can be accessed by scanning the sensor, reducing reliance on finger-pricking to monitor glycaemia. Little is known about uptake of this new technology in children with Type 1 Diabetes.

Objectives: FGS became available on prescription in our locality in November 2018, though prior to this a proportion of our clinic population self-funded this device. We wanted to evaluate whether differences in uptake between service users were related to deprivation category, age and diabetes duration.

Methods: Service users were written to and offered the opportunity to start using a FGS. If interested, families attended a mandatory 90-minute group information session facilitated by all healthcare professionals within the multidisciplinary paediatric diabetes service, and following this FGS was added to the child's prescription. Group sessions were delivered within a 2 week period to prevent inequitable waiting times. Baseline data including HbA1c, Scottish Index of Multiple Deprivation (SIMD) score & frequency of blood glucose testing were recorded for all attendees.

Results: Of 223 service users invited, 77 attended training sessions and consented to using FGS. Mean (±SD) age was 12.3±3.6 years, duration of diabetes 4.8±3.5 years and HbA1c 67.0±15.8 mmol/mol. Differences in SIMD group (p=0.1031) and diabetes duration (p=0.923) between those accepting and declining FGS prescription were not significant, but uptake was higher in younger children (12.3 ±3.6 vs. 13.4±13.5 years, p=0.022).

Conclusions: Greater than one-third of service users accepted FGS prescription and differences in uptake were not explained by deprivation category, but this form of glucose monitoring appeared to suit families and children of younger age.



[Figure 1: Differences in uptake of Flash Glucose Sensor between deprivation categories]

P225
An analysis of North West London diabetes units using data from the National Paediatric Diabetes Audit 2017/2018

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Objectives: The 2017/2018 National Paediatric Diabetes Audit (NPDA) compares 173 Paediatric Diabetes Units (PDU) in England

and Wales and health outcomes of 29,748 patients. Data includes incidence, prevalence, demographics & complications. Previous reports have shown differences in quality & outcomes of PDUs. Regional NPDA data for North West London (NWL) is used to identify where outcomes can be improved.

Methods: Data collection utilised the RCPCH NPDA online resource. 6 hospitals in NWL and 1011 patients. Age, ethnicity, diabetes type & patient deprivation profile were compared & 7 care processes. This included; HbA1c, BMI, BP, albuminuria, autoimmune screen, eye screen & foot examination. Emergency admissions & treatment methods were recorded. Illustrative graphs compared results amongst hospitals & against national standards.

Results: London shows ethnic variation. Most (34-44%) patients were aged 10-14 years. Type 1 diabetes accounts for 88% of diagnoses. PDUs achieved >88% completion of Hb1Ac and BMI checks, >60% of BP, thyroid & eye screen checks and >45% of foot and albuminuria checks. Median HbA1c 67.8mmol/mol (increased from 65.5mmol/mol 2016/2017, national median 64mmol/mol). Microvascular complications found in 13-30% & macrovascular in 8-31%. Multiple injections 50-86% (national 36.7%), insulin pump treatment 14-40% (national 35.7%) & continuous glucose monitoring 4.9-8.6% (national 9.4%) vary across NWL.

Conclusion: Ethnicity & demographics may affect care and outcomes. A data administrator may improve data quality. Median HbA1c has increased in NWL, with no change to national average. PDUs can improve diabetes outcomes with early intervention and insulin pump therapy. Setting individual goals & targets for each PDU in our diabetes network. Involving in the National Quality Improvement Programmes is recommended.

P226

Parent-child dyads in diabetes: Does it affect control and outcomes for both or either?

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Objectives: To examine diabetes control and engagement with diabetes services in parents and children following their child's diagnosis, rates of Diabetic Ketoacidosis (DKA) at presentation and episodes of severe hypoglycaemia (SH) compared to a control group.

Methodology: This quantitative retrospective study was undertaken at Cork University Hospital. 28 parent-child dyads were identified. The next newly diagnosed child matched by age and gender was used as a control. A questionnaire was distributed to the parents to gather gather more information on their diabetes management. Two sample *t*-tests and Pearson's Chi-square were used in the statistical analysis. A p-value of < 0.05 was considered statistically significant.

Results: 35.2% of the parents do not currently attend any diabetes service, 50% of whom are now awaiting an appointment having decided to re-engage following their child's diagnosis. 45% attend clinic at least twice per year, the remainder are seen annually. No improvement was seen in parents HbA1c in the 2 years following their child's diagnosis, although, 94% reported an improvement in diabetes self management. In the dyad/control group no differences were found in relation to HbA1c levels and episodes of SH. However, 25% of the children in the dyad group presented in DKA at diagnosis compared to 50% of the control group.

Conclusion: The rate of T1D among first degree relatives (16.4%) is higher than observed in previous studies. Despite a perceived improvement in diabetes management among parents, no improvement was seen in relation to clinic attendance and HbA1c levels. Having a parent with T1D does not appear to lead to an improvement in glycaemic control in either parent or child. The lower rates of DKA in the dyad group may be attributed to an earlier identification of the disease process.

P227

Quality improvement: coordination of pediatric diabetes care and education through the creation of a pediatric diabetes council

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Introduction: Diabetes management in the inpatient setting has been a challenge to all hospitals, especially in children's hospitals. Management of diabetic patients through each unit of the hospital needs to be carefully coordinated in order to appropriately care for these patients and have the best outcomes. Also, given the importance of proper education of diabetic patients, especially new onset diabetic patients, education must also be uniform throughout the hospital. Therefore, there is a need to create ways to coordinate care and education in order to have better patient outcomes.

Objectives: To coordinate diabetes care and education at our children´s hospital through the creation of a pediatric diabetes council.

Methods: We created a pediatric diabetes council, consisting of a nurse from each unit of the hospital that cares for diabetic patients. We also included nutritionists and a nurse educator. The council serves to discuss diabetes care and education and gives a forum for everyone to discuss problems they encounter. We also use the council to introduce changes in diabetes management. Our goal is to help improve diabetes care, which should lead to decreased length of stay and improved patient satisfaction. We also survey the council participants at each meeting to assess their comfort with caring for diabetic patients, in order to address gaps in education

Results: Our preliminary results have shown that since starting the council, diabetes care and education at our hospital has improved, which has led to reduced length of stay, improved patient satisfaction, as well as an improvement in the council members´ comfort in caring for diabetic patients.

Conclusions: The creation of a pediatric diabetes council has led to improvement in diabetes care and education at our children´s hospital, as evidenced by reduced length of stay, improved patient

satisfaction, as well as an improvement in the council members´ comfort in caring for diabetic patients.

P228
A National Quality Programme in England and Wales - The quality improvement story so far

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To drive an accelerated rate of improvement in paediatric diabetes outcomes in England and Wales, a National Children and Young People's Diabetes Quality Programme for Wales and England was established by the Royal College of Paediatrics and Child Health in April 2018. As part of the Programme, participating teams undergo a quality assurance process alongside a national quality improvement collaborative.

The aim of the collaborative is to provide teams with the support and tools to identify, design and analyse their own interventions specific to the needs of the children and young people they care for.

Following the Swedish Quality Improvement Collaborative, 10 MDTs were selected to participate in a pilot quality improvement collaborative in November 2017. The 9-month programme of training in QI methodology comprised 2 residential weekend events and 2 one-day training events 3 months apart. All members of the MDT attended every training event, with an online platform to share resources and teleconferences for team Champions to feedback progress between events.

The 10 teams chose individual areas of focus ranging from carb counting at diagnosis, self-management resources, access to technology, support for patients on pumps and the outpatient clinic experience. Now 18 months into their work, run-chart data collected by teams demonstrate an accelerated decrease in median HbA1c levels, reporting up to 10% of improvement.

Outcomes of the pilot collaborative confirms the sustained team performance and ongoing improvement in service quality possible through a whole MDT approach to quality improvement. In the next 3 years, up to 100 teams in England and Wales will undergo this course of QI training through 12 waves of the collaborative as part of the National Quality Programme. The addition of a peer review process along with robust audit data and a clear improvement methodology will support actions to enhance improvement across all participating units.

P229
Getting kids and families “Back on Track”: a retrospective chart review of patients in McMaster's Back on Track program for children living with type 1 diabetes

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Objectives: Back on Track (BoT) is a multidisciplinary program targeted toward children with persistent poor glycemic control or those with a recent decline in glycemic control. A retrospective chart review was conducted to determine characteristics of children accessing the program and health-related outcomes.

Methods: The sample included the cohort of children who attended BoT in 2017 (n=54). Two reviewers accessed medical records using PatientLink, an electronic medical record system. Descriptive statistics were generated for each of the measured variables.

Results: The average age of participants was 14.4 years and the duration of diabetes before referral was 5.5 years. 56% of the sample were male and 44% were female. 43% of children had separated parents and 15% of families had child services involved. Insulin regimens included MDI (79.6%), CSII (18.5%), and other (1.85%). Each patient had an average of 5 visits to the program over 10.5 months. Six months before referral, the mean HbA1c was 11.37% (SD=1.88). Six months after BoT, the mean HbA1C was 10.86% (SD=2.40), p= 0.10. The HbA1c increase was 0.21% over a six-month period post BoT compared to 2.24% in the six months prior. There were 14 episodes of diabetic ketoacidosis in the six months prior to the program and 7 episodes six months after the first visit to BoT.

Conclusions: The majority of children participating in BoT were on MDI. Many children were from single parent families or child services were involved. There was no significant change in HbA1c in the six months after children were involved in the program, however BoT contributed to reducing the rate at which the HbA1c increased. Rates of DKA decreased. This retrospective chart review provides a snapshot of the patient population accessing a targeted clinical program. Understanding the characteristics of patients who are more likely to have suboptimal glycemic control may allow these patients to be targeted for more intensive programming.

P230
Comparison of basal insulin in adolescents with type 1 diabetes during a school camp. The GLiDE Study

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Introduction: It is not clear whether specific basal insulin gives different glycemic profiles in type 1 diabetes (T1D) adolescents regularly

exercising. We conducted a study (GLiDE Study) to compare Glargine (GL) and Degludec (DE) insulin and to evaluate the percentage of time in range 70-180 mg/dl (TIR), below range (TBR) and above range (TAR) in T1D adolescents during a sport-school camp.

Methods: Twenty-seven moderate active adolescents with T1D for at least 1 year, using either GL or DE, without co-morbidities (such as celiac or hypothyroidism), were selected to participate in a 4-day sport-school camp with different sessions of exercise.

Before camp, patients underwent physical activity tolerance test to evaluate maximum heart rate and aerobic fitness. Patients' clinical data and fitness levels are represented in the Table.

During camp, patients reduced both basal insulins by the same amount (20%). They wore a glucose sensor (Dexcom ® G6) to be constantly, remotely monitored to prevent hypoglycemia (glucose < 70 mg/dL). All corrections were decided upon glucose value adjusted for the trend. Data were compared with values obtained 3 days before the camp. All patients also wore a heart rate sensor (Polar ® H10) to monitor heart rate while exercising.

	Glargine (n=16)	Degludec (n=11)	p-value
Age (yrs)	15 [14.25 - 17]	16 [15 - 17]	ns
BMI	23.5 [22.2 - 24.55]	21.9 [20.5 - 24.9]	ns
HbA1c (%)	7.4 [6.7 - 8.5]	7.5 [7.3 - 8.1]	ns
VO2max (ml/kg/min)	39.9 [35.5 - 43.3]	42.5 [38.2 - 44.6]	ns

[Table 1]

Results: We present preliminary data. Mean TBR before camp was 2.8% in GL and 2.4% in DE, while during camp TBR was 0.6% and 1.6% (p=0.79), respectively. TIR before camp was 66% for GL and 51.3% for DE, while during camp it was 53.2% and 55.9% (p=0.75). TAR before camp was 31.6% for GL and 46.2% for DE, while during camp was 46.1% and 42.6% (p=0.68). Glucose consumption was comparable between groups, both during and after physical activity (p-values > 0.5) and during the night (p-values > 0.9).

Conclusions: Data show an equivalence in TBR, TIR and TAR using two basal insulins during a physical structured sport-school camp.

Poster Tour 13 - Diabetes Care and New Therapeutics

P231

Different alterations in glomerular filtration rate detected by cystatin C in children and adolescents with type 1 diabetes or obesity

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Introduction: Hyperfiltration (HF) is one of the earliest alterations in renal disease associated with diabetes or obesity (OB).

Objectives: To evaluate the prevalence of HF in children and adolescents with type 1 diabetes (T1D) or OB.

Methods: This cross-sectional study included the evaluation of 28 patients with T1D (disease duration, 9±3 ys), 52 with OB and 26 normal-weight (NW). The creatinine and cystatin C-combined Zapitelli formula was used to estimate the glomerular filtration rate (eGFR). HF and low GFR were defined by an eGFR>135 and <90 ml/min.1.73m^2, respectively. Within-subject eGFR coefficient of variation (CV%) was calculated by the Root Mean Square method in 15 T1D patients in two samples drawn within a <6-month period. Chi-square test with Bonferroni's correction for multiple comparisons was used to compare the groups. Correlations were studied by Spearman test.

Results: There were no differences of sex and age between T1D (13 ±3 ys) and OB (13±2 ys), but NW patients were younger (11±3, p<.001). Only one case of HF was observed in NW children. Alterations of the eGFR were similarly prevalent among T1D and OB patients (21 and 25%, respectively p<.005). In T1D patients, HF was the only alteration seen, while low GFR was the most frequent alteration in OB (10/13). The within-subject CV% of the eGFR was 10.5% (95CI, 2.3-18.7%). Among T1D patients, higher eGFR levels were only significantly correlated with triglycerides (r=0.43, p=.023). In OB subjects, lower eGFR values were correlated with metabolic alterations such as increased waist circumference (r= -0.42), LDL-C (r=-0.37) and uric acid (r=-0.39, all p<.010).

Conclusions: Alterations in the eGFR, as assessed with the use of combined Zapitelli formula, were frequent in children and adolescents with T1D or OB. The opposite GFR alterations between these groups may indicate a more rapid decline of renal function in OB or an increase of cystatin C due to OB-associated metabolic abnormalities.

P232

Use of metformin as adjunct therapy in children and adolescents with poorly controlled type 1 diabetes and high insulin requirements. A 52-week randomized placebo-controlled clinical trial

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Background: Insulin resistance is closely linked to puberty and contributes to deteriorate glycemic control in type 1 diabetes. Metformin is an insulin-sensitizing agent that works by increasing the glucose uptake variably in the muscle and reducing hepatic glucose production, thus improving tissue sensitivity to insulin.

Methods: 25 pediatric subjects (9♂ /16♀) with type 1 diabetes with poorly controlled T1D (HbA1c 8-11%) and high insulin requirements (≥0.9 IU/Kg/d for Tanner 1 and ≥1.1 IU/Kg/d for Tanner 2-5) were recruited. 17 subjects completed a 52 week double-blind placebo-controlled trial. Their mean age (years) 12.82 ± 1.51 (10.1-16.2); mean diabetes duration (years) 6.42 ± 3.58 (1.8-13.0); mean HbA1c (%) 9.05 ± 0.71 (8.0-10.8); BMI (Kg/m^2) 21.83± 0.38 (15.2-30.8); insulin requirements (IU/kg/d) 1.29 ± 0.15 (1.10-1.60) with no differences in any of these parameters between metformin and placebo group. For participating subjects, HbA1c, insulin requirements, lipid profile, blood pressure, BMI and severe hypoglycemia episodes were quarterly assessed. Quality of life and treatment satisfaction were assessed at the start and at the end of the trial.

Results: No differences could be observed in HbA1c (metformin 8.55 ± 0.97 vs placebo 8.60±0.98;ns), lipid profile, BMI Z-score (metformin 0.67 vs placebo 0.42; ns), blood pressure or severe hypoglycemia episodes between both groups after 52 weeks of trial. Insulin requirements were significantly lower in the metformin group (metformin 1.15 ± 0.14 vs placebo 1.30 ± 0.28; p=0.044) at the end of study.

Conclusions: Metformin did not decrease HbA1c in pediatric subjects with type 1 diabetes and insulin resistance, although it decreased insulin requirements. No differences between metformin and placebo were seen in other metabolic parameters, adverse effects, quality of life or treatment satisfaction. This is to our knowledge the trial evaluating adjunct therapy with metformin with the longest period of intervention.

P233

Sotagliflozin (SOTA) reduces glucose variability and risk for hyperglycemia in adults with type 1 diabetes

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Introduction and Objectives: Individuals with type 1 diabetes (T1D) face daily challenges in achieving optimal glycemic control by reducing hyperglycemia, while avoiding hypoglycemia. Optimization is reflected by the High/Low Blood Glucose Indices (HBGI/LBGI) - established metrics using self-monitored blood glucose, or continuous glucose monitoring (CGM) data, to assess glycemic variability (GV) and predict the risks of hyper- and hypoglycemia with intensification of therapy.

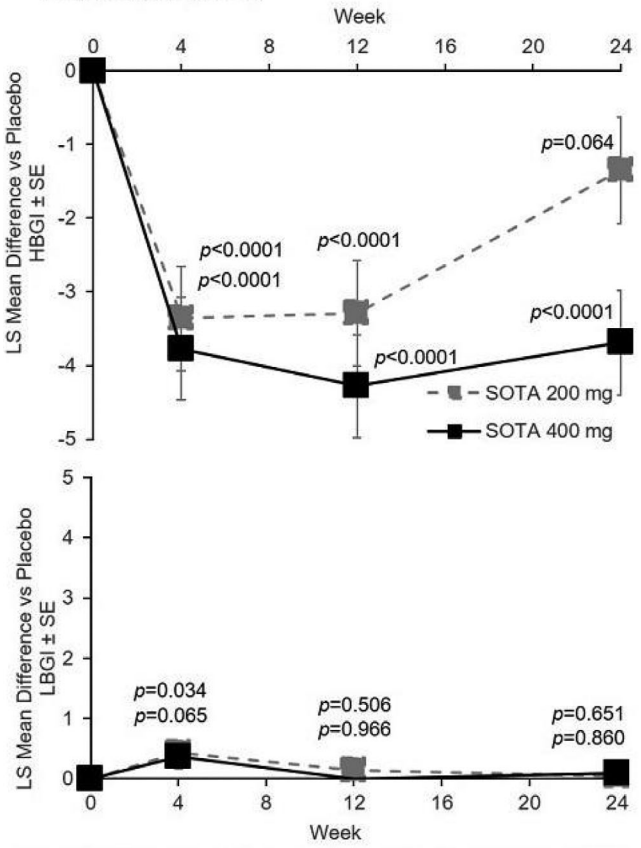
Methods: In the phase 3 inTandem1 and 2 studies, sotagliflozin (SOTA), a dual sodium-glucose cotransporter1 and 2 inhibitor, used as

adjunct to optimized insulin therapy in adults with T1D, reduced HbA_{1c} versus placebo. Significant improvement of glucose time in range (70-180 mg/dL), without increasing time < 70 mg/dL, was previously reported in the pooled CGM substudy. In this analysis (n=265), we evaluated hyper- and hypoglycemic risks with SOTA 200 mg and 400 mg, both taken once daily, using LBGI and HBGI computed from CGM data.

Results: Compared with placebo, HBGI values were lower with SOTA 400 mg at weeks 4, 12, and 24, and SOTA 200 mg at weeks 4 and 12 ($P< 0.0001$) (Figure). The percentage of adults in moderate (4.5-9) or high-risk (>9) HBGI categories was reduced with SOTA throughout the study for both dosages, and minimal changes were seen in LBGI values and risk categories.

Conclusion: The CGM profile showed that SOTA reduced GV through a favorable impact on HBGI without changing LBGI.

Figure. Mean Placebo-Adjusted HBGI and LBGI Change from Baseline through Week 24 (N=265)



Weekly least squares (LS) mean differences and standard errors were obtained from mixed model repeated measure (MMRM) with treatment, randomization strata of insulin delivery (CSII, MDI) and Week 2 HbA1c (≤8.5%, >8.5%), study week, study and treatment-by-time interactions as fixed categorial effects, and baseline value as covariates.
CSII, continuous subcutaneous insulin infusion; HbA1c, hemoglobin A1c; HBGI, high blood glucose indices; LBGI, low blood glucose indices; LS, least squares; MDI, multiple daily insulin injections; MMRM, mixed-model repeated measure; SE, standard error; SOTA, sotagliflozin. HbA1c 8.5% = 69 mmol/mol.

Note: Data were first presented at the American Diabetes Association´s 78th Scientific Sessions, June 7-11, 2019, San Francisco, California, USA, then at the European Association for the Study of Diabetes 55th Annual Meeting, September 16-20, 2019, Barcelona, Spain.

Clinical Trial Registration: NCT02384941; NCT02421510

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P234

Sotagliflozin (SOTA) reduces markers of arterial stiffness in type 1 diabetes (T1D): pooled analysis from inTandem1 and inTandem2 clinical trials

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Objectives: Cardiovascular (CV) disease is a major cause of mortality in type 1 diabetes (T1D). Elevated blood pressure (BP), including both systolic blood pressure (SBP) and diastolic blood pressure (DBP), and increased arterial stiffness are linked to CV events. While sodium-glucose cotransporter2 (SGLT2) inhibitors have shown positive outcomes pertaining to BP and markers of arterial stiffness and vascular resistance in adults with type 2 diabetes, such effects have not been reported previously in T1D. This analysis assessed the effect of SOTA, a dual SGLT1 and SGLT2 inhibitor on BP and markers of arterial stiffness in adults with T1D.

Table. Baseline patient characteristics, and least square mean (SE) changes from Baseline in BP and markers of arterial stiffness to Week 24

		PBO (N=526)	SOTA 200 mg (N=524)	SOTA 400 mg (N=525)
Baseline characteristics				
Demographics	Mean age (years)	43	44	44
	Sex, female (%)	49	49	52
	Diabetes duration (years)	21	22	22
HbA1c	Baseline HbA1c (mmol/mol)	61	61	60
	Baseline HbA1c (%)	7.7	7.7	7.6
CV parameters	Mean sitting SBP (mm Hg)	122.0	121.5	121.3
	Mean sitting DBP (mm Hg)	76.4	76.9	75.8
	Mean pulse rate (beats/minute)	74.5	74.4	73.4
LS mean changes from Baseline to Week 24				
SBP (mm Hg)	LS mean change (SE)	−0.9 (0.5)	−2.9 (0.5)	−3.7 (0.5)
	LS mean difference (SE) vs PBO	N/A	−2.0 (0.7)	−2.9 (0.7)
	P-value vs. PBO	N/A	0.0019	<.0001
DBP (mm Hg)	LS mean change (SE)	−0.1 (0.3)	−1.2 (0.3)	−0.9 (0.3)
	LS mean difference (SE) vs PBO	N/A	−1.1 (0.4)	−0.9 (0.4)
	P-value vs. PBO	N/A	0.0094	0.038
Pulse rate (beats/minute)	LS mean change (SE)	0.62 (0.4)	0.30 (0.4)	0.59 (0.4)
	LS mean difference (SE) vs PBO	N/A	−0.32	−0.04
	P-value vs. PBO	N/A	0.52	0.94
Pulse pressure[a]	LS mean change (SE)	−0.8 (0.4)	−1.8 (0.4)	−2.8 (0.4)
	LS mean difference (SE) vs PBO	N/A	−1.0 (0.5)	−2.0 (0.5)
	P-value vs. PBO	N/A	0.055	0.0002
Mean arterial pressure[b]	LS mean change (SE)	−0.3 (0.3)	−1.8 (0.3)	−1.9 (0.3)
	LS mean difference (SE) vs PBO	N/A	−1.4 (0.4)	−1.6 (0.4)
	P-value vs. PBO	N/A	0.0012	0.0005
Double product[c]	LS mean change (SE)	19.0 (58.4)	−183.5 (58.6)	−202.1 (58.6)
	LS mean difference (SE) vs PBO	N/A	−202.5 (78.3)	−221.1 (78.4)
	P-value vs. PBO	N/A	0.0098	0.0049

[a]Pulse pressure = SBP (mmHg) – DBP (mmHg).
[b]Mean arterial pressure = 2/3 DBP (mmHg) + 1/3 SBP (mmHg).
[c]Double product = pulse rate (beats per minute) x SBP (mmHg).
LS mean changes from Baseline, LS mean differences from placebo and SEs were obtained from mixed model repeated measure analysis with treatment, randomization strata of insulin delivery (CSII, MDI) and baseline Week -2 HbA1c category (≤8.5%, >8.5%), study week, study, and treatment-by-time interactions as fixed categorical effects, and Baseline value as a covariate.
BP, blood pressure; CSII, continuous subcutaneous insulin infusion; CV, cardiovascular; DBP, diastolic blood pressure; HbA1c, hemoglobin A1c; LS, least squares; N/A, not available; MDI, multiple daily insulin injections; PBO, placebo; SBP, systolic blood pressure; SE, standard error; SOTA, sotagliflozin. HbA1c 8.5% = 69 mmol/mol.

Methods: When added as an adjunct to insulin therapy, SOTA has previously demonstrated significant SBP reduction versus placebo in adults with T1D. In this post hoc analysis, several indirect markers of arterial stiffness including pulse pressure (PP), mean arterial pressure (MAP), and double product (DP), were calculated using observed SBP, DBP, or pulse rate at week 24 using pooled data (n=1575) from the inTandem1 & 2 studies.

Results: Baseline characteristics were similar among groups. Significant placebo-adjusted reductions were observed at week 24 for SOTA 200 mg and 400 mg in SBP, DBP, MAP, and DP, and in PP for SOTA 400 mg (Table). The reductions in BP were not associated with increases in pulse rate.

Conclusion: Treatment with SOTA in adults with T1D resulted in significant reduction in BP and several indirect markers of arterial stiffness and vascular resistance.

Note: Data were first presented at the American Diabetes Association´s 78th Scientific Sessions, June 7-11, 2019, San Francisco, California, USA, then at the European Association for the Study of Diabetes 55th Annual Meeting, September 16-20, 2019, Barcelona, Spain.

Clinical Trial Registration: NCT02384941; NCT02421510

Support: Study funded by Lexicon Pharmaceuticals, Inc., and analysis sponsored by Sanofi.

P235

Sotagliflozin (SOTA), a dual sodium glucose cotransporter (SGLT)1 and SGLT2 inhibitor, in overweight/obese patients with type 1 diabetes (T1D): addressing unmet needs as adjunct therapy to insulin

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Objectives: Up to 50% of adults with T1D are overweight or obese, which contributes to increased risk of micro- and macrovascular complications. In the phase 3 inTandem1 and 2 studies, SOTA as an adjunct to insulin improved glycemic control and reduced body weight (BW) in adults with T1D. In this analysis, we evaluated the effects SOTA in T1D adults with baseline body mass index (BMI) ≥27 kg/m^2.

Methods: In this post hoc analysis, main efficacy (24-weeks) and safety (52-weeks) data from pooled inTandem1 and 2 studies were analyzed in patients with baseline BMI ≥27 kg/m^2.

Results: Baseline characteristics were comparable among groups. Addition of SOTA 200 and 400 mg resulted in greater glycated hemoglobin (HbA1c), increased % of time-in-range (70-180 mg/dL) by continuous glucose monitoring and BW reduction vs insulin alone (PBO). Systolic blood pressure (SBP) reduction was greater than PBO with SOTA 400 mg. Safety profile was consistent with published data. There were numerically fewer severe hypoglycemia events and fewer documented hypoglycemia ≤55 mg/dL events in the SOTA arms vs PBO, but a higher incidence of diabetic ketoacidosis positively adjudicated in the SOTA arms as "yes with certainty" and "yes probably" vs PBO (Table). Overall there was a trend for an improved efficacy and safety profile in patients with baseline BMI ≥27 kg/m^2, comparable with the overall study population.

Conclusions: SOTA as adjunctive therapy to insulin in overweight/obese patients with T1D addresses several unmet needs in this high-risk population, improving glycemic control while reducing weight and SBP, with an acceptable safety profile.

Table. Results in the subpopulation with BMI ≥27 kg/m²

		PBO (n=298)	SOTA 200 mg (n=305)	SOTA 400 mg (n=313)
Efficacy: LS mean changes from baseline (after 6-week insulin optimization[a]) to week 24				
HbA1c	HbA1c at baseline, % HbA1c at week 24, % LSMD vs PBO[b], % (*P*-value)	7.62 7.61 N/A	7.72 7.27 −0.39 (<0.001)	7.63 7.13 −0.45 (<0.001)
TIR[c]	TIR at baseline, % TIR at week 24, % LSMD vs PBO[b], % (*P*-value)	50.68 49.05 N/A	52.155 58.39 8.17 (0.007)	50.317 65.64 15.05 (<0.001)
BW	BW at baseline, kg BW at week 24, kg LSMD vs PBO[b], kg (*P*-value)	94.20 94.30 N/A	94.68 92.55 −2.27 (<0.001)	93.66 90.89 −3.32 (<0.001)
SBP	SBP at baseline, mmHg SBP at week 24, mmHg LSMD vs PBO[b], mmHg (*P*-value)	124.3 122.7 N/A	124.6 121.6 −1.3 (0.13)	123.6 119.9 −2.5 (0.005)
Main safety results from randomization to week 52				
SH	EAIR per 100 patient-years (95% CL) Risk difference of EAIR (95% CL)	8.10 (4.71, 11.49) N/A	4.65 (2.12, 7.18) −3.45 (−7.67, 0.77)	4.10 (1.78, 6.42) −3.99 (−8.10, 0.10)
Documented hypoglycemia	≤55 mg/dL [3.1 mmol/L]: event rate (95% CL) ≤55 mg/dL [3.1 mmol/L]: event rate difference (95% CL)	17.99 (15.86, 20.13) N/A	13.75 (12.12, 15.37) −4.25 (−6.93, −1.57)	14.57 (12.88, 16.26) −3.42 (−6.14, −0.70)
DKA[d]	EAIR per 100 patient-year (95% CL) Absolute risk difference of EAIR (95% CL)	0.36 (0.00, 1.09) N/A	2.86 (0.87, 4.84) 2.49 (0.38, 4.60)	3.76 (1.53, 5.98) 3.39 (1.05, 5.73)

CL, confidence limits; EAIR, exposure adjusted incidence rate; LSM, least squares mean; LSMD, least squares mean difference; SH, severe hypoglycemia; TIR, time in range. [a]Six-week insulin optimization period prior to randomization; insulin optimization continued throughout the study in placebo and SOTA groups. [b]Statistical comparisons of each SOTA arm to placebo were descriptive and performed using a generalized linear model with repeated measures statistics. [c]Sub-study in 58, 59 and 65 patients. [d]Both "yes, with certainty" and "yes, probably" were adjudicated positively as an event of diabetic ketoacidosis.

Note: Data were first presented at the European Association for the Study of Diabetes 55th Annual Meeting, September 16-20, 2019, Barcelona, Spain.

Clinical Trial Registration: NCT02384941; NCT02421510

Support: Sponsored by Lexicon Pharmaceuticals Inc. and Sanofi.

P236

Lower risk for severe hypoglycemia with Gla-300 vs. Gla-100 in patients with type 1 diabetes: a meta-analysis of 6-month phase 3 clinical trials

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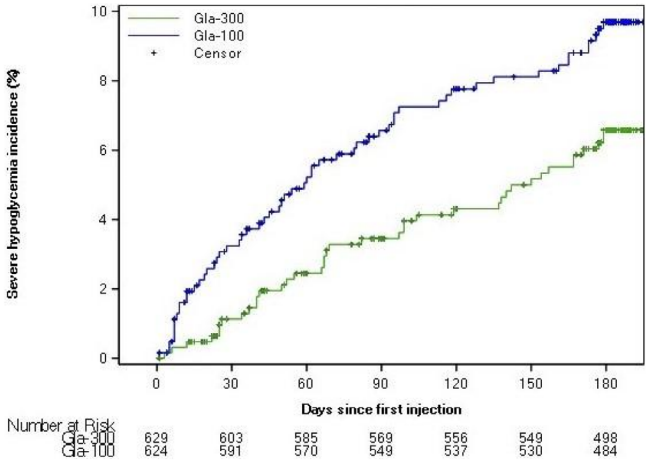
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Objectives: In this *post-hoc* meta-analysis the 6-month data sets from three randomized controlled open-label phase 3 trials with insulin glargine 300 U/ml (Gla-300) vs. insulin glargine 100 U/ml (Gla-100) in patients with type 1 diabetes (T1D) were pooled for analysis of severe hypoglycemia.

Methods: All three trials had a similar design for regulatory purposes and achieved their primary endpoint of HbA_{1c} non-inferiority of Gla-300 vs. Gla-100. Different T1D patient populations were studied: EDITION 4 (n=549) and JUNIOR (n=463) were conducted worldwide, EDITION JP1 (n=243) was conducted in Japan. EDITION 4 and EDITION JP1 studied only adult patients (age ≥18 years), JUNIOR children and adolescents (age 6-17 years). In the T1D study pool, 629 patients were treated with Gla-300 and 624 patients received Gla-100 along with prandial insulin. Severe hypoglycemia was defined 1) in *adults* as hypoglycemic event that required assistance of another person to actively administer carbohydrate, glucagon, or other resuscitative actions, or 2) in *children and adolescents* as having altered mental status and inability to assist in their care, being semiconscious or unconscious, or in coma ± convulsions that may require parenteral therapy (glucagon and/ or glucose).

Results: During the 6-month treatment period fewer patients experienced severe hypoglycemic events with Gla-300 vs. Gla-100 in the T1D Study Pool: 39 (6.2%) vs. 58 (9.3%) patients; Odds Ratio 0.65, 95%-CI [0.42; 0.98]. The Kaplan-Meier plot (Stratified Log-rank-Test: p=0.038) demonstrated the persistence of the risk reduction over time (Figure). Similarly, the event rate for severe hypoglycemia was numerically lower with Gla-300 vs. Gla-100 (0.23 events/patient-year vs. 0.29 events/patient-year; Relative Risk 0.80, 95%-CI [0.49; 1.29]).

Conclusions: Gla-300 showed a lower risk for severe hypoglycemia as compared to Gla-100 in a broad spectrum of patients with T1D.



[Cumulative incidence of patients with ≥1 episode of severe hypoglycemia]

P237
Quality assurance of insulin vials using NMR (Nuclear Magnetic Resonance) spectroscopy

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Introduction: Insulin is a delicate biologic requiring careful handling both at production and after leaving the factory to ensure that the positive response reducing glucose levels remain, and any never so unlikely negative side effect is avoided. However, sometimes also experienced users claim that the insulin in a vial does not work as expected making it difficult to argue that the cause is only due to incorrect handling by the user.

Objectives: Occasions when the integrity of insulin vials can be questioned, calls for new, more precise and sensitive methods to verify the structural integrity and quality of insulin than is currently used.

Methods: NMR spectroscopy provides a molecular fingerprint of structural integrity on the atomic level.

Results: We find by using NMR techniques a noticeable variability between batches from some producers, whereas batch variation from other producers is negligible. Since the investigated products are well established we assume that any structural variation of the former has no or limited impact on the function. Our findings show that NMR, as an analytical technique, provides the necessary accuracy and precision to verify insulin integrity.

To address the potential impact on insulin integrity by incorrect storage, we have investigated the molecular fingerprint of insulin after exposure to maltreatment, imitating real life-possible scenarios such as a couple of hours in a hot car or repeated freeze-thaw cycles as could be the case when storing insulin in a fridge.

Conclusions: We show, by either using advanced NMR experiments giving detailed structural data, or robust but still sensitive NMR experiments available to most NMR laboratories, that it is possible to detect exposure to maltreatment of insulin vials. The latter, being relatively inexpensive, has the potential to be used on regular basis for quality assurance of larger number of insulin vials in independent laboratories without connections to either users or industry.

P238
The diabetes drug metformin reverses cognitive impairment and attenuates insulin receptor in diabetic aging female rat brain: a link with diabetes and Alzheimer's disease

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Objectives: The emerging view is that diabetic brain features many symptoms that are best described as accelerated brain aging. The objective of this study was to investigate effects of metformin on body weight, blood glucose levels, glucose transporter (GLUT1), interleukin 1 β (IL-1β) and protein kinase B expression, antioxidant enzymes levels, expression of synaptic molecules synaptophysin and synapsin I, biomarkers of oxidative stress, lipid peroxidation, membrane fluidity and acetylcholinesterase (AChE) in diabetic aging brain of female rats.

Methods: Young (3 months) adult (12 months) and aged (24 months) rats will be diabetic by using alloxan monohydrate. Metformin was administered i.p. at a dose of 200 mg/kg/day for 30 days to both control and diabetic aging rats. A detailed study was carried on expression

of inflammatory cytokines, insulin receptor pathology and synapse, GLUT 1, biomarkers of oxidative stress and AChE activity. Morris water maze with expression of synaptic molecules synaptophysin and synapsin I and ultrastructural studies of brain region by magnetic resonance imaging.

Results: Present study shows that there was a similar pattern of increased expression of interleukin, protein kinase B, lipid peroxidation with AChE activity, and a decrease in membrane fluidity, lipid peroxidation, antioxidant enzymes activity, and (GLUT1) expression in brain of both aging and diabetes. On the other hand, metformin treated groups exhibited significant reduction in helped to reverse the age related changes studied, to normal levels. Metformin treatments improved attention and memory functions with enhanced the levels of synaptic molecules. Our data showed that exogenous administration of metformin brought these changes to near normalcy in diabetic aging female rats.

Conclusions: The results illuminate mechanisms of neuroprotection by metformin, and applying new strategies for control of age related disorders including metabolic syndrome.

P239

Sotagliflozin (SOTA) leads to lower rates of clinically relevant hypoglycemic events at any HbA1c level at week 52 in adults with type 1 diabetes (T1D)

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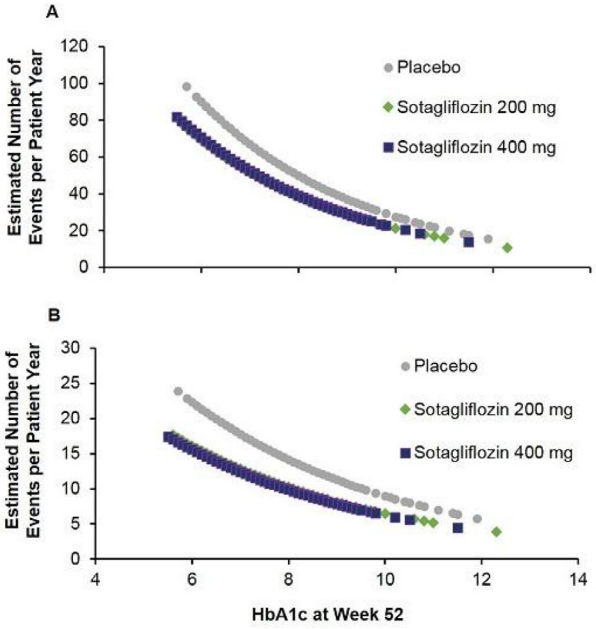
Objectives: Hypoglycemia (HYPO) is a major barrier in achieving optimal glycemic control in T1D. Intensifying insulin therapy to lower HbA_{1c} is frequently accompanied by an increased risk of HYPO. In two 52-week phase 3 studies (inTandem1 and 2), SOTA, a dual sodium-glucose cotransporter 1 and 2 inhibitor as an adjunct to optimized insulin therapy, produced significant reduction in glycated hemoglobin (HbA_{1c}) and body weight without increasing the risk of severe HYPO compared with placebo (PBO) in adults with T1D. The aim of this analysis was further to evaluate the HYPO profile of SOTA added to insulin.

Methods: We analyzed rates of confirmed HYPO (Level 1, glucose < 70 mg/dL but ≥54 mg/dL in the study) and clinically important HYPO (Level 2, glucose < 54 mg/dL in the study) in a patient-level pooled analysis (n=1362) using a negative binomial model adjusted for HbA_{1c} at week 52.

Results: Rates of Level 1 HYPO events per patient year were 58.25, 44.86, and 45.68 for PBO, SOTA 200 mg, and 400 mg, respectively ($P< 0.05$ vs PBO for both doses). Significantly lower rates ($P< 0.0001$ vs PBO for both doses of Level 2 HYPO were also observed (15.95, 11.51, and 11.13 for PBO, SOTA 200 mg, and 400 mg, respectively). HYPO rate reduction was more pronounced at lower HbA_{1c} with SOTA vs PBO (Figure).

Conclusions: At week 52, overall Level 1 and 2 HYPO event rates were 22%-30% lower with SOTA when used as adjunct to optimized insulin therapy vs PBO and were reduced at any HbA_{1c} level, especially at lower HbA_{1c} values.

Figure. Estimated Number of (A) Treatment-Emergent Documented Level 1 Hypoglycemia Events and (B) Level 2 Hypoglycemia Events per Patient-Year of Exposure from Baseline to Endpoint Adjusted on HbA_{1c} at Week 52 Endpoint†



†Level 1 hypoglycemia is defined as plasma glucose <70 mg/dL but ≥54 mg/dL; Level 2 hypoglycemia is defined as plasma glucose <54 mg/dL.

Note: Data were first presented at the American Diabetes Association´s 78th Scientific Sessions, June 7-11, 2019, San Francisco, California, USA, then at the European Association for the Study of Diabetes 55th Annual Meeting, September 16-20, 2019, Barcelona, Spain.

Clinical Trial Registration: NCT02384941; NCT02421510

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P240

Insulin Glargine 300 U/mL (Gla-300) provides effective glycemic control in youths with type 1 diabetes (T1D): the EDITION JUNIOR study

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Introduction: Gla-300 is a second-generation basal insulin analog, approved for the treatment of diabetes in adults, with a longer duration of action and lower hypoglycemia risk than insulin glargine 100 U/mL (Gla-100).

Objective: To test the non-inferiority of change in HbA_{1c} and to compare safety and secondary efficacy endpoints of Gla-300 with Gla-100 in youths with T1D aged 6-17 years.

Methods: This study (NCT02735044) was an international, multicenter, open-label, two-arm, parallel-group, phase 3b trial. The main treatment period was 26 weeks. Participants were randomized 1:1 to once-daily Gla-300 (n=233) or Gla-100 (n=230), previous mealtime insulin analogs were continued. Primary endpoint: change in HbA_{1c} from baseline to week 26. Secondary endpoints included change in fasting plasma glucose (FPG) and achievement of glycemic targets (HbA_{1c} < 7.5 %; FPG ≤130 mg/dL [≤7.2 mmol/L]). Safety endpoints included hypoglycemia and hyperglycemia with ketosis.

Results: Baseline HbA_{1c} and FPG were similar in both groups. Non-inferiority of Gla-300 vs Gla-100 in HbA_{1c} reductions from baseline to week 26 was demonstrated and change in FPG from baseline to week 26 was similar between groups (**Table**). Glycemic target achievement was similar between groups. Incidence and event rates of documented (≤70 mg/dL [≤3.9 mmol/L]) or severe hypoglycemia were similar between treatment groups. Numerically fewer participants in the Gla-300 vs Gla-100 group reported severe hypoglycemia (6.0% vs 8.8%). The incidence of any hyperglycemia with ketosis was lower with Gla-300 vs Gla-100 (6.4% vs 11.8%). No new or unexpected safety concerns were identified.

Conclusions: Results show that Gla-300 provided similar glycemic control to Gla-100 in youths with T1D. Both insulins had similar safety profiles, but a trend towards lower risk of severe hypoglycemia and hyperglycemia with ketosis was seen with Gla-300.Study sponsored by Sanofi (NCT02735044).

Efficacy outcomes (ITT population)[a]		**Gla-300 (N=233)**	**Gla-100 (N=230)**	**LS mean difference (95% CI)**
HbA_{1c}, %	Baseline (SD) LS mean change from baseline to week 26 (SE)	8.7 (0.9) -0.4 (0.1)	8.6 (0.9) -0.4 (0.1)	0.00 (-0.17 to 0.18)[c]
FPG (mg/dL)	Baseline (SD) LS mean change from baseline to week 26 (SE)	202.7 (90.3) -10.1 (6.7)	204.5 (91.3) -9.9 (6.7)	-0.25 (-18.55 to 18.04)
HbA_{1c} target achievement, n (%)				**RR (95% CI)**
	HbA_{1c} <7.5 % at week 26	61 (26.2)	54 (23.5)	1.11 (0.81 to 1.51)
	HbA_{1c} target without documented (<54 mg/dL [<3.0 mmol/L]) or severe hypoglycemia	10 (4.3)	11 (4.8)	0.90 (0.40 to 2.03)
FPG target achievement, n (%)				**RR (95% CI)**
	FPG ≤130 mg/dL (≤7.2 mmol/L) at week 26	64 (27.5)	61 (26.5)	1.03 (0.77 to 1.40)
	FPG target without documented (<54 mg/dL [<3.0 mmol/L]) or severe hypoglycemia	22 (9.4)	17 (7.4)	1.27 (0.70 to 2.31)
Safety outcomes (safety population)[b]		**Gla-300 (N=233)**	**Gla-100 (N=228)**	
Participants experiencing ≥1 hypoglycemic event, n (%)				**RR (95% CI)**
	Anytime (24 h) documented (≤70 mg/dL [≤3.9 mmol/L]) or severe	226 (97.0)	223 (97.8)	0.99 (0.96 to 1.02)
	Nocturnal documented (≤70 mg/dL [≤3.9 mmol/L]) or severe (00:00–05:59 h)	163 (70.0)	160 (70.2)	1.00 (0.88 to 1.12)
	Anytime (24 h) severe	14 (6.0)	20 (8.8)	0.68 (0.35 to 1.30)
Annualized rates of hypoglycemic events, number of events (rate per participant-year)				**Rate ratio (95% CI)**
	Anytime (24 h) documented (≤70 mg/dL [≤3.9 mmol/L]) or severe	10,341 (90.3)	10,077 (90.0)	0.99 (0.84 to 1.17)
	Nocturnal documented (≤70 mg/dL [≤3.9 mmol/L]) or severe (00:00–05:59 h)	933 (8.1)	875 (7.8)	1.03 (0.80 to 1.32)
	Anytime (24 h) severe	21 (0.18)	30 (0.27)	0.69 (0.32 to 1.50)
TEAEs	Participants with any TEAE, n (%)	152 (65.2)	150 (65.8)	
	Participants with ≥1 TEAE of hyperglycemia and ketosis, n (%)	15 (6.4)	27 (11.8)	

[a]The ITT population includes all randomized patients regardless of whether the treatment was used and was analyzed according to the treatment group allocated at randomization. [b]The safety population was defined as the randomized population who received ≥1 dose or part of a dose of Gla-300 or Gla-100 and was analyzed according to treatment received. [c]Non-inferiority of Gla-300 to Gla-100 in HbA_{1c} reductions from baseline to week 26 demonstrated.

Change from baseline to week 26 in HbA_{1c} and FPG were assessed using a multiple imputations approach followed by analysis of covariance; LS mean and LS mean differences between groups were combined using Rubin's formula. To assess non-inferiority of the primary endpoint (HbA_{1c} reductions from baseline to week 26), the upper bound of the two-sided 95% CI for the difference in the mean change in HbA_{1c} between Gla-300 and Gla-100 was compared with the non-inferiority margin of 0.3 % HbA_{1c}. The proportion of participants reaching HbA_{1c} and FPG targets and proportion of participants with ≥1 hypoglycemic event in each category was compared between treatment groups using Cochran-Mantel-Haenszel method. Rate ratio based on a negative binomial model. Other safety analyses were analyzed descriptively.

CI, confidence interval; FPG, fasting plasma glucose; ITT, intent-to-treat; LS, least squares; RR, relative risk; SD, standard deviation; SE, standard error; TEAE, treatment-emergent adverse event

[Table.]

Posters on Display – New Insulins and Pharmacologic Agents

P241
To evaluate the efficacy and safety of the IDegAspart in type 1 diabetic patients

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Methods: 16 patients' data were collected in 24 months duration from case record. Patient's demographic details along with baseline glycemic parameters and medications were studied.

Inclusion: Type 1 diabetes

Age: more 16 years

Duration: more than 1 year with disease

Mean HbA1c:10.19%, FBS :192.68 mg/dl, PPG:274.68 mg/dl

The study was carried out retrospectively at Arogyam Health Care Centre-a tertiary diabetes clinic in Ahmedabad, India. These patients were prescribed with IDegAsp once along with bolus insulin, in order to achieve targeted blood glucose range. The previous prescription included a basal bolus regimen

Patients were advised SMBG, diet control & moderate exercise. The dose was titrated whenever required telephonically if FBG was above 130 mg/dl & PPG was above 180mg/dl. These patients were studied for 2 year and follow up was scheduled every 3 months.

Result: After follow up at 6-7 months, the mean change in HbA1C after initiating patient on IdegAspart was 1.67, FPG 40.37mg/dl and PPG 80.12 mg/dl. The change in body weight was marginal and numerically lower rate of hypoglycaemia.

Conclusion: IDegAsp provides similar, non-inferior glycemic control to a standard basal-bolus regimen in patients with type 1 diabetes mellitus, with additional benefits of significantly lower episodes of hypoglycemia (particularly nocturnal) and fewer daily insulin injections.

P242
Evolution of the designs of the sitagliptin pediatric clinical studies

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Objectives: Approved antihyperglycemic therapies for pediatric patients with T2D are currently limited to metformin and insulin. Sitagliptin is being evaluated in 3 studies in patients 10-17 years of age with T2D: sitagliptin as initial oral therapy, MK-0431 P083; sitagliptin as add-on to metformin administered as a fixed dose combination (FDC), MK-0431A P170; and sitagliptin as add-on to metformin extended-release administered as an FDC of sitagliptin and metformin XR, MK-0431A XR P289.

Methods: The studies, conducted to fulfill post-marketing requirements and a Pediatric Investigation Plan (EU), were initiated between 2011 and 2013; enrollment completed in 2018. Study protocols were amended since initiation to accommodate regulatory agency requirements, reduce patient burden related to study conduct, and improve patient accrual.

Results: Major amendments to the protocols and their rationales are summarized in the Table. The impact on enrollment of 2 amendments common to all 3 studies were quantifiable. Of patients randomized after approval of an amendment that broadened the HbA1c entry criterion (from lower limit of 7.0% to 6.5%), ~34% in P083, ~20% in P170 and ~20% in P289 had a baseline HbA1c between 6.5% and 6.9%. Of patients randomized after approval of an amendment to include patients on background insulin, 11% of patients in P083, 22% in P170, and 19% in P289 enrolled on background insulin.

Conclusion: Despite reports of increasing prevalence of T2D in pediatric populations, these trials are difficult to enroll for a variety of reasons. Our experience and the results of various study amendments indicate that flexibility in trial design may be required to enroll such studies.

Table Summary of major amendments to Protocols 083, 170 and 289.

Major Design features/Change	Rationale
Changes in Study Procedures	
Metformin monotherapy arm dropped from P083 leaving only sitagliptin and placebo arms	To enhance enrollment into sitagliptin treatment arm: endorsed by agencies as metformin therapy profile is well-established
Primary endpoint of P083 changed from 16 to 20 weeks	Agency requirement
Clinic visits reduced from 13 to 11 (P083) and from 9 to 6 (P170); number of visits with fasting requirement reduced (both)	Suggested by investigators to ease patient burden and improve recruitment
Inclusion of a dental sub-study in P083	Enabling assessment of dentition by an independent reviewer (agency requirement)
A 34-week extension was added to the P170 20-week base study	To collect longer-term safety data and to facilitate pooling data with P289 (see below)
Assessment of swallowability in P289 interim analysis dropped	Agency position change, requirement withdrawn
In all studies, patients who discontinued study medication to be urged to continue in the study	Required by the agency to reduce missing data in clinical trials
Changes in Inclusion Criteria	
Diagnosis of T2D for P083 may occur both prior to (originally) or at screening	To improve recruitment
HbA1c entry criteria changed for all studies: 6.5% (not 7.0%) to 10.0%	Suggested by investigators to improve recruitment
Inclusion of patients on background insulin in all studies	Acceptance from agencies to include these patients to improve recruitment
Other Changes	
Sample sizes reduced to ≥90 evaluable patients/arm in all studies	Acceptance from agencies to: 1. reduce power to 80% in pediatric T2DM studies; 2. pool data from P170 and P289

P243
InRange: a randomized controlled trial comparing Gla-300 vs IDeg-100 in people with type 1 diabetes (T1D) using continuous glucose monitoring (CGM)

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Introduction: Insulin glargine 300 U/mL (Gla-300) and insulin degludec 100 U/mL (IDeg-100) have shown slightly different pharmacokinetic/pharmacodynamic profiles; however, the first head-to-head randomized controlled trial in insulin-naïve people with type 2 diabetes (T2D) demonstrated similarity in clinical endpoints, except during the 0-12 week period when results were in favor of Gla-300 for anytime hypoglycemia.

Objective: InRange aims to assess the clinical impact of Gla-300 and IDeg-100 in people with type 1 diabetes (T1D) by assessing primarily continuous glucose monitoring (CGM) endpoints.

Methods: The study will include approximately 340 people with T1D aged 18-70 years, on a basal + mealtime insulin regimen for ≥1 year, and HbA_{1c} ≥7 % and < 10 %. The screening period (1-2 weeks) will be followed by a 4-week run-in (background insulin treatment optimization including 2-weeks baseline CGM) and a 12-week randomized treatment period after basal insulin switch to Gla-300 or IDeg-100 (titrated to the target glucose range without hypoglycemia). During the randomized period, CGM will be performed at weeks 11-12 according to the most recent CGM consensus statement and ADA guidelines. The primary endpoint will be analyzed using a mixed-effect model with repeated measures approach.

Conclusions: The objectives are to assess the percentage time in range for glucose (70-180 mg/dL [3.9-10 mmol/L]) (primary endpoint) at week 12, and glucose variability (reported as coefficient of variation [total, within day, between day]); in addition to other clinical outcomes such as occurrence and frequency of hypoglycemia (severe; documented symptomatic; and asymptomatic (< 70 mg/dL [< 3.9 mmol/L], < 54 mg/dL [< 3.0 mmol/L])).

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P244
Clinical trial of the use of sitagliptin in pediatric patients with T2D: baseline characteristics

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Objective: MK-0431-P083, a multinational, 54-week, phase III study of the DPP-4 inhibitor sitagliptin as initial oral therapy in patients 10-17 years of age with T2D, was initiated in 2012 and completed enrollment in 2018.

Methods: A total of 201 patients with T2D who were either drug-naïve or on insulin alone at study entry were randomized and treated. Baseline characteristics of this population were summarized in a preliminary analysis and are presented below.

Results: Mean±SD age was 14.0 ±2.0 years, ~58% were < 15 years of age, and ~61% were female. The majority (~53%) were White, 14.9% were Asian, 5.5% were Black, and ~19% were multiracial; ~37% described themselves as Hispanic. The mean±SD duration of T2D was 0.7 ± 1.2 years, with ~17% of participants having a duration ≥1 year. Approximately 11% of participants were on insulin at study entry. Data for continuous endpoints are presented as mean ± SD. BMI was 32.2 ± 7.7 $kg.m^{-2}$, waist circumference was 100.9 ± 17.5 cm, systolic and diastolic BP were 115.5 ± 10.6 mm Hg and 70.5 ± 8.5 mm Hg, respectively, A1C was 7.5% ± 1.0, FPG was 138.3 ± 45.2 mg/dL, triglycerides were 137.4 ± 73.8 mg/dL, eGFR (calculated using the MDRD formula) was 200.4 ± 61.1 mL/min/1.73 m^2, ALT and AST levels were 27.3 ± 18.4 IU/L and 21.6 ± 9.8 IU/L, respectively. Among females, ~71% had Tanner IV-V breast development, and among males, ~63% had Tanner IV-V testicular development. These baseline data show that most participants in this study were drug-naïve, with a relatively short duration of T2D, and were predominantly female, White, and sexually mature. They were significantly obese, with central adiposity.

Conclusion: Except for race, the demographic and anthropometric characteristics and the A1C and FPG of the participants in this global study are consistent with previous reports of patients predominantly from the United States. In addition, these baseline data confirm reports of glomerular hyperfiltration in pediatric patients with T2D.

P245
Changes observed during the screening period in patients enrolled in the sitagliptin clinical study MK-0431 P083

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Objectives: MK-0431-P083, a 54-week phase III study of the DPP-4 inhibitor sitagliptin as initial oral therapy in patients 10-17 years of age with T2D was initiated in 2012 and completed enrollment in 2018. After informed consent was obtained, patient screening was initiated with a screening visit (V1), followed by a single-blind, placebo run-in (V2) for 1 week, after which they were randomized (V3, *N* = 201).

Methods: The changes observed in select laboratory and anthropometric parameters in these 201 patients between V1 and V3, and adverse events (AEs) reported during the 1-week placebo run-in (V2 to V3), were summarized in a preliminary analysis. Results (mean ± SD [95% confidence interval]) are presented below.

Results: Between V1 and V3 (25 ± 7 days, median 23 days), HbA1c decreased from 7.7% ± 1.0 to 7.5% ± 1.0, a change (Δ) of -0.23% ± 0.67 (-0.32, -0.13), while FPG was unchanged. Changes were also observed in ALT (Δ: -2.55 ± 11.21 IU [-4.15, -0.95]) and AST (Δ: -1.93 ± 9.08 IU [-3.22, -0.63]). Weight and lipid parameters were unchanged. Between V2 and V3, 75 AEs were reported for 40 patients (~20% of the randomized patients). Of these AEs, 3 were assessed to be drug-related by the investigators: 2 AEs of nervousness and dyspepsia in 1 patient, and an AE of worsening gastroesophageal reflux in another. None of the 75 AEs were assessed to be severe, and none led to discontinuation from the study.

Conclusion: These data suggest that changes may be observed in glycemic parameters during a screening period of < 4 weeks. Furthermore, during the 1-week placebo run-in period, AEs were reported for nearly 20% of patients; remarkably, despite being told that patients received only placebo during this period, investigators considered some of the AEs to be drug-related.

P246

The impact of sotagliflozin (SOTA), a dual sodium-glucose cotransporter (SGLT) 1 and 2 inhibitor, on renal function, albuminuria, systolic blood pressure (SBP) and diastolic blood pressure (DBP) in adults with type 1 diabetes (T1D)

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Objectives: SGLT2 inhibitors reduce cardiovascular risk and diabetic kidney disease (DKD) progression in type 2 diabetes (T2D). As several mechanisms of DKD progression overlap in people with T2D or T1D, we assessed if SOTA had renoprotective effects in T1D.

Methods: In a 52-week pooled analysis of the inTandem1 & 2 trials, 1575 adults were randomized to SOTA 200 mg, 400 mg, or placebo (PBO) plus optimized insulin therapy. Mean changes in estimated glomerular filtration rate (eGFR), urinary albumin-to-creatinine ratio (UACR), SBP and DBP from baseline to week (W) 52 were compared with PBO.

Results: From a baseline eGFR (±SEM) of 89.3±0.86 mL/min/1.73 m^2, mean eGFR reduction was -2.50±0.63 mL/min/1.73 m^2 vs PBO after 4 weeks for SOTA 200 mg; a similar change was observed with 400 mg (P< 0.0001 for both). From W4 to W52, although lower than PBO, eGFR tended to return toward baseline. At W52, eGFR was -1.96±0.76 (P=0.01) and -0.49±0.76 mL/min/1.73 m^2 (P=0.52) for SOTA 200 mg and 400 mg vs PBO, respectively. SBP and DBP decreased significantly with both doses of SOTA vs PBO. In adults with baseline UACR ≥30 mg/g, UACR decreased by 23.7±12.9% (P=0.05) and 18.3±13.8% (P=0.18) for SOTA 200 mg and 400 mg, respectively vs PBO. Increases in serum albumin and hematocrit at W12 persisted at W52 with both SOTA doses (P< 0.01).

Conclusion: In adults with T1D, SOTA 200 mg was associated with short- and long-term hemodynamic changes in eGFR and lower UACR. SOTA 200 mg and 400 mg lowered BP and induced mild hemoconcentration. The renal hemodynamic profile of SOTA in T1D is comparable to SGLT2 inhibition in T2D.

Note: Data were first presented at the ADA´s 78th Scientific Sessions, June 7-11, 2019, San Francisco, California, USA, then at the EASD´s 55th Annual Meeting, 16-20th September 2019, Barcelona, Spain.

Clinical Trial Registration: NCT02384941; NCT02421510

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Poster Tour 24 - Diabetes in Developing Countries

P247

Characteristics of type 1 diabetes mellitus in children and adolescents with Down's syndrome in a non-Caucasian population

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Introduction: Down's syndrome (DS) is a genetic disorder caused by the presence of a third copy of chromosome 21. Patients with DS have higher risk of developing type 1 Diabetes Mellitus (T1D) and may have specific clinical features when compared to T1D patients without DS. The low number of patients with this association may be a limitation for developing larger studies. To the best of our knowledge, there is no published data about T1D in DS subjects in non-Caucasian populations.

Objective: To evaluate clinical aspects of children and adolescents with DS and T1D (DS+T1D) in a non-Caucasian population.

Method: An observational, descriptive, cross-sectional and controlled study was performed, comparing patients with DS and T1D to patients with T1D without DS from two academic Hospitals in Sao Paulo, Brazil. Data were obtained accessing medical records and statistical analysis was done using Sigma Stat 3.5 program. Patients with DS and T1D younger than 18 years of age were included. The control group was paired by sex and age, in a proportion of 2 controls : 1 DS +T1D patient.

Results:

Conclusion: In a non-Caucasian population, patients with DS developed diabetes earlier, used a lower insulin dose and achieved better metabolic control than T1D patients without DS. The results were similar to those described in Caucasian population. Further studies are still needed to try to identify causes for these differences.

P248

Improvement in metabolic control in migrant children with type 1 diabetes moving from Central America to Chile

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Background: During recent years, migration to Chile has increased abruptly. Currently, 5.5% of the population was born in another country.

Objective: To describe the clinical characteristics and metabolic control in a group of migrant patients (MP) with type 1 diabetes (T1D) who were admitted to two public hospitals in Chile since 2010.

Method: Patients with T1D, who were born in another country, currently under control in the pediatric unit of 2 tertiary care hospitals in Chile, were evaluated in a descriptive retrospective study.

Results: twenty seven MP were identified. Twenty patients were diagnosed before migration (PRE-M) (Table), admitted in Chile with T1D duration of 3.4 ± 2.5 years. Seven patients had T1D onset once they were living in our country (POST-M).

The MP natal countries were: Venezuela (74%), Colombia (15%), and the remaining were other countries from Central America and Peru (11%). MP represent 12% and 3.5% of the total T1D population served by each hospital. The first MP was admitted in 2012 but most of MP were admitted in the 2016-2019 period (93%).

HbA1c was lower in the last medical visit compared to admission ($p < 0,05$, Table), and a higher proportion of patients were, using insulin and sensitivity ratios, carbohydrate counting and using insulin analogs.

Conclusion: Patients with T1D who have migrated recently from Venezuela and Colombia to Chile show an improvement in HbA1c levels and had learned skills to do intensive insulin treatment. Only recently, migrant patients are part of the population under care in Chilean public hospitals.

	DS + T1D	CONTROLS	P
n=27 patients	9	18	ns
Age (years) (SD)	9,7 (3,1)	9,6 (3,0)	ns
Gender (M/F)	4/5	8/10	ns
Age at diagnosis - y (SD)	4,9 (3,9)	6,4 (3,0)	ns
< 2 years at diagnosis - n (%)	3 (33%)	1 (5,5%)	< 0,05
DKA at diagnosis - n (%)	5 (55,5%)	10 (55,5%)	ns
BMI Zscore (variation)	0,4 (-0,05 to 0,9)	0,3 (-0,02 to 0,9)	ns
HbA1c - % (SD)	7,2 (0,6)	9,1 (2,0)	< 0,05
Total daily insulin dose - U/Kg/d (SD)	0,7 (0,2)	1,0 (0,3)	< 0,05

[Characteristics of patients with DS+T1D and controls (T1D without DS)]

T1D Onset	Visit	Age (y)	HbA1C (%)	NPH (%)	Rapid Analog (%)	Fix Doses (%)	Carb.Count (%)
Pre-M N=20	First Admission in Chile	9.0 ± 3.9	11.0 ± 2.2	40	75	85	10
	Last	9.9 ± 4.8	8.8 ± 1.7*	0	100	45	85
Post-M n=7	Onset Admission	8.7 ± 4.3	10.6 ± 2.9	(-)	(-)	(-)	(-)
	Last	10.6 ± 5.4	8.2 ± 2.3*	0	100	42	48

[Metabolic control and type of treatment in MP. Data is shown as mean ± SD or % of MP at first admission and during the last medical visit.]

P249
"Insulin Akshayapatra" for childhood onset type diabetes in India: three decades [1987 - 2019] dreams, challenges, failures and successes from India

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Introduction: "AKSHAYAPATRA" (Sanskrit: अक्षयपात्र) meaning inexhaustible vessel, is an object from Hindu mythology. It was a wonderful vessel given to Yudishtira by the Lord Surya, which held a never-failing supply of food to the Pandavas every day.

Providing FREE insulin, comprehensive medical care and social support for all poor and needy T1DM children.

Objectives: Illustrate difficulties in management of **pediatric T1DM** in resource limited settings and examine possibilities for further improvement

Outpatient Care Costs: Cost of "Basic / Minimum" Type 1 Diabetes Care per child per year in India (approx.)		
Item	Cost Rupees	Notes
Insulin	5840	Human insulin @ 40 units per day
Blood Glucose Strips	8000	Average 400 strips per year
Insulin Syringes	1500	Average 200 Syringes per year
Laboratory Tests	2500	HbA1C, S Creatinine, Urine Microalbumin, CBC, TSH, Eye- Fundus
Transportation	2000	1 Specialist, 6 general doctors visits
Total	19840	
In the event of need for hospitalisation the expense could well exceed Rs 16000 per hospitalisation (Median cost)		

Strategies	Perceived Effectiveness Score [0-10]	Successful Implementation Score [0-10]
Individual Counselling: Initial, Continued, Reinforcement	10	8
Group Counselling: Classes, Seminars, Workshops	8	6
24 hour helplines: Short term problem solving, Emergencies	10	10
Peer counselling: Motivation by achievers – Role models	8	4
Learning resource materials: Age, Literacy, Language tailored	6	4
Residential camps: Learning + Fun + Confidence building	6	2
"Giving Tree": Friends of DISHA Stars – Support a Child	6	2
Scholarship grant for school and college education	6	2
Mental Health Clinic: Psychology and Psychiatry services	8	4

Methods:

DISHA Free Diabetes Clinic for the Poor [1987 - Ongoing]: Since 2011, 386 children are receiving enhanced support - free insulin [Basal bolus insulin (meal time regular + bedtime NPH) 100%], syringes, health counselling, 24 h help lines, BG meters, 30 BG strips/ month and limited biochemical evaluations **[Changing Diabetes in Children/Life for Child with Diabetes].**

Results: [Mean]**Successes: QID insulin**= in 100%, **SMBG Quantity Score** (number of tests performed per month)= 28/30; **SMBG Quality Score**= 9/10; and **SMBG Accuracy Score:** 9.8/10; **Self-insulin adjustment score**= 6/10; **HbA1C trend (%)** Improvement: 39%; Stable: 50%; Worsening: 11%; **HbA1c< 8%**= Enrolment: 11%, Latest: 23%

Failures: Self-urine ketone testing< 10%; Glucagon injection at home/ school= 0% [unaffordable]

Strengths: Led by pioneers in diabetes health education in India, dedicated staff/ volunteers/ peers [Motto: Service with Devotion], long experience.

Limitations: Need for more structured programs, meagre finances, volunteer manpower time shortage.

Conclusions: In a resource limited setting, philanthropy based health education, counseling and psychosocial support has improved health and welfare in children with diabetes in our community. However, more systematic, committed and culture sensitive [including "Out of Box"] programs are necessary to bridge the health education / care gap between ***haves*** and ***have nots***.

P250
Type 1 diabetes mellitus in Pointe-Noire: epidemiology, glycemic control, outcomes and challenges

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Background: Type 1 diabetes mellitus accounts for 5-10% of diabetes. In developing countries there is a need of specialists and access to insulin. Difficult access to insulin and lack of awarness lead to frequent interruption of treatment, acute complications and early mortality. In Pointe-Noire (Republic of Congo), the opening of the first specialized endocrine service in 2010 and the its inclusion in the «Life for a Child» in 2012 improved access to insulin and management of T1DM.

Objectives: To describe epidemiological aspects and appreciate glycemic control and outcomes of patients living with T1DM in Pointe-Noire.

Patients and methods: Prospective study conducted in the endocrine service of the General Hospital Adolphe SICE from 2010 à to 2019. All T1D patients diagnosed during this period were included.

Studied parameters: age, sex, incidence,duration of diabetes, HbA1c,complications and mortality.

Data analyzed with epi-info 7.2.1.0, with use of Student test or Khi-2 and p< 0.05 significant.

Results: 136 patients were included during this period, 55.15% male and 44.85% female. Mean age was 19.51±5.62 (range 1- 29 years),at diagnosis 15.48±4.86(range 0- 25 years). Mean duration of diabetes was 3.65 years[range 0- 18 years]. The highest incidence was observed in 2014 with 21 new cases/ year. Type1 represents 98.53%. Glycemic control was poor mean A1c1(at inclusion)- 10.91±3.9% (range 4.9-18.4], A1c3- 10.00±2,76.[range 5.7-15]

Mortality was 14.71% (n=20), 75.00% were diagnosed after 2012 and died out of service, with mean age of 18.40 years[range 7-27] with difference between male and female (p=0.017) and mean duration of diabetes 3.22years [range 0-10].

Conclusions: Despite the existing programme improving access to insulin in Pointe-Noire, management of T1DM is still difficult. The incidence is increasing and mortality still high.Other factors(poverty, lack of education) also influence on outcomes. Specific programs with focus in improvement of education are highly required.

P251
Children, adolescents and young adults with type 1 diabetes with high HbA1c could fast safely in the month of Ramadan - an observational study in Bangladesh

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Objectives: Patients with uncontrolled type 1 diabetes mellitus (T1DM) are at a high risk for Ramadan fasting and are exempted from fasting; however, most still insist on fasting. Our aim was to investigate the ability, safety, frequency of complications and impact on glycemic control in uncontrolled T1DM.

Methods: Seventy four Patients with T1D who insisted on fasting were enrolled prior to Ramadan. Patients with their caregivers were given intensive education and instructions by Diabetes team on insulin adjustment, home glucose monitoring and dietary adjustments. Patients were divided into two groups according to their glycaemic control; group A- HbA1c < 9% and group B- HbA1c ≥ 9%. HbA1C, number of days fasted, number of hypoglycaemia, DKA episodes, weight and insulin dose (before and after ramadan) were compared in the two groups.

Results: Mean age of 19.8±3.4 years, 38(51%) were males; all were on multiple daily injections. Mean HbA1c was 9.7 ± 1.7 prior to Ramadan. The children could fast a mean of 22.9 ±6.5 days. There was no significant difference in the frequency of hypoglycaemia between two groups (P = 0.37). There was only one episode of severe hypoglycemia. No diabetic ketoacidosis was reported in either group. Weight gain and increased insulin dose requirement were observed in both groups during Ramadan which were statistically significant. There was significant reduction of Post Ramadan mean HbA1C in both groups [group A -8.5 ± 1.4 vs. 8.1 ± 0.65, (P = 0.0001)] vs group B; 10.7 ± 1.3 vs. 9.9 ± 2.3, P = 0.004)].

Conclusion: Children, adolescents and young adults with T1D with poor glycaemic control can fast safely during Ramadan with proper education and intensive monitoring. Hypoglycemia is not uncommon and glycemic control might improve during the month of Ramadan. However, further studies with large population are recommended to expand our knowledge in management of childhood diabetes during Ramadan.

P252
Probability of MODY in a cohort of 209 Brazilians with young onset diabetes

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Objectives: To assess the probability of MODY in a subset of Brazilian individuals diagnosed with young onset diabetes mellitus (DM) using the MODY Probability Calculator.

Methods: We evaluated 209 patients with DM diagnosed under 35 years of age, including 46 patients with MODY, 133 with type 1 diabetes and 30 with type 2 diabetes. Subjects of the first group had a confirmed genetic diagnosis of MODY (32 MODY-GCK and 14 MODY-HNF1A). Patients treated with insulin within 6 months of diagnosis were considered as having type 1 diabetes, otherwise they were considered type 2. Clinical and laboratorial data of patients were obtained from electronic medical records. To calculate the probability of MODY we used the clinical prediction model developed by Shields et al, University of Exeter, UK (www.diabetesgenes.org). Statistical difference of probabilities results among groups was performed using the Kruskal-Wallis and Dunn tests.

Results: According to Kruskal-Wallis test, the probability results found were statistically different among the 3 groups (p < 0.001). Median in the MODY group was 75.5% (Q1 75.5 - Q3 75.5); 0.7% (Q1 0.7 - Q3 1.9) and 4.6% (Q1 4.6 - Q3 4.6) were in type 1 and type 2 patients, respectively. Pairwise comparison also showed significant differences in probability values: Type 1 x MODY (p < 0.05); Type 2 x MODY (p < 0.05) and Type 1 x Type 2 (p < 0.05).

Conclusions: The MODY Probability Calculator was able to distinguish this rare subtype of diabetes from the more common types (type 1 and type 2) in Brazilian individuals diagnosed under 35 years of age. Studies with larger number of patients, including those with clinical diagnosis of MODY and negative genetic test results, are necessary to determine the sensitivity, specificity and ideal cut-off values of probability in this population.

P253

The positive effects of family functioning and resilience on health outcomes in Chinese youth with type 1 diabetes

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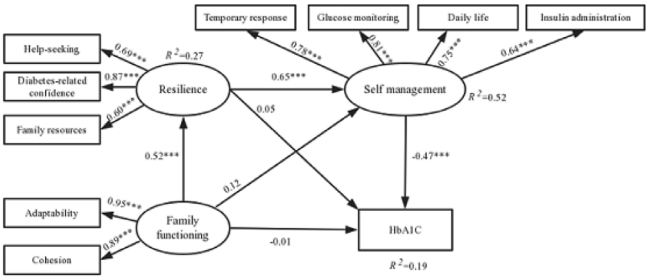
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Aims: To examine the positive effects of family functioning and resilience on health outcomes (self-management and glycemic control) in youth with type 1 diabetes and to find out whether resilience mediates the association between family functioning and health outcomes.

Methods: This study was a cross-sectional survey, followed the STROBE guidelines. Participants were 204 Chinese youth who had been diagnosed as type 1 diabetes. Family functioning, resilience, self-management and diabetes distress were measured using self-reported and standard measurement tools. Glycated hemoglobin (HbA1C) was used to reflect glycemic control. The structural equation model was used to test the hypothesized model.

Results: The final model accounted for 52.1% and 19.5% of the total variance of self-management and HbA1C, respectively. The finding suggested that resilience could directly influence self-management (β_{direct}=0.65, 95%CI=0.52 to 0.82, p=0.009) and indirectly influenced glycemic control($\beta_{indirect}$=-0.31, 95%CI =-0.48 to -0.18 p=0.010) by self-management. Family functioning could only impact health outcomes through resilience(See in Figure 1). The model was invariant between mild-distress and severe-distress group.

Conclusion: In youth with type 1 diabetes, resilience improved self-management, and, eventually, helped glycemic control, even in the presence of diabetes distress. The results affirm the importance of incorporating resilience assessment and family-based resilience intervention into clinical care for youth with type 1 diabetes.



[Results of the correlational model of family functioning, resilience, self-mangement and HbA1c]

P254

From toy to tool: using water beads for insulin storage in Haiti

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Diabetes management in severely resource-limited countries such as Haiti presents many challenges. In addition to the stigma surrounding diabetes, lack of access to health care, disease education, and life-saving insulin make diabetes a morbidity-bearing and often fatal disease.Insulin storage at 4°C is recommended, with one month at room temperature (up to 25°C) acceptable. Proper insulin storage is essential, as significant degradation is seen at higher temperatures. In Haiti and other tropical, low-income countries, access to refrigeration and thereby proper insulin storage is severely limited. Commercially available storage devices, such as the Frio®Cooling Wallets, are cost-prohibitive at 22-25$ per wallet. Alternative storage devices such as Zeer pots are more accessible but are fragile and non-portable. This project aimed to design and develop novel insulin storage devices that are both efficacious and affordable (i.e. low-cost) for use in tropical, resource-limited settings. All studies took place at the Kay Mackenson Clinic in Montrouis, Haiti. Temperature and humidity data was collected using Wireless Lascar Temperature/Humidity monitors placed inside a homemade cotton bag filled with water beads, a Frio® Cooling Wallet, and a Zeer pot. A hygrometer was used to measure hourly ambient temperature and humidity, and evaporative cooling efficacy was calculated using hourly temperature and humidity values. The homemade device and Frio® Cooling Wallet demonstrated comparable cooling efficacy throughout, with an average of 71% and 73% cooling, respectively. The Zeer pot demonstrated significantly decreased cooling efficacy as compared to the other two devices, with an average of 27% efficacy throughout (p< 0.05). Thus, the inexpensive homemade prototype (cotton bag with water beads) was as efficacious as preexisting insulin storage devices (Frio® bag and Zeer pot), without the same financial and physical barriers.

P255

Assessment of cognitive dysfunction in a group of Moroccan children and adolescents with type 1 diabetes mellitus

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Type 1 diabetes mellitus is one of the most common chronic diseases in childhood. One of more recently appreciated complications are the ones affecting the brain. particularly in childhood and adolescence, when it undergoes significant myelination and synaptic pruning development. Simultaneously, the young brain has a heightened and rapidly changing metabolic demand. These unique properties have led to the suggestion that the developing brain may be especially vulnerable to glycemic extremes during childhood depending on the age and severity at which these extremes are experienced.

This study is designed to evaluate the cognitive abilities in 100 (55 boys and 45 girls) eligible type 1 diabetic children and adolescent aged 6 to 16-year-old, to be compared to 100 same aged non diabetic healthy peers.

The cognitive functions evaluated include general intelligence memory, attention, executive function and processing speed, using a variety of cognitive tests. Other data such as demographic, school performance and medical information were collected by questionnaire.

Youth with type 1 diabetes showed slightly lower overall intellectual function than comparison group. The domains of executive functions, sustained attention and processing speed were particularly affected. However, larger differences in cognitive function including memory are seen among a subset of youth with early age of onset and greater exposure to glycemic extremes (severe hypoglycemia, chronic hyperglycemia, and DKA).

Children and adolescents with early onset of diabetes and exposed to glycemic extrems are at risk for negative effects on the developmental trajectories of cognitive processes. It may be useful to include cognitive screening in youth with type 1 diabetes—a practice that is not currently part of routine clinical care for these patients—to be able to detect alterations from normal development and provide supportive measures.

P256
Oral diseases in a young population of patients living with Type 1 Diabetes in Cameroon: Epidemiological and clinical aspects

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Introduction: Diabetes has been unequivocally confirmed as a major risk factor for periodontitis, which amplifies the immune response to pathogenic oral germs and, therefore, amplifies the destruction of periodontal tissues. On the other hand, severe periodontal diseases induced by dental plaque will also alter metabolic control by inducing insulin resistance.

Objective: To evaluate the frequency and typology of oral diseases observed in a cohort of young patients living with type 1 diabetes in Cameroon.

Methods: oral diseases were clinically assessed in 101 patients (7-28 years of age) followed up in a project "Changing Diabetes in Children" in Cameroon with diabetes and 101 non- diabetic control subjects (12-29 years of age).

Results: Severe periodontitis was more common in T1DM patients than in controls. The number of teeth with evidence of attachment loss was significantly greater in patients with diabetes 28.8% vs 16.8% p = 0.032. patients with diabetes had significantly higher plaque and gingival inflammation levels compared with control subjects 46 ± 31% vs 24 ± 23% in controls p = 0.001 and 51 ± 30% in T1DM vs 19.2 ± 23% in control p <0.001. Halitosis and coated tongue were more prevalent in diabetes patients 72.3% vs 25% controls, p = 0.001 and 50.5% vs 15% controls, p = 0.03. The prevalence of decays was high in both groups. The prevalence of oral diseases was higher in T1DM patients with poor glycemic control. Diabetes was correlated with the onset of oral diseases in our study population.

Conclusion: The prevalence of oral diseases was high in our study population, probably reflecting the situation in the general population. These conditions were diagnosed in a context of low consumption of oral health benefits coupled with a lack of knowledge about the two-way relationship between type 1 diabetes and oral diseases.

Key words: oral diseases; type 1 diabetes; oral hygiene

Posters on Display – Diabetes in Developing Countries

P257
Nerve conduction studies in patients with type 2 diabetes mellitus and its correlation with HbA1c

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Introduction: Diabetes mellitus is the most common cause of neuropathy worldwide. Electrophysiological parameters may be abnormal even in newly diagnosed cases of Diabetes mellitus as it is insidious in onset.

Objective:

1. To study pattern of neuropathy in type 2 Diabetes.
2. To correlate nerve conduction parameters with HbA1c.

Methods: This cross sectional, descriptive study included all the diagnosed cases of type 2 Diabetes (n= 20; age: 56±9.5) referred from OPD. Nerve conduction study (NCS) were performed in median, ulnar, tibial, common peroneal and sural nerve using Nihon Kohden machine in Neurophysiology lab 2, BPKIHS.

Result: NCS were performed in 20 patients out of whom 17 patients i.e 85% had axonal pattern, 3 patient i.e.15% had mixed (axonal and demyelinating) pattern of neuropathy. Among sensory nerve; median, ulnar and sural were involved and among motor nerve; median and tibial nerve were mostly involved. Distal amplitude of median nerve showed significant negative correlation with HbA1c (rt; r= -0.621, p= 0.004; lt; r= -0.690, p= 0.001) and nerve conduction velocity of tibial nerve showed significant negative correlation with HbA1c respectively.

Conclusion: In type 2 Diabetes patients mostly axonal pattern of neuropathy is seen. Distal amplitude and nerve conduction velocity were negatively correlated with HbA1c.

P258
Inherit "B" blood group and get diabetes for free!

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Objectives: To measure the frequency of ABO and Rh(D) blood groups in major local ethnic groups (Arains, Jutts, Maliks, Rajpoots etc) along with frequency of familial diabetes in healthy subjects.

Subjects and methods: Blood testing for ABO and Rh (D) typing was done (after informed consent) among 1000 unrelated students from both genders in University College of Medicine and Dentistry students of University of Lahore in association with their blood donor's society over few months using finger prick method followed by routine slide method. Information about sub-ethnicity of subjects and presence of diabetes in the family was inquired.

Results: Blood group "B" was the most predominant (n=374; 37.4%) in both Rh positive and negative subjects, followed by blood group "O" (n=295; 29.5%), "A" (n=248; 24.8%) and "AB" (n=83; 8.3%). Majority (n=882; 88.2%) of the subjects were Rh (D) positive and only 11.8% (n=118) were Rh negative. Subjects with blood group "A" and "AB" had maximum frequency of Rh positivity (n=226; 91.1%) and negativity (n=15; 18.1%) respectively. Most common sub-ethnicities were "Araeens" with predominance of blood group "B" (41.3%) followed by "Jutts" with blood group "B" (33.3%), "Maliks" with blood group "A" (30.6%) and "Rajputs" with blood group "B" (43.2%). Blood group "A" was most concentrated in "Butts" (36.8%) and blood group "B" in Khokhars (72.7%). Blood groups "AB" as well as "O" were most common in "Cheemas" with percentages of 25% and 37.5% respectively. A total of 54% (46 out of 118) cases of paternal Diabetes and 52% (45 out of 116) cases of maternal Diabetes were concentrated in blood group "B".

Conclusions: The ethnic distribution of blood groups is important in predicting familial diseases like diabetes possibly due to marriages within same ethnicity in our population.

Key words: ABO, Rh(D), blood groups.

P259
The immediate and medium-term prognosis of newborns of diabetic mothers at EHS Nouar Fadéla. Preliminary findings; Oran, Algeria

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Introduction: the newborn of a diabetic mother is no longer "a colossus with clay feet". The fetal prognosis is even worse than the diabetes is old, and depends on the maternal glycemic balance.

Objective: was to evaluate the morbidity and mortality of newborns of diabetic mothers

Materials and methods: This was a retrospective study, conducted over 20 months, in the neonatology department ward between January 1, 2017 and August 31 2018

Results: We recorded 6684 deliveries, of which 68 newborn couples and their mothers with diabetes were the subject of our study Maternal characteristics: maternal age: 32.5 ± 5.67 years; gestational diabetes: 66.2% of cases. Maternal risk factors: multiparty (63.2%) and hypertension (27.9%). Obstetric outcome: 85.3%; was high. Neonatal characteristics: the average weight of newborns was 3430 ± 98 gr, of which 10.3% were hypotrophies and 35.9% were macrosomic. Neonatal complications were represented by respiratory distress (16.2%), prematurity (30.9%), jaundice (38.2%), and hypoglycaemia (47.1%). Four deaths (4.04%) were recorded.

Conclusion: Diabetes in pregnancy is a known morbidity factor for both mother and child. Thus, improving the fetal prognosis will require the involvement of a multidisciplinary team before conception, during pregnancy and delivery, and in the postpartum.

P260

Clinical profile of type 1 diabetes mellitus among children in western part of Nepal

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Background: The objective of this study is to determine the clinical profile of Type 1 diabetes mellitus (T1DM) among children.

Methods: Descriptive cross sectional study was conducted at Nepalgunj Medical college, Nepalgunj Nepal, the western part of Nepal. A total of 42 diabetic children of less than 20 years old diagnosed with T1DM were included in the study. Data were collected via semi-structured interviews and medical records of patients attending diabetic clinic at the time of follow up.

Results: The mean age at diagnosis of disease was 11.1±4.9 years. Polyuria 33 (78.6%) was found to be the commonest symptom followed by polydipsia 27 (64.3%), weight loss 23 (54.8%) and polyphagia 13 (30.9%). The mean duration of symptoms before diagnosis was 14.3±9.7 days. DKA was present in 25 (59.5%) children at the time of diagnosis. Mean Glycosylated hemoglobin (HbA1c) value was 10.6±2.7. Obesity was observed in 9 (21.4%) children. Nine (21.4%) children had family history of diabetes. In most of the cases, primary caregiver was mother, among them only 24 (57.2%) had formal education. Almost half of the caregivers were using FRIO, an insulin cooling case, for insulin storage.

Conclusions: Polyuria was the most common presenting symptom followed by polydipsia, weight loss and polyphagia. Moreover, most of the children had landed up in diabetic keto-acidosis (DKA) at the time of diagnosis. Therefore, community awareness programs should be emphasized among parents and primary health care workers especially in rural areas regarding T1DM for early recognition and prompt treatment.

P261

Camps Man Mohan (= Mind Endearing) for type 1 diabetes children and youth: challenges, experiences and successes in resource limited settings (1987-2019-Future ????) - (100% free to the beneficiaries)

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Introduction: Between 1987-1993, a series of structured **Residential Camps** were conducted with significant positive long term health and life benefits. With encouragement of benefactors, we successfully restarted **Camp Man Mohan** in 2019.

Methods: Venue Sanehalli Village, 250 kms from Bangalore, 25 acres, 2 schools, dormitories, playgrounds, auditoriums, lush foliage

T1DM beneficiaries 101 + 10 parents Poorest of poor families

Big Brother/Sister Peer Role Models 3 Engineer, Scientist, Financial Analyst

Volunteer doctors/staff 35

Camp duration 6 days

Medical Care Real life experience in basal bolus insulin therapy, 4 to 6 SHBGM per day, nutrition, physical activity, management of hyperglycemia and hypoglycemia (including nocturnal), self-insulin adjustments, Sick day care.

Health Education 6 teaching modules and display poster discussions on various topics.

Recreation Games, quizzes, excursion to historic forts, temples, gardens, picnics.

Culture Participation in inspirational and value based singing, dance and drama “My Dream World - Education beyond four walls of classrooms”.

Personality Development Yoga and meditation, inspirational talks and seminars by spiritual leaders and motivational speakers “Body is the Temple; Work is Worship"

Pre and Post Health Education Evaluation [MCQs]: Improvement in Diabetes Self Care Knowledge Scores was observed in multiple areas Diabetes Monitoring, Insulin Adjustments and Sick Day Guidelines

Smiles and Hope

Children "I never had a friend with diabetes and now I have many with whom I can care and share" “We had so much fun, that we forgot our problems”

Parents "All doctors and staff treated our children as their own children” “The camp was filled and flooded with love, which was the best part"

Conclusion: The multidimensional benefits of **Residential Camps** are much more useful for economically deprived children and families, who deserve an extra compensatory dose of **Love- Care-Share**.

P262

Experience and challenges in managing type I diabetes at low resource setting - children and youth

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Introduction: Management of Diabetes is associated with different experiences and multiple challenges amongst children and youth. We demonstrate unique requirements in coordinating care for children and youth with diabetes. Managing diabetes in children and

adolescents needs to be in the form of a collaborative work between health care professionals, children, adolescents, and their families.

Aims and objectives: To understand challenges and experiences of children and youth living with type 1 diabetes.

Methods: This, prospective cohort study conducted among type 1 diabetic patients in Pediatric diabetic clinic till the age of 26years from 2017 to 2019 in department of Pediatrics and Adolescent Medicine.

Result: We analysed 55 diabetic patients under follow up in our diabetic clinic. The mean age at diagnosis is 11.31 years±4.68 (1.5-21). Most (71%) of them were females. The most common presenting symptoms were polyuria (56.4%), significant weight loss(49.1%), polyphagia (47.3%) along with 30% patients presenting in DKA with shortness of breath and loss of consciousness being dominant symptoms. Maximum patients were taking mixtard (70/30) and only 7.28% were on basal bolus regime due to financial constraint. In terms of mixed split regime, symptomatic hypoglycemia was the most common complain. In total 86% of the patients had HBA1c>7% and hypothyroidism was the common co-morbidity found among the patients (21.8%).

Conclusion: The problems experienced by children and youth with type 1 diabetes are multifactorial .The study population typically had limited glycemic control, which affects the occurrence of diabetes-related complications. There is inherent need to confirm disciplined lifestyle behaviour (proper exercise, following diet charts) with regular blood sugar monitoring, insulin injection and awareness of hypoglycemic and its symptoms.

P263

Roller coaster in the insulin requirements of a child with chronic kidney disease

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Background: Insulin resistance (IR) is common in patients with end stage renal disease, and is linked to numerous factors related to chronic kidney diseases have been implicated in the etiology of insulin resistance: Uremic toxins.Chronic metabolic acidosis.Intracellular ion homeostasis disequilibrium,as well as qualitative and quantitative disturbances of insulin receptors on adipocytes, skeletal muscle cells and hepatocytes. Cytokines produced by adipocytes (adipocytokines), Chronic inflammation, Low physical activity, protein energy wasting and malnutrition.Subcutaneously administered insulin is renally excreted, unlike endogenous insulin, which undergoes first-pass metabolism in the liver. As renal function declines, insulin clearance decreases and the insulin dosage must be reduced to prevent hypoglycemia which was occurring during peritoneal dialysis(PD). PD is to treat hypervolemia. Removal of excess water from the patient´s body occurs mainly by osmotic ultrafiltration and the substance that creates osmotic gradient is glucose present in the dialysis solution, thus making the water from vascular bed flow to the peritoneal cavity as a solution compartment. By using a high glucose load via the peritoneum, which can worsen insulin resistance.

Case report: Two years and 7 months old male child who is a known case of end stage renal disease due to bilateral autosomal recessive polycystic kidneys diagnosed at age of 6 months and started peritoneal dialysis till now. He was diagnosed as diabetes mellitus at age of 2 years and 3 months old, his initial investigations were:HbA1C: 8.9 %,C-peptide: 18ng/ml and HOMA-IR: >7 and he started insulin therapy.His insulin requirements varied in relation of dialysis days where his requirement is 0.5 unit / kg /day in days off dialysis and 1.2 unit/ kg/day in days of dialysis.

Conclusion: we concluded that we have to monitor and adjust the doses of insulin according to dialysis days.

P264

Pre type 1 autoimmune diabetes presenting as childhood stress hyperglycaemia

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Background: When transient hyperglycaemia occurs during a serious intercurrent illness, the risk of progression to IDDM is low!! In contrast, one third of children in whom transient hyperglycaemia is identified without a serious illness, can be expected to have IDDM within 1 year.

Objectives: Child with "Pre type 1 autoimmune diabetes" presenting as stress hyperglycaemia - transient.

Methods: Day 1 Age 6 ½ year girl; Fever, Headache, Dullness 4 days; Blood glucose 321 mg/dl; Urine glucose 2%; Type 2 DM Maternal Grandmother; Hypothyroidism Mother.Day 2 BP 104/70, PR 96, Height 90th %, Weight 50th %, Afebrile. Fasting BG GRBS 127 mg/dl; After Breakfast BG 204 mg/dl; Hb%-13.2g/dl; WBC-8,-100cells/cu mm; Widal Test-Negative; HbA1C- 5.6% !!!!; TSH-3.11 µIU/ml(0.35-4.94). Day 2 onwards: Never received insulin.

Day	BB	AB	BL	AL	BD	AD	MN
2	125	204		407	307	268	227
3	107	127	89	143	99	273	171
4	86	98		121	92	130	105
5	80	91	82	110	79	123	121
6	99	115	81	116	96	163	126
7	85	103	111	107	123	144	112
8	91	104	101	105	95	161	105
9	89	113	80	146	101	158	109

[Fig 1]

Provisional diagnosis ? T1DM; Atypical DM; Stress Hyperglycemia.

Since the blood glucose was normal without insulin, patient was planned to manage by home glucose monitoring and daily urine glucose levels.

Results: C Peptide Serum 0 min 0.93 ng/ml (0.81-3.85)

GAD-65 Antibody Positive >2000 IU/ml

Thyroid Peroxidase Antibody < 5 IU/ml Negative

Final diagnosis

Pre type 1 autoimmune diabetes, with Childhood stress hyperglycaemia [Transient Hyperglycemia]

Follow up 1 year

C Peptide 60min post 100mg glucose 6.26 ng/mL (0.78 - 5.19)!!!!

GAD-65 Antibody Positive >2000 IU/ml

IA2-Insulin Negative 7.4 IU/mL Negative: < 30; Positive: > 30

Islet Cell Antibody Positive [Immunofluorescence]

Child remains euglycemic and has never received has never received insulin till today!!!!

Conclusion: A combination of islet cell antibodies, competitive insulin autoantibodies, and stimulated insulin release levels during an intravenous glucose tolerance test can accurately distinguish children with pre-type 1 diabetes, from those with presumed benign transient increases in plasma glucose concentrations.

P265
Interactive online education is comparable to in-person training to teach insulin adjustment skills in a low-resource setting: a pilot study with non-communicable disease providers in Rwanda

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Rwanda relies on non-communicable disease (NCD) nurses in district hospitals to provide diabetic care with limited supplies; specialty training is limited by cost and availability of expertise. We compared efficacy and feasibility of live conference-style training vs interactive e-modules to teach insulin adjustment skills (IAS) to NCD nurses.

Rwanda's district hospitals were randomized into 2 groups. At T0, Group 1 nurses attended a conference on type 1 diabetic care with breakout sessions to practice IAS. Group 2 received conference materials online with interactive e-modules to practice IAS. Both groups reviewed conference content online 4 months later (T1). Participants took 10-question assessments before and after education/review, as well as surveys on demographics, medical practice, and training feasibility. We compared group characteristics at T0 and assessment scores serially. T0 and T1 results are reported with a planned year of follow up.

Forty-one nurses in Group 1 and 35 in Group 2 were enrolled with no group differences in gender, time in practice, or time in NCD role. Pre- and post-assessments were completed at T0 by 35/43 of Group 1 and 26/34 of Group 2, and at T1 by 11/43 of Group 1 and 23/34 of Group 2. T0 to T1 was 138 ± 14 days for Group 1 and 78 ± 16 days for Group 2 (p< 0.01). Compared to pre-education scores, both groups improved equally at T0 (Group 1 increment +1.9 ± 2.2 vs Group 2 +1.6 ± 3.6, p=0.47). Group 2 improved at T1 (+1.0 ± 2.2), while Group 1 approached significance (+1.6 ± 2.4, p=0.07). Groups did not differ in their confidence in IAS after education or perceived relevance of education to their practice. Group 2 had lower initial enrollment than Group 1 but greater retention at T1.

Group 1 and Group 2 performance was comparable at T0, and online training is promising for durable skill acquisition. Barriers to completing online education exist, but it is a viable option to narrow the specialty care gap in resource limited settings.

P266
Clinical profile of young diabetics attending a tertiary care hospital in South India

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Objectives: To study the clinical profile of young diabetics attending a tertiary care hospital in South India. To compare the results,to look for change in trends.

Materials and methods: The records of all diabetic patients attending the OP clinics of the departments of Endocrinology & General Medicine, Pushpagiri Medical College, Tiruvalla,Kerala,India between June 2014 &May 2019 were screened. The data of patients with age of onset of diabetes before 20 years, irrespective of the aetiology was analysed. There were 230 diabetic patients analysed with age at diagnosis, sex distribution, blood sugar value at diagnosis, anthropometric data,lipid profile. Patients were grouped based on the (ADA) 2015, classification of diabetes.

Results: Out of the 230 patients with age of onset of diabetes less than 20 years, 138(58.6%)were diagnosed to have type 1 diabetes, 90(39.1%)to have type 2 diabetes, Two patient was found to have genetic syndrome.Out of the total 230 patients, 130 (56.5%)were male and 100 (43.5%)female, with type 1 DM patients including 87(63%)males and 51(37%)females. The sex distribution in type 2 diabetes was 45 (50%)males and 45(50%)females. The mean age of diagnosis of type 1 DM patients was 11.3 years as compared to type 2 DM patients at 16.4 years.A total of 15(11%) patients in T1DM and 79 (88%)of T2DM group were obese.

The average total cholesterol was 170.5 mg/dl with type 2 DM patients having the highest average total cholesterol levels of 192.42 mg/dl, T1DM patients having average 156.7 mg/dl of cholesterol respectively. The LDL levels were higher in the type 2 DM group. Low HDL was the commonest lipid abnormality in this study.

Conclusions: The commonest type of diabetes in young diabetics is T1DM, with the incidence of T2DM also emerging as a common type and is associated with obesity. Elevated triglycerides is the commonest dyslipidemia. Significant percentage of young diabetic patients have evidence of peripheral neuropathy at diagnosis.

P268
Morbidity and mortality of newborns born to from mothers with or without diabetes at EHS "Nouar Fadela" in Oran Algeria

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Introduction: Maternal diabetes is one of the factors that influences birth weight. However, there are few data on complications in neonates from diabetic mothers. The objective of this work is to compare the morbidity and mortality of newborns of mothers with and without diabetes.

Material and methods: This is a retrospective and analytical study of all term newborns born to from mothers with or without diabetes from April 15, 2015 to March 15, 2017 inclusive. We identified the maternal characteristics, the existence of an old a former diabetes. With regard to neonatal characteristics: birth weight, birth status, presence of traumatic lesions or other perinatal complications and become immediate. The data were analyzed using the chi (2) test and Fisher´s exact test. Logistic regression analysis was also performed.

Results: 889 mother-newborn couples were included in the study (147 newborns of diabetic mothers (NMD) and 742 newborns of non-diabetic mothers (NMND).

Maternal characteristics: mean age was 30 , 4 ± 6.1 years, diabetes was 19%, of which 15.3% gestational diabetes. Newborn characteristics: mean NMD weight was 3974 ± 578 and 3664.27 ± 512 gr in NMND ($p < 0.0001$) .The incidence of hypoglycemia was 31.97% in NMD versus 11.3% NMND ($p < 0.0001$). Hypocalcemia was 4.8% and 2%, respectively., 2% NMD and NMND ($p < 0.05$), 2% brachial plexus paralysis in NMD versus 0.9% NMND and macrosomia 66.7% vs. 44.1% (p. < 0.0001

Conclusion: Our results suggest that newborns of diabetic mothers are at increased high risk for hypoglycemia, hypocalcemia and macrosomia in the early neonatal period.

P269
Helplessness, hopelessness and self-destruction situation in a type 1 diabetes poor village family: successful transformation story to a united nations global art awardee, role model and a future doctor

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Background: Poverty, illiteracy, paucity of medical fraternity knowledge and skills, and societal / government apathy add huge additional burden to families at the "bottom of the socioeconomic pyramid", afflicted with T1DM.

Objectives: Heart-warming success story: saga of determination, indomitable spirit and the infinite love and care of family and medical team.

Methods: 2014 Age 9: Ms Spoorthy T1DM; 250 km from Bangalore city; gross disease unawareness of family, public and medical community; life of family virtually destroyed; parents ran pillar to post seeking right medical help and advice which was unavailable; total desperation and utter helplessness- family "suicide" contemplated; brave advice of child to parents averted this disaster.

2019 Age 14: Ref to Project DISHA Samatvam Jnana Sanjeevini - Bangalore [Pioneer institution providing FREE care to about 3000+ poor and needy T1DM children]; received comprehensive, compassionate and state of art care and psychosocial support; life of child and family completely changed towards the best; wants to become a doctor and help the sick and suffering in her community.



[Fig Spoorthy Arsikere Village to United Nations]

Results: 2018 UN General Assembly New York: She received International Award at NCD Global Art Contest [Health for Youth = Health for All]; Children with Diabetes: Future Stars [2 minutes] https://www.youtube.com/watch?v=LedPU0LmQ9s"CHILD HEALTH AMBASSADOR OF INDIA"; Proposal to Government- "INSULIN AKSHAYAPATRA", to provide FREE insulin, blood glucose meter/

strips, medical care and social/educational support to all poor and needy children suffering from T1DM in India.

Discussion: T1DM CARE IN INDIA - UNRESOLVED

Issues: Insulin for all Children Poor and needy; SHBGM and Quarterly/Annual Health Reviews; Education and employment opportunities: "Beggars to Citizens" - self-reliance; No discrimination in education, employment; "Death before Diagnosis": Physician and public awareness and education.

P270
Psychosocial impact of type 1 youth diabetes camps in India - patient advocacy and going beyond blood glucose testing

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Introduction: Type 1 diabetes has a huge impact on the emotional wellbeing & self-confidence especially in a developing country like India. Many feel isolated from their peers and experience discrimination at school/workplace. A major barrier to improving diabetes care is limited availability of support, socio-economic problems, societal stigma and lack of appropriate health care facilities.

Objective: To evaluate the psychosocial impact of camp on attitudes toward their illness, perception and satisfaction among youth living with type 1 diabetes in India through a comprehensive need assessment survey.

Methods: A patient centred advocacy group- "Diabetes India Youth in Action" (DIYA) conducted camps for youth living with type 1 diabetes in India using various approaches like team- building activities, demonstration and workshop model of teaching to raise awareness about diabetes, diabetes self-management education (DSME) and bringing together the youth living with the chronic disease. A pre-structured pre and post camp survey was administered to 80 campers and responses collected onsite on a scale of 1-5 to evaluate the challenges faced, identify the barriers and the need to bridge the patient-doctor gap.

Results: Detailed results will be presented at the conference. Most respondents felt strongly that community activities provided a better platform for sharing information and exchanging experiences. This in turn led to better emotional wellbeing and better glucose control.

Conclusions: Diabetes camps led to improvements in self-confidence, diabetes-related stress, DSME in campers. The camps help them to share their experiences, communicate with confidence about challenges faced. Type 1 diabetes camps are still a non-existent term in developing countries and are not a part of the national health programmes.The challenges encountered by youth living with type 1 diabetes are much more than just blood sugar testing and camps serve to bridge the patient-doctor gap.

P271
Partial clinical remission in newly diagnosed children with type 1 DM seen at the Lagos University Teaching Hospital, South Western Nigeria: a retrospective preliminary report

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Introduction: The partial clinical remission (PCR) phase of T1DM, seen in about 50% of children is a critical window that has short and long-term implications. Non-remission may have significantly poorer long-term prognosis than partial remission.[Nwosu-2019]

Objective: To determine the prevalence of partial clinical remission (PCR) in newly diagnosed children with type 1 DM in LUTH over a 3 year period.

Methods: Case records of new patients from Jan 2016 to Dec 2018 were analysed. A total daily insulin requirement of < 0.3 units/kg was defined as PCR.The Health Research and Ethics Committee of LUTH approved the study and waived the requirement for informed consent. Data were analysed with SPSS version 20.

Results: A total of 33 new paediatric patients with diabetes were seen during the period. Excluded patients were one case of neonatal DM, 3 cases of type 2 DM, 4 previously diagnosed and 3 with incomplete records leaving 22 children with new onset type1DM.They constituted 2 males and 20 females with M:F ratio of 1:10. Eight,7 & 7 patients were newly diagnosed in 2016, 2017 and 2018 respectively. The mean age at diagnosis was 9.64±3.47 years while HbA1C at diagnosis was 11.37±3.5%. The percentage of DKA vs non DKA at presentation was 68.2% vs 31.8%. Partial remission clinical was recorded in only 3 patients (all females) while majority,19 (86.4%) never experienced it. At diagnosis, the 3 remitters were aged 7, 11 & 13 years with HbA1c 15.8,13.1 & 14 respectively and 2 presenting in DKA. Duration of the PCR phase was 6 & 9 months in 2 patients with the 3rd still in PCR.

Conclusion: Partial remission occurred in only 13.6% of the newly diagnosed children with type 1 DM.This creates concern for the possible consequences associated with non- remission.A prospective multicentre nationwide study is underway, to determine the true prevalence and factors associated with non-remission in affected Nigerian children to inform proactive policies and action on management.

P272
Financial aspects of a type 1 diabetes program in Northern Haiti

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Objective: Type 1 Diabetes has high morbidity and mortality in resource-limited settings. The costs of supplies and hospital visits can be prohibitive. While international organizations such as the

International Diabetes Foundation (IDF) have created global supply and support networks, national infrastructures are often inadequate. To look at the type of support structures required and the financial aspects of diabetes care in a resource limited setting, we examined the Pediatric Diabetes Program at Hôpital Sacré Coeur in Milot, Haiti.

Methods: The overall patient costs (outpatient and inpatient) of care for 20 consecutive months in 2017-2018 were reviewed utilizing HSC accounting reports. In addition, monthly salaries for the diabetes nurse and social worker as well as money given to the patients to cover their transportation costs were tracked.

Results: The total costs during this time period amounted to $29,712.63 US. Annual cost per patient was $401 US over this period. Medications (inpatient and outpatient) represented 67.2% of expenses followed by transportation costs (15.5%) and laboratory fees (10.4%). Other costs included miscellaneous hospital fees, studies, supplies and consultations

Conclusion: While the estimated annual cost per patient is modest ($401 US), this does not reflect the total cost of care given the external provision of insulin from LFAC/FHADIMAC and private donors. Transportation costs to and from clinic were higher than anticipated, reflecting the challenges of travel within this mountainous region.

This program represents a hybrid model for providing diabetes care-joining local providers, national and international diabetes organizations, and international donors and volunteers. Numerous threats remain, including the rising cost and availability of insulin, and economic uncertainty, and the longterm stability and growth of the program will require flexible and adept local management.

P273

Sarvodaya and Anthyodaya - diabetes and health care for all: 3 decades of Indian challenges, struggles and experience

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Introduction: Sarvodaya means 'development of all'. Anthyodaya means 'development of the last'. Sarvodaya through Anthyodaya refers to "Welfare of all through the weakest of the society"- Sri Mahatma Gandhi [1908]. Thus good of the individual is contained in the good of all.

Objectives: Innovate and implement several FREE health care programs to provide best possible care to all socioeconomic segments of the society.

Methods: Project DISHA ["direction" 1987-current].

Type I diabetes [386 since 2011]; Insulin [Basal bolus (meal time regular + bedtime NPH) 100%], syringes, counseling, 24h help lines, BG meters, 30 BG strips/ month, limited biochemical evaluations.

Project DOSTI ["friendship"1994-current].

Type II diabetes [5000 +] Oral medicines for diabetes, hypertension, dyslipidemia, cardiovascular prophylaxis; human insulin 16% to an extreme poverty subset only.

Results: Type 1 Diabetes [N=120] Hypertension=12.5%; Retinopathy: Non-proliferative: 3%; Proliferative 1%. ACEI/ARB =25%

Type 2 Diabetes [N=355] Hypertension=78.4% [Non-DM adults= 29.6%].

eGFR	%	Diabetes Duration [Years]	Diabetes Onset [Years]	BMI [Kg/m2]	Sys BP [mm/Hg]	Dia BP [mm/Hg]	Hb [G/dl]	HBA1c [%]	S Alb [mg/dl]	U ACR [mcg/mg]
Non-DM										
>90	65	0	0	24	132	81	13.5	5.7	4.0	16
60-89	26	0	0	22	149	85	14.1	5.9	4.2	10
15-59	9	0	0	21	128	72	11.6	6.0	3.9	260
P					0.004				0.09	
T1DM										
>90	90	8	10	21	113	72	13.0	9.6	4.2	41
60-89	8	11	12	22	114	70	12.1	8.4	4.0	226
15-59	2	22	13	20	137	83	11.2	7.3	4.0	225
P							0.08	0.09	0.06	0.0000
T2DM										
>90	66	9	44	26	126	76	13.1	8.8	4.2	46
60-89	27	13	51	26	133	73	12.5	8.4	4.1	53
15-59	7	12	53	27	144	77	12.0	8.0	4.1	139
P		0.0002	0.0000		0.0000		0.0002	0.007		0.0002

[Diabetes HTN CKD]

Hypertension: Hypertension groups had elevated UACR and S Creatinine [decreased eGFR], more significantly in T1DM [Cf T2DM]. Also, subjects with hypertension [and associated renal dysfunction], tended to have significantly lower HbA1c [?decreased renal insulin clearance/ gluconeogenesis; increased hypoglycemia].

CKD Stages: Higher CKD Grades were associated with longer diabetes duration, later age of diabetes onset, higher systolic BP, lower hemoglobin, lower HbA1c and higher UACR.

Conclusion: On a foundation of philanthropy, with "minimum - best possible" medical care, we have tried to "bridge" the disease burden gap, between the economically 'underprivileged' versus 'privileged'. Our efforts have resulted in improvements in glycemic control and decrease / retardation of acute and chronic complications in both type 1 and type 2 diabetes in a resource limited setting.

P274

Acute complications in children with type 1 diabetes mellitus attending Alexandria University Children's Hospital

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Objectives: Was to study of the prevalence of acute complications in children with type 1 diabetes mellitus(T1DM) attending diabetes clinic at Alexandria university children's hospital (AUCH) and its relation to glycemic control and the duration of diabetes and to study the glycemic control and its relation to type of insulin used

Methods: The study was conducted on 50 children and adolescents with T1DM of long duration ≥5 years,attending the diabetes clinic of the AUCH.All patients were subjected to complete history taking and physical examination. HbA1c was done; our patients were divided according to their glycemic control into 3 groups:Good with HbA1c < 7.5%,Fair with HbA1c 7.5 to 9% and Poor with HbA1c >9%.

Results: 64% of the patients were receiving premixed insulin,while only 36% were on basal-bolus insulin.70% of our patients had poor glycemic control and only 10% had good control.There was statistically significant relation between the type of insulin therapy and the glycemic control.84.4% of patients on premixed insulin therapy had poor glycemic control,Two-thirds of the patients were admitted to PICU due to severe DKA, and 14% of them had hypoglycemic episodes.The majority of DKA attacks 67%, PICU admissions 64% and hypoglycemic attacks 86% occurred in patients with poor glycemic control, but statistically there was no significant relation between the frequency of these acute complications and the degree of glycemic control

Conclusions: 70% of our diabetic patients have poor glycemic control and only 10% have good control. Basal-bolus insulin regimen is associated with better glycemic control than premixed insulin regimen.So all our diabetic children should be treated with basal-bolus insulin and more emphasis should be laid on education of the patients and their families with regard to compliance to therapy and dietary plan,self-monitoring of blood glucose,physical activity and regular follow-up visits to prevent the occurrence of acute complications

P276
Fasting blood glucose and lipids profile among children living with human immunodeficiency virus infection on first line antiretroviral therapy in Abidjan, Cote d'Ivoire

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Objective: To determine the fasting blood glucose (FBG) and lipid levels among children living with HIV (CLWH) on first line antiretroviral treatment (ART).

Methods: A cross-sectional study was done from June to November 2015 in CLWH on first line ART aged from 2 to 15 years in Cocody Hospital, Abidjan. Blood glucose (BG) was determined using the fructose kinase method.Total Cholesterol (TC), triglycerides (TG) and HDL Cholesterol (HDL-C) were measured using standard techniques while LDL Cholesterol (LDL-C) and very-low-density lipoprotein (VLDL) were derived from the Friedwald equation.Definitions of impaired fasting glucose (IFG) and diabetes mellitus (DM) were according to ISPAD/IDF guidelines.P value < 0.05 was considered statistically significant.

Results: The mean age was 113.4±42.8 months with a M:F ratio of 1.19. 99.5% were infected by HIV1.At diagnosis of HIV infection, 74.9% were symptomatic with stage B (34%) and stage C (40%) disease.Only 16.4% had severe immune deficiency while 80.5% had normal nutritional status. Mean duration of ART was 49±31.5 months. The common regimens were AZT+3TC+EFV (45.6%) and AZT+3TC +NVP (35.9%).Protease inhibitors based regimen was used in only 4.1% of cases.The mean BG was 75.2± 10.1mg/dl. IFG was found in 2.6% of cases while none had DM.Dyslipidaemia was seen in 26.6% of children with total TC,TG, HDL-C and LDL-C disorders in 13.3%, 9.2%, 5.6% and 8.7% respectively. Dyslipidemia was statistically significant with the duration of ART (p=0.003), family history of DM (p=0.002) and lack of exercise (p=0.047).Clinical stage at diagnosis was significantly associated with abnormalities in HDL(p=0.026) and LDL(p=0.047) cholesterol.

Conclusion: In these CLWH on ART, IFG and dyslipidaemia was found in 2.6% and 26.7% respectively. Screening for metabolic complications from ART should be incorporated into care of CLWH for early detection and management to avoid progression into frank DM and other metabolic sequelae in adulthood.

P277
Instructional therapeutic play (ITP): a play-based self-care intervention to educate children with type 1 diabetes (T1D) in developing countries

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Introduction: Intensive insulin therapy is challenging in developing countries due to lack of school nurses. Early child self-care is needed to avoid missed insulin doses and resulting poor glycemic control. ITP is a play-based intervention that can promote youth T1D self-care, acceptance, and participation.

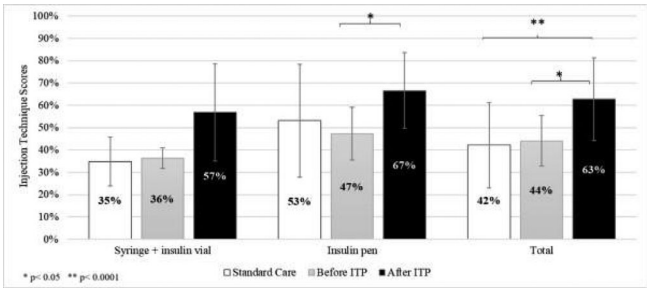
Objective: To evaluate the impact of ITP vs. Standard Care (SC) on injection technique and frequency of self-injection by youth with T1D.

Methods: Children with T1D (7-12 years) were recruited/consented at 2 diabetes clinics in Brazil, and randomized to ITP or SC. ITP group received training by a nurse that included a story about a child with T1D who self-injects insulin at school; SC group received routine clinic-based education with a physician. Youth were video recorded giving insulin injections to a doll; after receiving the ITP intervention, youth were re-recorded giving the doll an injection. Injection technique was scored by reviewing the videos using validated checklists

(0-100% scale). Parents reported frequency of self-injection at baseline and after 30 days.

Results: Youth (N=20, 40% male) were 9.6±1.3 (X±SD) years old and had T1D for 3.6±2.3 years; A1c was 9.1±2.0%; 20% of ITP and 50% of SC youth used syringes (vs. pens) for injections. At baseline, 80% of both groups knew how to self-inject; age at first self-injection was 7.7 ±1.6 years; most were taught by a parent/relative; and youth had similar rates of self-injections/week (ITP=3.7±3.3, SC=5.0±3.0). Injection technique scores were low in both groups; ITP group increased their scores significantly after the intervention (Fig). Frequency of self-injection did not change significantly in either group after 30 days.

Conclusion: The play-based intervention appears to improve injection technique in the short-term; longer studies are needed to assess its durability and future impact on A1c in school-aged children with T1D.



[Injection Technique Scores]

P278
Usability testing of a web-based serious game for Brazilian children with type 1 diabetes (T1D)

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Introduction: Diabetes education interventions designed to assess needs, skills and preferences of youth with T1D might impact positively the self-management. A well-designed serious game (SG) is an example of intervention able to engage youth through an interactive scenario, in a modern and effective manner.

Objectives: To present the quali-quantitative usability testing of a SG designed for children with T1D.

Methods: Prior to the SG development we interviewed 21 children from Sao Paulo state, Brazil, to identify their preferences, learning needs and correspondent health behavior determinants. Based on this data, a design team developed a SG Paper Prototype (PP). Diabetes educators and technology experts answered a 25-items survey (5 points Likert scale, higher scores reflecting greater agreement) in order to evaluate the PP content, presentation and educational aspects during audio-recorded sessions. Diabetes educators also tested the Medium Fidelity Prototype (MFP) and responded the same survey. Study staff observed and video-recorded children with T1D playing the MFP version.

Results: The SG included gameplay strategies both for T1D pathophysiology, food groups and self-care tasks, as well as its effects on glycemic control. The PP testing showed high content validity ratio (CVR=.80), in which 3 items related to images' quality, SG complexity and player choices didn't achieve the CVR critical values. Experts (N=12) recommended to improve game's content and the food illustrations layout. After design improvements, the MFP testing also had high values of CVR (=.88), and one item on SG choices didn't meet the critical values. The experts suggested increasing the options of outdoors activities and meals on MFP version. Children with T1D (N=5) played the MFP with satisfactory interaction and considered the game enjoyable.

Conclusions: The quali-quantitative usability testing proved to be a successful strategy to improve the SG final version and to achieve its goals.

P279
Childhood onset diabetes mellitus: epidemiological, clinical and follow-up features in Ouagadougou (Burkina Faso)

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Introduction: Pediatric diabetes is still poorly understood in developing countries because of the lack of adequate facilities and staff in health care centers. In Burkina Faso, all pediatric diabetes cases from arround the country are referred to the Internal Medicine department of the Centre Hospitalier Universitaire Yalgado Ouédraogo (CHU YO), a tertiary care hospital.

Objective: We aimed to describe the epidemiological, clinical and evolutionary features of diabetes in childhood in this setting of CHU YO.

Methods: Single-center observational study conducted between 2013 to 2018 at CHU YO. Epidemiological, clinical and follow-up characteristics have been described for all consecutive patients with diabetes diagnosed before the age of 18 years.

Results: Eighty-eight patients were included, with an incidence of 14.6 cases/year. The mean age at diagnosis was 14 years [2-18] years and the sex ratio (M/F) was 0.55. 48.9% of patients lived within 25km from the hospital (CHU YO) and 44.3% lived from more than 100km away. 79.4% had attended school. Type 1 diabetes accounted for 97.7% of patients and a family history of diabetes was found in 11.4% of cases. 11 patients had a delayed growth (12.5%) and 3 (3.4%) had delayed puberty. Keto-acidosis was the main circumstance of discovery of diabetes (62.5%). The mean duration of diabetes progression was 4 [0-20] years. 53 patients (60.2%) had a glucose meter. 66 patients (75%) had a daily dual injections regimen of mixed insulin and 22 patients (75%) had more than 2 insulin injections per day. Glycemic control was considered acceptable in 47.7% of patients and the mean glycated hemoglobin was 9.9 [6.3-15]%. We reported 2 cases of

nephropathy without renal failure, 3 cases of non-proliferative diabetic retinopathy and 3 deaths.

Conclusion: Keto-acidosis remains the main circumstance of discovery of diabetes in childhood. Many patients lived far from the hospital. About half of the children do not have a good glycemic control.

P280
Metabolic profile worsens in indigenous children at very high altitudes

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Background: Markers such as blood pressure (BP), triglycerides (TG), HDL-C and TG to HDL-C ratio (TG/HDL-C) measured in children predicts cardiovascular disease as well as T2DM in adulthood independently of BMI.

Objective: To compare different metabolic markers in children from three indigenous Argentinean communities living at different altitudes.

Methods: A cross-sectional study compared 185 (83 females) children aged 5-14 years from San Antonio de los Cobres (SAC), 3750 m above sea level, 46 (23 females) from Cobres, 3450 m, and 167 (83 females) from Chicoana (CH), 1400 m between November 2017 and January 2019. Children´s height, weight, waist circumference, BP, and lipid levels were measured.

Results: The prevalence of overweight/obesity was significantly lower-C in SAC, 6.5% (12) and Cobres 4.3%(2) than in CH 24% (40) (BMI >85 percentile per CDC norms). As altitude increase, z- BMI decreased significantly: (SAC (-0.43), Cobres (-0.15), and CH (0.37). However, median arterial pressure (MAP) (SAC 67 mmHg, Cobres 60 mmHg, and CH 55 mmHg) increased with altitude. In addition, TG/HDL was significantly higher in SAC 2.39 and Cobres 3.11, than in CH 1.96. Furthermore, TG increased with altitude (SAC 103 mg/dL, Cobres 96 mg/dL, vs. CH 87mg/dL); whereas HDL-C decreased (SAC 45 mg/dL, Cobres 38 mg/dL vs. CH 48mg/dL) Multiple linear regression analyses showed that altitude was significantly and independently associated with children's MAP (beta 7.69; R^2=0.32); TG/HDL-C (beta 3.14; R^2=0.1), TG (beta 12.2; R^2=0.12) and HDL-C (beta -0.17; R^2=0.04); adjusted for age, sex, and BMI.

Conclusions: This study suggests as altitude increases the metabolic profile worsens indicating a higher risk for future T2DM. Future longitudinal studies should be performed to confirm these findings.

P281
Glucose variability in east African children and youth with Type 1 Diabetes: A pilot study

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Introduction: East African patients with type 1 diabetes (T1D) commonly have hemoglobin A1c (HbA1c) levels >10%, indicating very poor diabetes control. NPH and regular insulin are provided by international donation programs. However, test strip availability is limited and patients cannot routinely monitor blood glucose levels.

Objective: This observational pilot study aimed to describe glucose variability in children and young adults with type 1 diabetes mellitus living in East Africa, using a continuous glucose monitor.

Methods: Patients were recruited from their local pediatric endocrinology clinic. A blinded Freestyle Libre Pro flash sensor was placed, and participants were instructed to continue their usual diabetes care. The sensor continuously recorded blood glucose levels for two weeks. Subjects returned 15 days later for sensor removal and the data were downloaded for analysis.

Results: Sixty-two participants age 4-25 years received Libre sensor placement. Fifty-six participants returned after two-weeks. All participants were on a regimen of regular and NPH insulin with fingerpoke glucose testing an average of 2.2 times per day. Mean glucose±SD was 240±85 mg/dL (range 82 - 418). Mean HbA1c was 11.3%. Only 11% of participants were at the recommended HbA1c goal of < 7.5% and 61% had an HbA1c >10%. Participants spent 29% of time in the recommended target range of 70 - 180 mg/dL. Hypoglycemia (glucose < 54 mg/dL) occurred in 82% of participants, averaging 5 hypoglycemic events per week with an average duration of 132 minutes per event.

Conclusions: This pilot study demonstrated that children and young adults with T1D in East Africa have large variability in blood glucose levels with their current insulin regimen and experience both chronic hyperglycemia and frequent, prolonged periods of hypoglycemia. This puts them at increased risk for serious acute and chronic complications, indicating that current methods of care are inadequate in this population.

P282
Factors affecting insulin adherence in type 1 diabetics presenting in ketoacidosis - an experience from a teaching hospital

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Objective: To study the factors causing type 1 diabetes treatment interruption leading to ketoacidosis requiring hospitalisation

Methodology: This is a hospital based observational study over a two year period. Children diagnosed as type 1 diabetes within the last 2 years and presenting with DKA were included in the study.

Observation: Twelve Type 1 diabetics presented to pediatric emergency in ketoacidosis during study period. For analysis purpose, they were categorized as prepubertal (n= 8) and post pubertal (n=4). Among pre pubertal children, 3(37.5%) presented with moderate ketoacidosis and 5(62.5%) with severe ketoacidosis. All the children in post pubertal group (100%) presented with severe ketoacidosis. The mean duration from diagnosis of Type 1 diabetes and ketoacidosis was 13.4 +/-1.8 months in pre pubertal group and 8.7+/- 2.9 months

in post pubertal group. In pre pubertal group, financial constraints was the major reason for stopping the insulin therapy (37.5%) followed by incorrect administration technique (25%) and improper storage of insulin (12.5%). Parents resorting to alternate medicines accounted for 25% of cases. Among the post pubertal group, social stigma accounted for the majority of cases (75%) followed by peer pressure and poor self-esteem (25%). Adolescent children also showed a trend towards poor follow up in the diabetes clinic as compared to pre-pubertal children who were followed up more regularly. There was no significant gender difference and faltering therapy (p value: 0.68).

Conclusion: Though financial constraints are always cited as a main reason for faltering therapy in diabetes, other factors like lack of knowledge and motivation on the part of care givers is equally import. Also, increasing awareness about diabetes in the community as well as schools is of paramount importance for overall management of affected children as diabetes is a typical example of a condition that requires support from the entire community.

P283
Identification of novel variants in genes associated with neonatal diabetes in a Brazilian cohort

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Objectives: To establish a molecular genetic diagnosis, using Next Generation Sequencing target panel (tNGS), in a Brazilian cohort with Neonatal Diabetes Mellitus (NDM) (permanent - PNDM / transient - TNDM).

Methods: We evaluated twenty-six patients with NDM referred to our Monogenic Diabetes Group website (diabetesgeneticousp.com). Twenty-one had PNDM and 5 TNDM. Patients presented diabetes before 6 months of age or between 6-12 months if there was no evidence of autoimmunity (exception for those with congenital defects/ extra-pancreatic features). Twenty-four NDM genes were sequenced using a tNGS panel.

Results: The majority of patients (15/26) were male. The median age at diagnosis was 3.5 months (Q1 2.0 - Q3 8.75), with 61% (16/26) presenting diabetes up to 6 months. Fifteen had extra-pancreatic features including chronic diarrhea, developmental delay and short stature. A candidate variant was identified in 50% (13/26) of investigated subjects (*FOXP3*, *KCNJ11*,*ABCC8*, *GCK*, *ZFP57* and *EIF2AK3* genes), 5 of them not previously described, including 1 homozygous complex indel in *GCK* and 3 heterozygous missense variants in potassium channel genes. No variant was shared by probands. One patient (*ABCC8*) initiated the transition to sulfonylurea treatment after genetic diagnosis. The genetic test positivity reached 69% (11/16) among those diagnosed up to 6 months, being 48% (10/21) in PNDM and 60% (3/5) in TNDM.

Conclusions: It was possible to identify a candidate variant associated with NDM in half of the investigated cohort. Genetic test positivity was considerably higher among those diagnosed in the first 6 months of life, and ATP-sensitive potassium channel genes were the most affected (4 *ABCC8* / 3 *KCNJ11*). This reinforces the importance of an early comprehensive genetic testing to define NDM subtype and adequate treatment.

P284
Blood pressure level increase with altitude in three argentinean indigenous communities

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Background: Studies performed by our group in schoolchildren showed a significant association between high blood pressure (BP) and high altitude.

Objective: to compare BP levels in three groups of Argentinean Indigenous schoolchildren from similar ethnic backgrounds but living at three different altitudes.

Methods: A cross-sectional study compared 185 (83 females) children aged 5-14 years from San Antonio de los Cobres (SAC), 3750 m above sea level, 46 (23 females) from Cobres, 3450 m, and 167 (83 females) from Chicoana (CH), 1400 m between November 2017 and January 2019. Children´s height, weight, waist circumference, and BP were measured.

Results: The prevalence of overweight/obesity was significantly lower in SAC, 6.5% (12) and Cobres 4.3%(2) than in CH 24%(40) (BMI >85 percentile per CDC norms). As altitude increase, z- BMI decrease significantly (SAC (-0.43), Cobres (-0.15), and CH (0.37). However, systolic BP increased significantly with altitude: (SAC 86 mmHg, Cobres 77 mmHg, and CH 69 mmHg). Similar results were obtained with diastolic BP (SAC 57 mmHg, Cobres 51 mmHg, and CH 47 mmHg) and with median arterial pressure (MAP) (SAC 67 mmHg, Cobres 60 mmHg, and CH 55 mmHg). Multiple linear regression analyses showed that altitude was significantly and independently associated with children's systolic BP (beta 10.56; R^2=0.40), diastolic BP (beta 6.27; R^2=0.25) and MAP (beta 7.69; R^2=0.32); adjusted for age, sex, and BMI.

Conclusions: Our results suggest that as altitude increase, BP levels increased significantly in indigenous children from similar backgrounds; suggesting that higher BP levels are associated with higher altitudes. Given the long lag time between the detection of hypertension and the onset of clinical cardiovascular disease, screening of BP might provide a unique opportunity for intervention in these communities.

Poster Tour 21 - Telemedicine & Digital Support, Pumps & CGM, and Automated Insulin Delivery

P286
Contributions and limits of Integrated Telemedicine in diabetes care and education program: perceptions of families from Chilean remote rural area

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Introduction: Telemedicine (TM) is one more tool at modern medicine service at care and treatment of Type 1 Diabetes (DM1) moreover in remote areas. However, it's contribution isn't known from the real families' use and perceptions.

Methodology: Qualitative exploratory study, from the analysis of content of TM conversation and guided telephone interviews to 21 families that uses TM for care and follow-up of young people with DM1 between 2016 and 2018, from Aconcagua Valley, Chilean remote rural area.

Results: Our sample included children aged 11,4+- 4,04 years; treatment MDI (85,7%), CSII (14,3%); hospital visits 2,83 +- 1,38 per year. A1c average from 8,52 +- 2,17% (2016) to 7.9 +- 1,25% (2018). We analized 716 TM conversations mainly instant messaging (93,15%) with 12,35 ± 10.05 times per year and per family. The main themes for consultation were administrative (medical control and supplies) (35.3%), glycemic variability and insulin therapy (27.2%), urgencies management (20,5%), social support (11%) and education (5,8%). Satisfaction was optimal (100%) principally because of geographic and economic accessibility of TM, medical support availability to respond, educate and resolve daily difficulties, teamwork with professionals in the aim to improve metabolic control and quality of life. However, families identified more needs from TM to optimize its use, especially from remote rural areas.

Conclusion: Integrate TM into diabetes care program is a pillar of care and follow-up of youth and support families. However, there are still many pending challenges, including those recognized by the families, among the access, the new technologies, the technical conditions and the integration of peer support that should be reflected in future practices and studies.

P287
Lessons learned from using telemedicine with youth with type 1 diabetes and families

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Objectives: To highlight challenges and solutions for telehealth visits with youth with type 1 diabetes (T1D) and their families.

Methods: Since 2012, 1221 clinic-telehealth visits at 5 sites in western Colorado and Wyoming and 282 home-telehealth visits as part of an RCT (DP3DK113363) were completed to improve T1D health outcomes. Providers and staff identified challenges and solutions to conducting telehealth visits.

Results: Lack of T1D-proficient staff and T1D medical resources complicated clinic- and home-telehealth visits. Technology challenges (audio/video, device uploads) occurred in both settings but arose more with home-telehealth. “Tech checks” prior to appointments minimized these obstacles. During home-telehealth, 50% of families engaged in ≥1 appointment interfering barrier (logging in from stores, bed, moving cars; while cooking; without a caregiver present); however, providing clear guidelines and expectations for visits increased family attentiveness and encouraged engagement with providers. Despite these challenges, the late cancel/no show rate for telehealth was 11% lower than the average for in-person clinic visits (17%). Completing fewer appointments in a given time period compared to in-person visits and obtaining additional state licensure and medical privileges for providers were additional constraints.

Conclusions: Clinic- and home-telehealth visits provide convenient and practical access to T1D care. Assessment of anticipated barriers is important to identify solutions to improve telehealth visits. Providing better support to families to improve technology connectivity and assistance with uploading devices is needed. Continued work is also needed with partner sites to improve workflow and efficiency. Multistate consortiums for medical licensing may provide a friendlier model to conduct telehealth across state lines in the US. Preparation and team work to address challenges unique to the telehealth environment can amplify clinical benefits.

P288
Leveraging the Project ECHO model for type 1 diabetes (T1D) to democratize specialty knowledge in underserved T1D communities

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Persistently suboptimal outcomes for people with T1D and a lack of access to subspecialty care mandate the development of innovative healthcare delivery models. T1D care for many pediatric and adult patients in the U.S. falls on primary care providers (PCPs). Using the Project ECHO™ (Extension for Community Healthcare Outcomes)

model, Stanford and the University of Florida partnered to pilot an "ECHO T1D" teleECHO clinic. The goal was to demonstrate feasibility of an ECHO teaching and mentoring model for T1D and improve the ability of PCPs to manage T1D.

Utilizing a "Hub-and-Spoke" model, we recruited and collaborated with PCPs at non-specialty diabetes practices across Florida and California and held weekly one-hour tele-ECHO clinics for 8 months consisting of didactic presentations and learner presented cases. Precision recruitment methods to target clinics in medically underserved regions included:

(1) geocoding to identify high-need areas,

(2) claims data to identify PCPs treating T1D,

(3) survey data from PCPs.

Baseline surveys (n=110) documented PCPs were burdened with providing primary oversight for insulin management in 27% of their pediatric and 61% of their adult T1D patients despite reporting vast lack of confidence in using insulin pumps (81%) and continuous glucose monitors (71%). The pilot demonstrated feasibility with high PCP uptake and enrollment filled beyond capacity. In California, 11 Spoke sites enrolled with 37 clinics serving roughly 1,000 T1D adult and pediatric patients who do not receive routine specialty T1D care. In Florida, 12 Spoke sites enrolled with 67 clinics serving roughly 1,300 T1D patients.

Project ECHO T1D is an innovative healthcare delivery model that appears capable of building capacity for diabetes care in the medically underserved. Having demonstrated proof-of-concept for ECHO T1D, future efforts will focus on replicating the model and on implementing studies to demonstrate value and improvements in outcomes.

P289

Real-world application of an artificial intelligence model predicting short-term change in glycemic control in youth with type 1 diabetes

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Objective: To evaluate the real-world performance characteristics of a model using supervised machine learning to predict visit-to-visit (≥70-day) changes in glycemic control (HbA1c) among youth with type 1 diabetes (T1D).

Methods: Using a convenience sample of youth with T1D receiving care at one of 11 outpatient clinics in a tertiary care diabetes center over a 6-month period, we deployed a model to predict ≥70-day changes in glycemic control (HbA1c) based on using discrete and free-text data derived from electronic health records of youth ages 9-17 years with HbA1c < 12%. The ability of the model to predict rise in HbA1c at different thresholds was evaluated. Predictive ability was assessed using sensitivity, specificity, and positive predictive value (PPV).

Results: Youth with T1D (N=1275) were 51% female, 82% non-Hispanic white, with median [IQR] years of age=14.1 [10.8,16.5]. Forty-seven percent used a continuous glucose monitoring device, and 53% were insulin pump users. Predicted HbA1c correlated with actual HbA1c (ρ=0.84; p< 0.0001). The table presents sensitivity, specificity, PPV, and NPV for the predicted and actual HbA1c rise at four cutpoints for rising HbA1c: 0.3%, 0.4%, 0.5% and 0.6%. Sensitivity and PPV improved in predicting smaller changes in HbA1c rise while specificity and NPV improved when predicting larger changes in HbA1c rise.

Conclusions: A supervised machine learning model predicted clinically significant change in HbA1c for some youth with T1D. The trade-off between sensitivity and specificity should be considered when examining intervention predictions in a clinical care setting. Inclusion of device data and patient-reported outcomes may improve future model performance.

P290

Provider perceived barriers to technology use in pediatric patients with type 1 diabetes

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Type 1 diabetes (T1D) affects about 200,000 youth in the United States and the incidence is rising. Diabetes technology, such as insulin

Actual HbA1c rise (%)	Model Diagnostic Characteristics	Estimate (%)	95% Confidence Interval
≥0.3	Sensitivity/Specificity	21.3 / 86.1	18,24.9 / 83.3,88.5
	PPV/NPV	55.5 / 57.3	48.6,62.1 / 54.2,60.3
≥0.4	Sensitivity/Specificity	11.7 / 93.5	9.1,14.9 / 91.6,95.2
	PPV/NPV	54.1 / 62	44.3,63.7 / 59.1,64.7
≥0.5	Sensitivity/Specificity	6.5 / 97.3	4.3,9.2 / 95.9,98.3
	PPV/NPV	54.9 / 66.9	40.3,68.9 / 64.1,69.5
≥0.6	Sensitivity/Specificity	2.7 / 98.8	1.3,4.9 / 97.8,99.4
	PPV/NPV	47.6 / 71	25.7,70.2 / 68.4,73.5

[Diagnostic performance of prediction vs. Actual HbA1c Rise at next clinic visit (Sensitivity/Specificity, and Pos/Neg Predictive Value [PPV/NPV])]

pumps and continuous glucose monitors (CGM), have been associated with improved glycemic control and improved quality of life. However, as of 2015 only 60% of children used a pump and only 6% used CGM. Potential barriers to device uptake in the T1D population have been described from both patient and provider perspectives, but studies were mostly conducted in adults who were predominantly white, of higher socioeconomic status, and privately insured.

Providers at Children's Hospital Los Angeles who deliver care to youth with T1D (n=42) were surveyed to investigate their perceived barriers to use of diabetes technology as well as explore potential differences between provider and patient-reported barriers. The most commonly perceived barriers were insurance coverage (83.33%), patients' dislike of having diabetes devices on their body (88.1%), patients' dislike of how diabetes devices look on their body (69.05%), and others noticing and inquiring about their devices (69.05%). When compared to reported barriers by youth with T1D, the most commonly reported barriers were similar between patients and providers with the exception of insurance coverage. However, providers endorsed barriers more frequently than youth as seen in Table 1. For example, 69.05% of providers felt that others noticing and inquiring about diabetes devices was a barrier, while only 13.99% of youth felt this was a barrier.

Differences between patient-reported barriers and provider-perceived barriers, as well as increased perception of barriers by providers, may affect the use of diabetes technology in youth with T1D. Further investigation into other potential barriers as well as provider-patient disparities will assist in improving how providers support their patients and the adoption of diabetes technology.

	% Endorsing Barrier		
Barrier	**Patient (n = 143)**	**Provider (n = 42)**	**P-Value**
Cost of supplies	5.59%	40.48%	<0.0001
Cost of device	3.50%	35.71%	<0.0001
Insurance coverage	9.09%	83.33%	<0.0001
It is stressful wearing devices all of the time	16.08%	57.14%	<0.0001
I do not like having diabetes devices on my body	20.28%	88.10%	<0.0001
I do not like how diabetes devices look on my body	16.78%	69.05%	<0.0001
I get nervous that the device might not work	13.29%	28.57%	<0.0001
I do not want to take more time from my day to take care of my	4.90%	16.67%	0.011
I get nervous to depend on technology	6.29%	21.43%	0.004
I worry about what others will think of me	9.09%	50.00%	<0.0001
I do not like diabetes devices because people notice them and ask questions about them	13.99%	69.05%	<0.0001
I am too busy to learn how to use a new technology or device	2.10%	9.52%	0.05
My diabetes care team has never talked with me about diabetes technology options	0.00%	11.90%	<0.0001
I do not understand what to do with the information or features of the devices	0.00%	23.81%	<0.0001
I am not able to get my diabetes care team to write me a prescription	1.40%	11.90%	0.002
I do not get enough help from my family	0.00%	16.67%	<0.0001
I do not get enough help from my diabetes care team in using devices	0.00%	2.38%	0.23
I do not want to have more information about my diabetes	0.70%	11.90%	0.002
My family does not think diabetes devices are important for taking care of my diabetes	0.70%	14.29%	0.001

[Table 1. Frequency of Patient and Provider-Reported Barriers to Device Use]

P291

How does video-counseling work under real-life conditions? Results from the VIDIKI study, a multicenter, controled study evaluating the impact of monthly video consultations for children with type 1 diabetes using a continuous glucose monitoring system

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Objectives: The Virtual Diabetes Outpatient Clinic for Children and Youth (VIDIKI) is a German multicenter controled study with a multimethod design to assess the feasibility and acceptance of monthly video-consultations.

Methods: The multicenter VIDIKI study quasi-randomized participants with type 1 diabetes (age: 1-16 yrs; diabetes duration: 0.5-15 yrs.) to either the intervention group or the waiting control group (each N=120). All participants were using a continuous glucose monitoring system (CGM). The video-consultations were documented over six months. In addition parents' and adolescents' satisfaction with video-consultations and treatment satisfaction was assessed by using a standardized instrument (DTSQ).

Results: Overall 644 telemedical contacts (median duration 22 minutes) were documented, 584 of them were performed as scheduled and 60 unscheduled. 67.5% of the contacts took place during regular working hours (8:00 a.m. to 6:00 p.m.), 29.0 % after working hours, and 3.1 % during weekends. Patients and parents reported 171 technical problems (26.5%), clinicians 92 problems (14.3%) based on the 644 contacts, which were mainly related to the video portal. Despite technical problems, satisfaction with video counseling was high to very high among parents (94/107=87.8 %) and adolescents (45/46=97.8 %). After adjustment for covariates, the DTSQ scoreat 6 months was 4 points higher in the intervention group than in the control group (95%-CI 2 to 6, p< 0.001) in the parent report and 2 points higher in the adolescent report (-2 to 5, p=0.404).

Conclusion: Telemedicine is particularly useful in pediatric diabetes care, if CGM and insulin data are stored online in clouds. After 6 months, the VIDIKI participants were highly satisfied with video consultations. However, secured video consulting requires the availability of technical facilities, e.g. stable internet access, and families' and consultants' readiness to deal with several technical barriers at the beginning.

P292

VIDIKI: a multicenter, controled study assessing the impact of monthly video consultations for children with type 1 diabetes compared to usual care

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Objectives: As continuous glucose monitoring (CGM) data in a cloud are accessible at any time and any place, video-consultation gains more attention in diabetes care. It reduces travelling time and organizational burden of families with affected children. The Virtual Diabetes Outpatient Clinic for Children and Youth (VIDIKI) is a multicenter controled trial with a multi-method evaluation design in Northern Germany to assess the acceptance and efficacy of video-counseling.

Methods: The study consists of a six-month controled study phase with monthly video consultations as an add-on to regular care (intervention group) and a control group with usual care. After six months, video-consultation was offered to all participants throughout one year. In a final phase contact intervals were freely chosen. All participants were using a CGM system and considered themselves able to perform a video-consultation from home. Primary outcome parameter was HbA1c, secondary parameters were psychosocial wellbeing and treatment satisfaction.

Results: Between July 2017 and May 2018, 240 participants (age: 1-16 yrs.; diabetes duration: 0.5-15 yrs.) were quasi-randomized to the intervention or waiting-control group. After adjustment for covariates, the HbA1cat 6 months was 0.15 % lower in the intervention group than in the control group (95%-CI -0.34 to 0.05, p=0.143). After 12 months of video-consultation, the cohort analysis of the intervention group revealed a change of HbA1c of -0.38 (-0.61 to -0.14, p=0.003).

Conclusions: In 2017 video-consultation was an innovative concept of diabetes care in Germany. After six months no significant reduction of HbA1c could be observed, probably due to major technical problems. However, after 12 months of video counseling, metabolic control in the intervention group improved significantly. Effective video-consultation depends on safe, secure and flawless technical solutions and physicians' and patients' competence and motivation to use this technology.

P293

A pilot non-inferiority randomized controlled trial to assess automatic adjustments of insulin doses for patients with type 1 diabetes on multiple daily injection therapy

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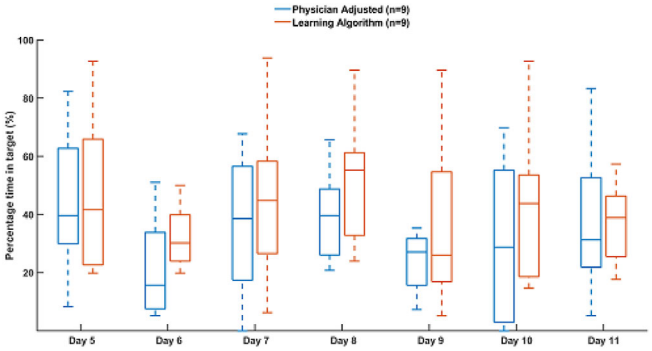
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Introduction: Multiple daily injection (MDI) therapy for type 1 diabetes (T1D) involves basal insulin doses which keep glucose levels constant under fasting conditions, and bolus insulin doses given at mealtime to cover carbohydrates from meals. Non-optimal basal and bolus doses contribute to the lack of satisfactory glycemic control.

Objective: We aimed to evaluate the feasibility of a learning algorithm that optimizes daily basal and bolus doses for MDI therapy.

Methods: We performed a non-inferiority, randomized, parallel study comparing daily physician adjusted (PA) insulin doses against daily learning algorithm (LA) adjusted doses in children and adolescents on MDI therapy. The study was conducted at Camp Carowanis (Quebec, Canada), a camp for youth with T1D diabetes, where campers on MDI therapy (age 8-21, HbA1c ≤ 11%) were recruited. Participants wore a Freestyle Libre glucose sensor and underwent 11 days of daily insulin dose adjustments by either a physician or our algorithm. Algorithm adjustments were reviewed by a physician and the last 7 days were examined for outcomes.

Results: 18 youths (age 13.1 (SD, 3.9) years, Female (n=10), HbA1c 8.7 (SD, 1.9) %, total daily insulin per weight 0.76 (SD, 0.24) U/kg) were randomized to both groups (LA (n=9) or PA (n=9)). In the last 7 days, the algorithm made 195 adjustments where 18 were overridden by a physician. The time in target glucose (3.9-10 mmol/L) in LA (35.4%) was similar to PA (37.7%) (P = 0.73). The median difference was non-significant (-3.8%, 95% CI, [-21.7, 12.1]). The number of hypoglycemic events per day in LA (0.7) was similar to PA (0.7) (P = 0.54). There was no incidence of severe hypoglycemia nor ketoacidosis.



[Comparison of daily time in target between the two groups (Physician-adjusted and Learning algorithm)]

Conclusions: This is the first study assessing personalized day-to-day algorithmic adjustments for MDI therapy. In this pilot study, our learning algorithm performed similarly to a physician. Longer and larger studies are warranted.

P294

Real-world glycemic profiles and insulin use patterns of 12,796 pediatric, adolescent and young adult patients with Type 1 diabetes using the Omnipod® insulin management system with cloud-based data management

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Objectives: This observational study characterized glycemic profiles and treatment patterns of a large cohort of pediatric, adolescent and young adult patients with T1D using the Omnipod® Insulin Management System (Insulet Corp., Acton, MA) with integrated BG meter (Abbott Diabetes Care Inc., Alameda, CA) and data management system (Glooko, Mountain View, CA).

	<6 y (n=594)	6 - 12 y (n=4,972)	13 - 17 y (n=5,321)	18 - 25 y (n=1,909)
Age, y	4.2 ± 1.0	9.6 ± 1.9	14.9 ± 1.4	21.0 ± 2.3
Mean BG, mg/dL (mmol/L)	194 ± 41 (10.8 ± 2.3)	191 ± 36 (10.6 ± 2.0)	202 ± 42 (11.2 ± 2.3)	194 ± 45 (10.8 ± 2.5)
eA1C / GMI, % (mmol/mol)*	8.0 ± 1.0 (64 ± 11)	7.9 ± 0.8 (63 ± 9)	8.1 ± 1.0 (65 ± 11)	7.9 ± 1.1 (63 ± 12)
Percent BG readings <70 mg/dL (<3.9 mmol/L), %	4.0 ± 3.4	5.5 ± 3.8	5.6 ± 4.0	6.1 ± 4.9
Percent BG readings 70-180 mg/dL (3.9 - 10.0 mmol/L), %	41.5 ± 13.1	44.4 ± 11.8	42.5 ± 14.1	44.5 ± 16.8
Percent BG readings >180 mg/dL (>10.0 mol/L), %	54.5 ± 14.0	50.2 ± 13.1	51.9 ± 15.4	49.3 ± 17.8
TDD, U	11.3 ± 4.5	24.6 ± 12.4	47.5 ± 17.2	48.0 ± 17.5
Bolus, U	1.0 ± 0.6	2.4 ± 1.8	5.4 ± 3.1	6.2 ± 3.3
Bolus, x/d	7.5 ± 2.9	6.5 ± 2.2	5.3 ± 2.1	4.4 ± 2.2

[Table. Glycemic Profiles and Insulin Use Patterns of Youth with Type 1 Diabetes Using the Omnipod System.]

Methods: From January 2015 through December 2018, usage data from the pump system were uploaded to the data management system and matched via device serial number to a second database of self-reported demographic data and de-identified. BG and insulin data from ≥3 mo of system use per patient were analyzed.

Results: Demographics, glycemic profiles and insulin use of patients with T1D (n=12,796) stratified by age group < 6 y (n=594), 6 to 12 y (n=4,972), 13 to 17 y (n=5,321) and 18 to 25 y (n=1,909) are reported in the Table. Mean glucose was 194±41 (10.8±2.3), 191±36 (10.6 ±2.0), 202±42 (11.2±2.3) and 194±45 (10.8±2.5) mg/dL (mmol/L) and bolus frequency per day was 7.5±2.9, 6.5±2.2, 5.3±2.1 and 4.4±2.2 in the < 6 y, 6 to 12 y, 13 to 17 y and 18 to 25 y groups, respectively.

Conclusions: These real-world data from a large cohort of youth with T1D demonstrate that use of a tubeless insulin pump was associated with BG levels that compare favorably to large registries including the T1D Exchange. These data also highlight important management patterns including frequent bolusing with Omnipod System use.

P295
Infrequent uploading of insulin pump and glucose sensor data due to motivation rather than knowledge for families living with paediatric type 1 diabetes

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Introduction: Families' ability and desire to upload, review and share device data underpins improving diabetes control; however, many families do not practice this and there is limited paediatric research literature. We undertook a quality improvement project to empower engagement with device uploading in paediatric type 1 diabetes.

Objectives:

1) Increase the proportion of patients who: know how to upload; upload at home; print or share data for clinic.

2) Decrease the proportion of device uploads in clinic. 3) Improve clinic patient flow.

Methods: Baseline patient surveys preceded quality improvement interventions: written resources on uploading and sharing device data; clinic reminder notice; telephone reminder - followed by surveys at 3 and 6 months. Other outcome measures collected each clinic: patients' uploading routines; device uploads in clinic; clinic flow metrics.

Results: Demographics and device use were similar between survey periods, which included a total 167 respondents (53% of those eligible). There was good baseline understanding of sensor and pump uploading - 19/27 (70%) and 41/51 (80%), respectively - which, as well as the frequency of uploading and print or sharing data for clinic, remained unchanged over the project (p>0.05). Runs charts from clinic collected outcome measures confirmed no change in all objectives.

Technical barriers to sensor and pump uploading were reported by 18/48 (38%) and 13/68 (19%), respectively. Disengagement with sensor and pump uploading was reported by 23/48 (48%) and 39/68 (57%), respectively. Written resources motivated change in 30% of respondents; health care professional recommendations or instruction motivated change in 70%.

Conclusions: Written resources did not improve uploading routines, which could be explained by good baseline understanding. Disengagement with device uploading could be additionally addressed by extrinsic motivations: consistent health care professional messaging and expectations.

Poster Tour 6 - Telemedicine & Digital Support, Pumps & CGM, and Automated Insulin Delivery

P296
Flash Glucose Monitoring technology in the management of children and adolescents with type 1 diabetes leads to improved glycemic control

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Objectives: Flash Glucose Monitoring technology (FGM) has been recently introduced in diabetes management and its use is becoming increasingly popular among children with Type 1 diabetes (T1D). The aim of this study was to evaluate real-life data from pediatric patients using FGM followed in our center.

Methods: We studied 37 patients (51.4% males), with a mean ±SD age of 10.1 ±3.9 years at FGM start for a follow-up period of 10.1 ±6.5 months. HbA1c, BMI z-score, number of self-reported hypoglycemias and severe hypoglycemic events, total insulin daily dose/kg (TDD/kg), as well as the number of blood glucose self-measurements (SMBGs) by finger prick were collected and compared with paired analysis before and after introducing FGM.

Results: A significant reduction was observed in mean HbA1c (7.82% ±1.78 vs 7.19% ±0.69, p=0.04) after FGM introduction. The number of hypoglycemias/month (6.3 ±7 vs 4.6 ±5.3, p=0.31), the BMI z-score (0.68 kg/m^2 ±0.99 vs 0.76 kg/m^2 ±0.8, p=0.473) and the insulin TDD/kg (0.58 IU/kg/day ±0.3 vs 0.68 IU/kg/day ±0.24, p=0.061), did not change significantly. No severe hypoglycemias were recorded before or after FGM. As expected, there was a significant reduction in the number of SMBGs /day (7.05 ±2.7 vs 2.45 ±2.38, p< 0.001). All families report a high level of satisfaction with the combined use of SMBG and FGM despite frequent discrepancies between FGM and SMBG, especially at low glucose levels. All patients use FGM continuously, except of an adolescent girl who requested "time-off" during her holidays and an adolescent boy who uses it intermittently. The main complaint is frequent sensor detachment especially during summer months. The families do not download the sensor at home.

Conclusions: Short-term follow-up of children using FGM has shown a beneficial effect on HbA1c, with no increase in the number of hypoglycemic episodes. Further long-term real-life studies will provide additional information on the impact of FGM on diabetes management.

P297
A comparison between treatment with continuous insulin infusion and multiple daily injections in children and adolescents with type 1 diabetes in Sweden: data from the Swedish national quality register SWEDIABKIDS

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Introduction: There is no evidence that patients with continuous subcutaneous insulin infusion (CSII) will achieve a better glucose metabolic control compared to multiple daily injection (MDI). Previous studies have indicated that CSII regimen improves quality of life for the patients, but since CSII is more expensive than traditional MDI regimen it might not be cost-effective for the healthcare systems.

Objectives: The aim of this study was to study if treatment with CSII results in better metabolic control compared to treatment with MDI in children with type 1 diabetes.

Methods: Data extracted from SWEDIABKIDS 2011-2016 was HbA1c, age, sex, diabetes duration, insulin method, BMI-SDS and severe hypoglycaemia. Mean HbA1c and BMI-SDS was calculated for every patient each year and comparisons were made between groups of 0-6, 7-12, 13-17 years and HbA1c < 48, 48-57, 57-64, 64-72 and >72 mmol/mol. Patients changing methods were excluded for that year (10%).

Results: Data were available from 35624 patient-years (54% boys). There were no differences in mean HbA1c between patients using CSII compared to MDI except for the group with HbA1c>72 mmol/mol; (CSII) 77.4 and (MDI) 79.8 mmol/mol (p< 0.05). In 2011, more girls (41%) than boys (35%) used CSII and in 2016 there was 60% of the girls and 56% of the boys using CSII. Patients using CSII were younger and had longer diabetes duration (p< 0.05). In 2011 there were more incidents of severe hypoglycaemia with MDI (3.8%) compared to CSII (3.5%) and in 2016 the incidents were less frequent; MDI (2.3%) and CSII (2%). Patients using CSII had a tendency to higher BMI-SDS and in teenage girls the difference was; 0.8 (MDI) and 0.98 (CSII) (p< 0.05).

Conclusions: Patients with the highest HbA1c had a better glucose metabolic control with CSII compared to MDI but they had a higher BMI-SDS. The incidence of severe hypoglycaemia in 2011 was 3.5% (CSII) and 3.8% (MDI) and decreased during these years while the use of CSII regimen increased.

P298
Flash glucose monitoring: lower sensor usage in children with poorer diabetes control

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Objectives: The FreeStyle Libre flash glucose monitoring system (FGM) is reimbursed and largely used by Belgian type 1 diabetic

children and adolescents. The aim of this study was to characterised sensor usage in that population.

Methods: This prospective observational study of two month duration included subjects with type 1 diabetes using FGM, aged from 4 to 20 years. Clinical data, HbA1c and FGM data were collected. A linear regression was used to ascertain factors affecting FGM usage.

Results: On the 299 subjects included, 127 (42.5%) scanned their sensor ≤ 5 times/day. They were older [median (IQR)] [15.0 (12.5-17.2) vs 12.3 (9.2-14.7) years; p< 0.001], older at diagnosis [9.4 (6.3-12.1) vs 5.9 (3.2-9.1) years; p< 0.001], used less the trend arrow (39.9 vs 87.8 %; p< 0.001) and the glucose profile (40.7 vs 65.2 %;p< 0.001) and had higher HbA1c [8.1 (7.4-9.0) vs 7.4 (6.9-8.0) %] than those with > 5 scans/day. They also had a lower time in range 70-180 mg/dl [25 (29-44) vs 42 (37-51) %; p< 0.001] and a higher time above 180 mg/dl [29 (20-39) vs 19 (11-27) %; p< 0.001]. We calculated that a minimum of 6 scans/day was necessary to capture at least 70% of the sensor data in more than 90% of subjects. In multivariate analysis, frequency of scans was only positively related to sensor usage (β=0.108, p< 0.001) and sensor usage was independently and negatively related to percentage of time above 180 mg/dl (β= -0.590, p=0.013), age (β= -0.784, p=0.027), age at diagnosis (β= -0.987, p=0.004) and HbA1c (β= -4.476, p=0.004).

Conclusion: FGM is well used in younger patients, younger at diagnosis and with better glucose control. Poor FGM sensor usage is associated with higher HbA1c and reflects the poorer treatment compliance in older one.

P299
Successful use of continuous glucose monitoring to titrate an intravenous insulin infusion

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Objective: To demonstrate the safety and effectiveness of Continuous Glucose Monitoring (CGM) to titrate an intravenous insulin infusion in a patient who received a bone marrow transplant for myelodysplastic syndrome and subsequently developed diabetes mellitus.

Methods: A 17 year old boy with severe graft versus host disease (GVHD) following bone marrow transplant for myelodysplastic syndrome developed diabetes mellitus associated with systemic corticosteroid treatment and total parenteral nutrition, on which he was dependent due to gut involvement by the GVHD. GAD autoantibodies were positive (53 U/ml, reference range < 5), but IA-2 and insulin autoantibodies were undetectable. Management of his diabetes required an intravenous insulin infusion, but frequent capillary blood glucose level (BGL) monitoring was not feasible, due to severely impaired skin integrity from GVHD, and due to recurrent thrombocytopenia despite platelet transfusions. CGM using the DexCom G4 system was started and subsequently switched to DexCom G5. Calibration capillary blood glucose levels were performed every 12 hours. Sensor glucose levels were used to titrate the intravenous insulin infusion to maintain glucose levels in target range, without any significant hypoglycaemia. The insulin infusion was continued in this manner for 38 days until the patient died from gram negative septicaemia.

Results: CGM was a safe and effective means of titrating an intravenous insulin infusion for this patient who developed diabetes mellitus from complications following bone marrow transplant for myelodysplastic syndrome. The burden of capillary BGL monitoring was significantly reduced as a result of the availability of CGM technology.

Conclusions: CGM was a safe and effective means of titrating an intravenous insulin infusion for this patient.The availability of CGM technology greatly reduced the burden of capillary BGL monitoring and improved quality of life.

P300
Young children with type 1 diabetes (T1D) use continuous glucose monitors on a near daily basis

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Objectives: Continuous glucose monitoring (CGM) may benefit young children with type 1 diabetes (T1D) and their caregivers if used consistently, but findings from prior studies using earlier generation devices were disappointing due to unsustained CGM use by young children. We analyzed CGM usage in the Strategies to Enhance New CGM Use in Early childhood (SENCE) study to assess frequency and persistence of CGM use among young children using the Dexcom G5 CGM.

Methods: We analyzed data from 94 children 2-< 8 years old with T1D who were not currently using CGM (median age 5.6 years, median T1D duration 1.6 years, 49% female, 71% non-Hispanic white, 30% pump users, mean±SD HbA1c 8.2±0.8%). Participants were randomized to CGM alone (N=44) or CGM with a family behavioral intervention (FBI) (CGM+FBI N=50) over 6-months. CGM training visits were at enrollment, randomization, 1 and 3 weeks post-randomization. FBI sessions were delivered at 1, 3, 6, 13 and 19-week visits. Use of the Dexcom Mobile App (to display CGM data on a smartphone) with or without SHARE feature was optional.

Results: Over 6 months, children's median (25^{th}, 75^{th} percentile) weekly CGM wear rates were 6.9 (6.6, 7.0) days/week in CGM alone and 6.9 (5.9, 7.0) days/week in CGM+FBI (P=0.33). In the final month, ~90% used CGM ≥6 days/week and ~50% used Dexcom SHARE. Daily SMBG frequency decreased from 6 at baseline to 4 at 6 months, including the required 2 calibrations/day, and 95% of CGM alone and 79% of CGM+FBI group reported solely using CGM data for mealtime insulin dosing. Nearly all (97%) families wished to continue using CGM for their child at the 6-month visit.

Conclusions: Advances in CGM performance have improved usability in young children with T1D. With educational and/or behavioral support, families of young children with T1D can sustain a high frequency of CGM use, which has important implications for advances in automated insulin delivery systems.

P301
The use of insulin pumps and continuous glucose monitoring: does it make a difference? Data from the Norwegian Childhood Diabetes Registry

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Introduction: Existing knowledge on the use of CSII and CGM systems are often based on studies with a limited number of selected participants and a short timeframe. The impact of CSII and CGM on HbA1c under real life conditions are yet not known. Therefore, examination of actually used systems in a clinical setting can contribute to the evaluation of the real impact of these technical devices.

Objectives: To examine the effect of insulin pumps and CGM systems widely in use today, in a population based national cohort study.

Material and methods: We did a population-based nationwide observational study, using the annual data from the Norwegian Childhood Diabetes Registry (NCDR) in 2017. NCDR has a high completeness of 98%. Altogether 2749 patients were included (45.6% girls) with mean age 12.9 years (SDS 3.9), and mean diabetes duration 5.3 years (SD 3.7). HbA1c was evaluated depending on the insulin delivery device (CSII vs insulin pen) and the glucose control device (CGM or not) in a linear mixed-effects model (LME with main effects and interactions) adjusted for age, sex and diabetes duration as fixed effects and hospital as random effect.

Results: Of 2749 patients, 1996 (74%) used CSII and 1359 patients (52%) used CGM. The mean HbA1c in the total sample was 7.85% (62mmol/mol). In the adjusted models, we saw a significantly lower HbA1C for CSII compared with insulin pen (-0.16 percentage points, (CI -0.28, -0.03), p=0.016). For CGM we observed an even bigger decline in HbA1C (-0.21pp, (CI -0.31, -0.11), p= < 0.001) for pen users, while CGM for pump users had in mean a 0.12pp lower HbA1c.

Conclusions: In this nationwide, population based observational study, children and adolescents using insulin pumps or CGM reached better metabolic control as indicated by HbA1c. The best results were seen in the group using CSII and CGM. Thus, the rather huge HbA1c improvements reported in short term RCT's are not fully reproducible in our data from a clinical setting.

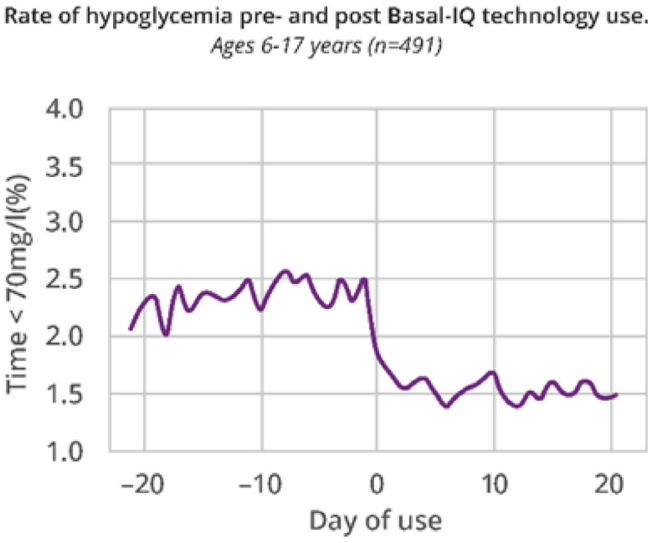
P302
Improvement in hypoglycemia outcomes in pediatric population using predictive low-glucose suspend (PLGS): basal-IQ system real-world data

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Technology is changing how that type 1 diabetes is managed, however pediatric registry data continue to demonstrate suboptimal outcomes. Hypoglycemia is a limiting factor for the attainment of optimal glycemic control. A retrospective pre-post and longitudinal (defined ≥9 weeks of use) analysis of Tandem's PLGS technology used by a real-world pediatric cohort showed significant reductions in hypoglycemia.

Real-world pre-post data uploaded to Tandem's t:connect® diabetes platform by Basal-IQ® system users who had at least 21 days of system use before and after introduction of Basal-IQ are presented from 491 youth ages 6-17 years old [mean age = 12.01; SD = 2.79; 271 males (55.2%)]. There was a significant reduction in hypoglycemia (< 70 mg/dL; p = < .001). Time in range (53%) did not significantly change with PLGS. Longitudinal data of 1220 youth users aged 6-17 years old [mean age = 12.22; SD = 2.85; 627 male (51.4%)] indicate that the system was available 98% of the time; algorithm-enabled insulin suspensions occurred on average 5x/day for an average 15.86 minutes per suspension. Users were euglycemic when insulin was suspended (mean BG = 111.67) and resumed (mean BG = 100.69); 95.7% of the time, resumption of basal insulin was system driven and users overrode insulin suspension only 4% of the time.Real-world use of Basal-IQ technology is associated with significant reduction in hypoglycemia for pediatric users. High system reliability and infrequent user overrides reflect high user trust and continued product adoption. Basal-IQ technology shows promise in improving clinical outcomes. Future studies needed to confirm comparable changes in distress and burden.



[Rates of Hypoglycemia Pre and Post Basal-IQ technology Use]

P303
Predictors of successful use of continuous glucose monitors in pediatric patients with type 1 diabetes

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Introduction: Continuous glucose monitor (CGM) use is associated with improved glycemic control in some, but not all, pediatric patients with type 1 diabetes (T1D).

Objective: The aim of this study was to identify baseline factors that are associated with optimal or improved glycemic control one year after starting to use CGM.

Methods: Patients with type 1 diabetes (T1D) aged under 18 years at the time of starting CGM between 1/1/14 and 5/1/18 were included in this retrospective chart review. Successful use at 1 year was defined as a reduction in hemoglobin A1c (HbA1c) concentration of ≥ 0.5% at 1-year, or a HbA1c concentration of < 7.5% at 1-year.

Results: Of the 616 patients who started CGM (540 Dexcom, 76 Medtronic), 62 (10%) discontinued using the device within the first year. Of the remaining 554 (51.4%) patients, median (IQR) HbA1c was similar at baseline and 1-year (7.6% (6.9, 8.5) vs 7.7% (7, 8.4)). There were 285 patients who met criteria for successful use at 1-year (148 HbA1c < 7.5%, 61 HbA1c reduced by ≥ 0.5%, 76 both). Successful users had lower baseline HbA1c (7.3% (6.6, 8.2) vs 7.8% (7.3, 8.5), p< 0.001). They had a shorter duration of diabetes (1.4 y (0.5, 4.5) vs 3.1 y (0.8, 6.4), p < 0.001), but were similar in age (10.7 y (7.3, 13.3) vs 10.9 y (7.9, 14), p=0.2) at the time of CGM start. There were no significant differences in success rates according to: CGM device (36/53 (57%) Medtronic vs 249/491 (51%) Dexcom, p=0.4); Insulin pump users at time of CGM start (108/225 (48%) insulin pump vs 113/199 (57%), p=0.08); sex (155/304 (51%) males, 130/250 (52%) females, p=0.9); or insurance type (247/464 (53%) commercial vs 38/90 (42%) government, p=0.07).

Conclusions: Approximately half of patients have an improved or optimal HbA1c at 1-year, and this is associated with shorter duration of T1D and lower HbA1c at the time of CGM start. Further study is needed to investigate whether these factors are also associated with reduction in hypoglycemia.

P304
Publicly insured youth continue to use CGM up to 2 years following CGM initiation

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In the United States, people with lower socioeconomic status rely on public insurance. Despite its benefits in lowering hemoglobin A1c (HbA1c) and improving quality of life for those with type 1 diabetes (T1D), continuous glucose monitor (CGM) coverage is variable for children with public insurance. California Children's Services (CCS) covers CGM for some publicly insured children. We have previously shown that children with CCS started on CGM continue to wear CGM at a high rate. The purpose of this study is to follow up CGM use in children with CCS 2 years after the original study.

We performed chart review to: identify children with CCS started on CGM, determine CGM use, HbA1c, time in range (TIR, 70-180 mg/dL), and time in hypoglycemia (< 70 mg/dL) at the most recent clinic visit.

Since 2016, 84 patients with CCS started on CGM at a mean age of 11.9 ± 4.7 years, diabetes duration of 4.7 ± 4.3 years, HbA1c 8.7 ± 1.7%, and 53 were on insulin pumps. The most recent visit occurred 1.4 ± 0.9 years after CGM initiation. 65 (78%) continued on CGM, 18 stopped CGM (12 due to a loss in insurance coverage), and 1 was lost to follow up. Among continued users of CGM, the mean HbA1c was 8.4 ± 1.4%, mean wear time of was 11.2 ± 3.3 days over the past 2 weeks with 34.7 ± 17.5% TIR and 2.2 ± 3.0% time in hypoglycemia. 52% used a cell phone to view data. 33 (51%) had a decrease in their HbA1c. Among those who stopped wearing CGM, the mean HbA1c was 9.2 ± 1.3%. The mean change in HbA1c for users of CGM was -0.2 ± 1.6% while the mean change in those who discontinued CGM use was +0.2 ± 0.9%.

A majority of children with CCS continue to use CGM with a high percentage of wear time. Although not powered to demonstrate statistical significance, users of CGM had a decrease in their HbA1c while those who discontinued CGM had an increase in their HbA1c. Given the benefits of CGM and data showing sustained use, our results continue to support coverage for publicly insured children.

P305
Bolus and basal rate accuracy of two recently released insulin pumps

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Objectives: Dosing accuracy of different insulin pumps has already been studied and presented over the last few years. Two more pumps that became available recently were now tested to complement the overview of insulin pump accuracy. One focus was set on small insulin doses that are relevant in the therapy of children using continuous subcutaneous insulin infusion (CSII).

Methods: Two durable insulin pumps (MiniMed® 670G [670G] and mylife™ YpsoPump® [YP]) were tested in an experimental setting following EN 60601-2-24. Accuracy was assessed by measuring the weight gain of a water-filled beaker placed on a balance. Insulin was delivered by the pump that was placed outside of the balance through the infusion set into the beaker. From each pump model, 3 devices were used, and measurements were repeated 3 times to achieve a total of 9 data sets per pump model. Basal rate accuracy was tested at a constant basal rate of 0.1 U/h and 1 U/h for 72 h. Deviation from target delivery was evaluated over the whole testing period and for each individual hour of delivery. Bolus accuracy was tested for

		Basal rate		Bolus		
	n	0.1 U/h 9	1 U/h 9	0.1 U 225	1 U 225	10 U 108
670G	Mean deviation	10.6%	0.1%	6.0%	0.3%	-0.8%
670G	% of 1-h windows/boluses within ±15% of target	59%	99%	85%	100%	100%
YP	Mean deviation	4.2%	1.2%	-2.3%	1.1%	0.7%
YP	% of 1-h windows/boluses within ±15% of target	67%	99%	88%	100%	100%

[Table 1: Basal rate and bolus delivery accuracy]

boluses of 0.1 U, 1 U and 10 U, applying 25 or 12 (for 10 U) subsequent boluses that were weighted individually.

Results: Results for basal rate and bolus delivery accuracy are shown in Table 1.

Conclusions: The results for the two new pumps fit to those obtained with previously tested durable insulin pumps. As delivery accuracy and especially precision decreases with smaller basal rates and bolus doses care should be given especially when treating small children with CSII.

Poster Tour 14 - Telemedicine & Digital Support, Pumps & CGM, and Automated Insulin Delivery

P306
Bacterial strains colonizing the sensor electrodes of continuous glucose monitoring system in children with diabetes

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Introduction: Continuous glucose monitoring (CGM) system provides information on changes in blood glucose (BG) levels throughout the day. Its use facilitates optimal therapeutic decisions for a diabetic patient. Information on BG trends helps to identify and prevent unwanted episodes of both hypo- and hyperglycaemia. One of the factors limiting the use of CGM is inflammation at the insertion site.

Aim of the study: The aim of the study was the microbiological identification of the bacterial strains which are found on CGM sensor electrodes.

Material and methods: We performed microbiological tests on patients' CGM Enlite Medtronic electrodes, which were removed after 6 days of usage according to manufacturer's instructions. 22 sensors were examined from 22 children (10 girls) aged from 0.5 to 14.6 years. The microbiological analysis was routinely performed at University Diabetes Center in Katowice, Poland.

Results: 9 (40%) of the electrodes were colonized. In 8 (88%) cases the electrodes were colonized by one bacteria strain. 6 times methicillin susceptible coagulase negative staphylococcus (MSCNS) was detected. We also found one case of *Klebsiella pneumonia* and *Ochrobactrum tritici*colonization. One electrode was colonized by the mixed flora (*Enterococcus faecalis*, MSCNS, *Pseudomonas stutzeri*, methicillin-sensitive *Staphylococcus aureus*). The average HbA1c in the group with colonization of electrodes was 8.14%±2.36 vs. 7.23%±1.99 in the group without colonization. The average BMI in the group with colonization of the electrodes was 17.05±1.55 vs.16.48±1.64. in the group without colonization. Statistically, significantly more often electrodes are colonized in older children (average age in the group with colonization of electrodes 11.05±3.22, without colonization 7.44±3.85, p=0.03).

Conclusions: Around 40% of sensors of CGM in diabetic patient colonized bacteria. It seems that older children are more likely to have their sensor electrode colonized by bacterial strains.

P307
Using trend arrow-protocol in adolescents with type 1 diabetes in continuous glucose monitoring minimizes the risk of hypoglycemia during a sport-school camp

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Introduction: Insulin therapy needs to be adapted in adolescents with type 1 diabetes (T1D) while exercising. Hypoglycemia is the major issue and while insulin reduction is recommended, carbohydrate supplementation is also frequently needed.

We conducted a study to evaluate carbohydrate supplementation to prevent hypoglycemia in T1D adolescents during a sport-school camp.

Methods: 27 adolescents with T1D for at least 1 year, treated with multiple daily injections, without co-morbidities (such as celiac or hypothyroidism), were enrolled in a 4-day sport-school camp with different session of physical activity.

During camp, participants reduced their basal insulin by 20% and pre-meal insulins up to 50%, as recommended by international guidelines. Patients wore a glucose sensor (Dexcom® G6) to monitor directly and remotely their glucose in order to prevent hypoglycemia (< 70 mg/dL). All corrections, made with liquid glucose, were decided using glucose value corrected for the trend, with a protocol showed in the Figure. Time spent in range 70-180 mg/dL (TIR), below range (TBR), above range (TAR) and coefficient of variation (CV) were compared with values obtained 3 days before the camp.

TREATMENT PROTOCOL DURING THE CAMP

	Glucose Trend						
CGM Value	⇓⇓ -100	⇓ -75	↘ - 50	→	↗ + 30	↑ + 60	⇑ + 90
If: - Hypoglycemia symptoms - Hypoglycemia threshold alarm CHECK BLOOD GLUCOSE (SMBG)	If SMBG < 70 TAKE 15 gr of glucose	If SMBG < 70 TAKE 15 gr of glucose	If SMBG < 70 TAKE 15 gr of glucose	If SMBG < 70 TAKE 15 gr of glucose If SMBG > 70 IGNORE CGM values for 25'	-	-	-
70-140 mg/dL	TAKE 15 gr of glucose	TAKE 15 gr of glucose	TAKE 5-15 gr of glucose	-	For correction w/ insulin use CGM value + 30 mg/dL	For correction w/ insulin use CGM value + 60 mg/dL	For correction w/ insulin use CGM value + 90 mg/dL
141-250 mg/dL	-	For correction w/ insulin use CGM value - 75 mg/dL	For correction w/ insulin use CGM value - 50 mg/dL	For correction w/ insulin use CGM value	For correction w/ insulin use CGM value + 30 mg/dL	For correction w/ insulin use CGM value + 60 mg/dL	For correction w/ insulin use CGM value + 90 mg/dL
> 250 mg/dL	For correction w/ insulin use CGM value - 100 mg/dL	For correction w/ insulin use CGM value - 75 mg/dL	For correction w/ insulin use CGM value - 50 mg/dL	For correction w/ insulin use CGM value	For correction w/ insulin use CGM value + 30 mg/dL	For correction w/ insulin use CGM value + 60 mg/dL	For correction w/ insulin use CGM value + 90 mg/dL

In case of glucose assumption, re-check CGM after 25 minutes:
- if glucose trend is still downward, unchanged: take 15 gr of glucose and re-check after 25 minutes
- if glucose trend is still downward, with slower decrease: wait 5 minutes, if trend persists unchanged for 10 minutes take 15 gr of glucose and re-check after 25 minutes
- if glucose trend is flat or upward: hypoglycemia resolved

Results: We present preliminary data. No severe hypoglycemia and diabetic ketoacidosis were observed during the camp. Mean glucose and standard deviation resulted similar during and before the camp (177±56 and 170±59 mg/dL, p=0.38). TBR was lower during camp

(1% vs. 2,7%, p=0,04), and time spent with glucose < 54 mg/dL was 0.03% (before was 0.9%, p=0.008).

TIR was comparable (54.3 vs. 59.8%, p=0.25), as well as TAR (44.8 and 37.5%, p=0.14) and CV (34.6 vs. 32.2, p = 0.18). Sensor usage was above 90% both during and before the camp.

Conclusions: correction with glucose using sensor value adjusted for trend were helpful in strongly reducing values below 70 and 54 mg/dL, without increasing TAR in T1D adolescents while exercising.

P308

Glycemic variability assessment with continuous glucose monitoring systems demonstrates seasonal patterns in pediatric patients with type 1 diabetes mellitus

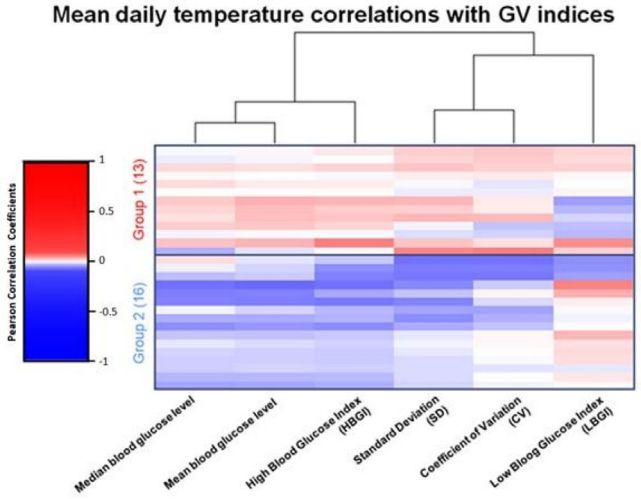
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Introduction: Monitoring of blood glucose is the mainstay of successful therapy of type 1 diabetes (T1D). Continuous glucose monitoring (CGM) is increasingly being used for everyday glycemic control, allowing for glycemic variability (GV) assessment in long-term observations.

Objectives: We aimed to determine GV indices' seasonal nature, in light of previously reported seasonal characteristics of T1D.

Methods: A retrospective analysis of long (>70 days) CGM records of children (< 18 y.o.) with T1D (for >6 months) between 2015-11 and 2019-02. GV indices were calculated with our published software *GlyCulator 2.0*. Meteorological data was obtained from the National Institute of Meteorology.



[Heatmap of correlations between glycemic variability (GV) indices and mean daily temperature.]

Between-seasons differences of GV indices were compared using ANOVA test. We identified patient-specific seasonal patterns by unsupervised clustering based on patient-specific correlations between GV indices and meteorological factors. The periodicity was evaluated using power spectrum analysis.

Results: We included 29 children [median record length 381 days (25-75%: 166-679)], age 4 to 14 y.o. Seasonal patterns of GV indices were observed, however, differences in standard deviation (SD, p=0.6639) and coefficient of variation (CV, p=0.1350) did not reach significance. Hierarchical clustering identified two groups of 13 and 16 patients, with different patterns in risk of hypoglycemia (Time Below Range Target < 54mg/dL: p< 0.0001) and GV indices (SD and CV: p< 0.0001, p< 0.0001) correlated with mean daily temperature. Among 16 patients whose GV indices presented high autocorrelations, a period of 12 months was identified as dominant, with recurrent periods of high GV.

Conclusions: We report the first analysis of seasonal patterns of GV indices based on long-term CGM recordings. A subgroup of children with T1D showed a seasonal pattern of GV hinting at a mechanism explaining variable incidence of hypoglycemia and acute complications of diabetes.

P309

Continuous subcutaneous insulin infusion (CSII) versus multiple-daily injections (MDI) in youths with type 1 diabetes mellitus: a systematic review and meta-analysis of the literature with an equity lens

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Objectives: Previous studies comparing the management of type 1 diabetes (T1D) in youths lack information on fairness regarding to accessing newest therapies. Thus, we conducted an equity-oriented analysis of the literature to assess glycemic effects of CSII vs. MDI among youths with T1D.

Methods: Searches were run on MEDLINE, CENTRAL and EMBASE from 2000 to 2018 to identify randomized clinical trials (RCT) and non-randomized studies (NRS) on the effect of CSII vs. MDI on glycemic outcomes among patients with T1D aged ≤20 years. Results were summarized with the pooled mean difference (MD) for HbA_1c, rate-ratio (RR) for severe hypoglycemia (SH) and risk-ratio (RR) for diabetes ketoacidosis (DKA), calculated with a random-effects model. Based on the PROGRESS framework, we assessed the effectiveness of the therapies among different social groups (Table 1). The quality of evidence was evaluated with the GRADE tool.

Results: Of the 1589 articles screened for eligibility, 73 (121288 patients; 16 RCT) were included. There were high-level evidence that CSII was associated with lower HbA_1c in RCT (MD: -0.24%; 95% CI: -0.33 to -0.14%; 623 patients, I^2 17%) and low-level evidence in NRS (MD: -0.43%; 95% CI: -0.52 to -0.35%; 119348 patients, I^2 99%). Also, we found moderate-level evidence from RCT of a tendency to lower rate of SH in those on CSII (RR: 0.80; 95% CI: 0.49 to 1.31;

PROGRESS acronym	Positive social gradient	Negative social gradient	Neutral social gradient
Place of residence: Country where individuals reside. (as per the World Bank database)	To reside in a high income country	To reside in a low-to-middle income country	No matter the place of residence, outcomes are non-significant
Race, ethnicity, culture and language: Self-identification racial or ethnic group, or different culture and language, including nationality status.	To be a based-country language comprehension inhabitant or to be part of an ethnic majority	To be part of minority groups or to be a foreign with low language comprehension	No matter the race or ethnic group, outcomes are non-significant
Occupation: Patterns of work that provide proper maintenance of a treatment.	Affordability to have access and maintain technological devices	No affordability to have access and maintain technological devices	No matter the parental occupancy status, outcomes are non-significant
Gender/Sex: Boys and girls were identified between groups.	Characterization of sex distribution (M/F) between therapies; girls are related to belonging to an advantaged group	No characterization of sex distribution (M/F) between therapies; boys are related to belonging to a disadvantaged group	No matter the sex distribution, outcomes are non-significant
Religion: Religious affiliation of spiritual beliefs or values	Access to health services is favored for a subgroup because of its religious affiliation or beliefs	Access to health services is limited because of its religious affiliation or beliefs or due to the lack of religion	No matter the religion or beliefs, outcomes are non-significant
Education: Assessed by the informed educational level or approximated by health literacy and numeracy	High educational level or health literacy and numeracy	Low educational level or health literacy and numeracy	No matter the education, outcomes are non-significant
Socioeconomic status: To obtain information considering access to resources and privilege.	A higher household wealth	A lower familial income	No matter the SES, outcomes are non-significant
Social capital: Benefits obtained by individuals due to their social relationships, e.g.: to be member of a diabetes foundation, to participate in diabetes camp.	To have network involvement	Not to have network involvement	No matter the network involvement, outcomes are non-significant

[PROGRESS framework to guide health equality data extraction on type 1 diabetes]

501 patients, I^2 0%), while NRS provided low-level evidence of a reduced rate of SH in those on CSII (RR: 0.70; 95% CI: 0.61 to 0.80; 69673 patients, I^2 62%). No effect on DKA was found. Residing in high-income countries and being part of a majority group, but not gender, were associated with better glycemic outcomes when on CSII.
Conclusions: CSII are superior to MDI for lowering HbA_1c and reducing SH episodes in pediatric patients with T1D. However, patients in disadvantaged strata were less likely to receive recommended diabetes-related technology.

P310
Continuous glucose monitoring in teens and young adults (CITY) improves glycemic control: primary results from a multi-center randomized clinical trial (RCT)

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Objectives: Glycemic control remains suboptimal in many adolescents and young adults (AYA) with type 1 diabetes (T1D). The CITY study assessed effect of real-time non-adjunctive continuous glucose monitoring (CGM; Dexcom G5) compared with blood glucose monitoring (BGM) on glycemic control.
Methods: CITY enrolled 153 AYA, age 14 to < 25 yrs old with T1D and HbA1c 7.5-< 11% from 14 US diabetes clinics (median age 17 yrs, median T1D duration 8 yrs, 50% female, 63% non-Hispanic white, 54% insulin pump use, mean±SD HbA1c 8.9±1.0%) who had not used CGM in the prior 3 months. Masked CGM data were collected for a minimum of 200 hours at baseline prior to randomization (1:1) to CGM or BGM for 6 months. Masked CGM data also were collected in BGM group at 13 weeks (7 days) and 24 weeks (14 days) to compare with CGM group. Primary outcome was HbA1c after 6 months.

	Baseline		26 Weeks		P-Value
	CGM (N=73)	BGM (N=79)	CGM (N=68)	BGM (N=72)	
Hours of Data – *Median (Q1, Q3)*	302 (269, 324)	311 (268, 380)	376 (262, 475)	428 (380, 477)	
Glucose Control – *Mean (SD)*					
% Time in Range	37% (13%)	36% (12%)	43% (15%)	35% (12%)	<0.001
Mean Glucose	209 (36)	212 (36)	199 (36)	217 (35)	0.002
Coefficient of Variation	42% (7%)	42% (7%)	39% (6%)	42% (7%)	0.01
Hyperglycemia –*Mean (SD)*					
% Time > 180 mg/dl	58% (15%)	59% (15%)	54% (18%)	61% (14%)	0.009
% Time > 300 mg/dl	18% (12%)	20% (12%)	14% (11%)	21% (12%)	<0.001
Hypoglycemia – *Median (Q1, Q3)*					
% Time < 70 mg/dl	3.2% (1.3%, 7.7%)	3.7% (1.7%, 6.7%)	2.2% (1.0%, 5.0%)	3.2% (1.9%, 6.2%)	0.02
% Time < 54 mg/dl	1.0% (0.4%, 3.2%)	1.3% (0.3%, 3.0%)	0.7% (0.2%, 1.4%)	1.3% (0.5%, 2.4%)	0.002

Secondary outcomes included treatment group comparisons for CGM measured glycemic metrics, patient reported outcomes, and occurrence of severe hypoglycemia (SH) and diabetic ketoacidosis (DKA) events. Analyses performed using intent-to-treat linear models adjusted for baseline measures of interest and clinical center; secondary analyses adjusted for multiple comparisons.

Results: Of 153 participants, 93% completed the RCT. At 6 months, HbA1c decreased from 8.9±1.0% to 8.5±1.2% for CGM but was unchanged for BGM group (8.9±1.0% to 8.9±1.2%), (mean adj. diff. -0.4%, P=0.01). CGM time-in-range (70-180 mg/dl), glycemic variability, and time spent in hyper- or hypoglycemia improved in CGM group (Table). Rates of DKA, SH, or severe adverse events did not differ between groups. Glucose monitoring satisfaction scores were higher for CGM at 6 months compared with BGM (P=0.003) and 68% of CGM participants wore CGM for ≥5 days/week at 6 months.**Conclusions:** CGM was safe and effective in improving glycemic control and was preferred over BGM in AYA with T1D.

P311
Impact on glycaemic outcomes of funding continuous glucose monitoring for youth in Australia

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Introduction: In April 2017 the Australian Government initiated funding for continuous glucose monitoring (CGM) for eligible under 21 year olds resulting in an acute increase in CGM use in young people in Australia. Although clinical trials have demonstrated a positive effect of CGM use on glycaemic and psychosocial outcomes in T1DM there are as yet few data to describe its impact in real world use.

Objectives: The Australasian Diabetes Data Network (ADDN) is a centralised database capturing de-identified coded clinical data from people living with T1DM on a single purpose-built platform. A total of 17 centres are now incorporated into the database, including regional and adult centres in five States. Following the initiation of CGM funding, ADDN was expanded to include a CGM module. This has provided a unique opportunity to evaluate CGM uptake on clinical outcomes for young people with T1DM.

Methods: Analysis of CGM outcomes in ADDN participants between 1 April 2017 to 31 December 2018, inclusive, captured 2,724 of the 10,644 youth < 21 years who registered for CGM with the National Diabetes Services Scheme (NDSS) .

Results: Of those with documented usage data, HbA1C reduced significantly from 8.3±1.5% at the start of CGM use to 7.9±1.4% at 12 months (p< 0.001) and 7.8%±1.3% at 18 months (p< 0.001) from CGM start. This was associated with an increase in the proportion of patients achieving the recommended HbA1c target of < 7.0%: from 13.1% at start of CGM use to 26.0% 18 months post CGM start. No significant change in severe (coma/convulsion) hypoglycaemia rates (3.08 vs 3.69 events/100 patient years, pre vs 12 months post use) or DKA rates (3.99 vs 4.3 events/100 patient years, pre vs 12 months post use) were observed.

Conclusions: This preliminary analysis of the early impact of general availability of CGM for young people with T1DM indicates a positive impact on key glycaemic outcomes in those using the technology.

P312
Lipoatrophy in children, adolescents and adults with insulin pump (CSII) treatment: is there a beneficial effect of insulin glulisine?

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Aim: To investigate whether a zinc-free insulin is an effective treatment option for lipoatrophy.

Methods: Controlled, randomized, open-label parallel study* in children, adolescents and young adults with T1D, CSII and lipoatrophy at injection sites. Participants underwent expert dermatological examination and an evaluation of their atrophic areas using ultrasound and MRI. After randomization, half of the participants switched their pump insulin into insulin glulisine (intervention group) for 6 months. The others continued their treatment with zinc-containing insulin (control group) and switched to insulin glulisine 6 months later. Both groups were followed-up until month 12. Primary endpoint was the increase of the thickness of the subcutaneous fat layer between cutis and the muscle fascia of the most atrophic site at 6 months between both groups as documented by MRI.

Results: Fourteen participants (10 female; age 14.5±4.0 years; T1D duration 7.0±3.3 years; mean±SD) were included into the study. At baseline, absolute [4.0mm (0.1-21.0) vs. 7.3mm (2.0-14.0), p=.805] and relative thickness [-60% (-98.8 to -17.6) vs. -50.0% (-72.7 to -1.0), p=.259; median (range)] of subcutaneous fat tissue was comparable between intervention (n=7; 4 female) and control (n=7; 6 female) group. After 6 months, both absolute [12.0mm (1.0-21.0) vs. 7.0mm (2.0-14.0), p=.028)] and relative fat thickness [-14.3% (-85.7 to 83.3) vs. -31.3% (-66.7 to 0), p=.028] improved significantly in the intervention group. At 12 months, absolute (p=.027) and relative fat thickness (p=.018) as well as number of atrophic sites (p=.034) and size of most atrophic site (p=.027) were further improved in the intervention group.

Conclusions: Although the results of this pilot study are based on a small sample, the data give hint that the use of the zinc-free insulin glulisine may be beneficial in patients with T1D, CSII and lipoatrophy. Further investigation is recommended.

*This study was funded by Sanofi.

P313

Disparities in diabetes technology use and HbA1c in pediatric type 1 diabetes: a trans-atlantic comparison

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Objective: Diabetes technology for pediatric type 1 diabetes (T1D) has increased worldwide, but inequalities in diabetes technology use may exacerbate disparities in HbA1c. We describe the evolution of the use of diabetes technology and HbA1c by individual socioeconomic status (SES) in the US or area deprivation (as proxy for SES) in Germany during the last decade. We hypothesized lower SES/higher deprivation would be associated with lower rates of diabetes technology usage and higher HbA1c.

Methods: Participants in the Type 1 Diabetes Exchange (T1DX) and Diabetes-Patienten-Verlaufsdokumentation (DPV) registries aged < 18 years with T1D duration ≥1 year were included in the study (T1DX n=16,515; DPV n=39,836). SES and area deprivation were categorized into least (Q1) to most (Q5) deprived SES quintiles. For the DPV cohort, quintiles were determined using district level data from the German Index of Multiple Deprivation (GIMD) 2010. For the T1DX cohort, a composite SES score of insurance type, education level, and annual income level was generated and aggregated into quintiles. Regression analyses for the DPV and T1DX cohorts for 2010-12 and 2016-18 evaluated rates of pump and CGM use and the effect of SES/deprivation on HbA1c, adjusting for age, sex, and T1D duration.

Results: CGM and insulin pump use increased in both the T1DX and DPV cohorts. In T1DX the use of CGM and pump was significantly greater in those with higher SES, but these associations were not seen in DPV. For DPV, the effect of GIMD on HbA1c *decreased* between the 2 time periods (p< 0.001) whereas for T1DX the effect of SES on HbA1c *increased* between the 2 periods (p< 0.001).

Conclusions: These data demonstrate widening gaps in diabetes technology use related to SES status which are associated with higher HbA1c in the US in contrast to no clear association of GIMD with diabetes technology use and a decreased HbA1c gap in Germany.

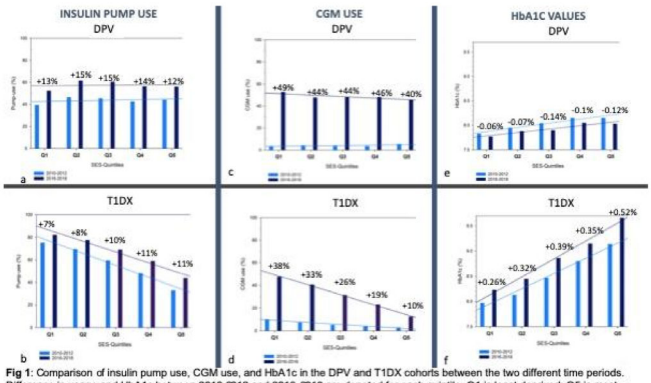


Fig 1: Comparison of insulin pump use, CGM use, and HbA1c in the DPV and T1DX cohorts between the two different time periods. Difference in usage and HbA1c between 2010-2012 and 2016-2018 are denoted for each quintile. Q1 is least deprived; Q5 is most deprived. Insulin pump use by SES quintiles for the DPV (**a**) and T1Dx (**b**), CGM use by SES quintiles for the DPV (**c**) and T1Dx (**d**), and HbA1c by SES quintiles for the DPV (**e**) and T1DX (**f**) above. The difference between all cohorts are statistically significant at p<0.001.

[Insulin pump, CGM use, and HbA1c by SES quintiles in T1DX and DPV cohorts]

*Denotes First Author

P314
Accuracy of glucose sensor estimate of HbA1c in children with type 1 diabetes

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Introduction: Glucose sensor usage is increasing in the paediatric type 1 diabetes population. The sensor downloads can generate an estimated HbA1c based on the average glucose level.

Objectives: We aimed to test whether the sensor-estimated HbA1c over 90 days was an accurate prediction of the measured HbA1c.

Methods: Over a 12-week period, 90-day sensor downloads were collected from children with type 1 diabetes who were wearing a glucose sensor (Freestyle Libre or Dexcom G5) when they were due their 3-monthly HbA1c laboratory test. Each family provided informed consent for their data to be used in the study. The HbA1c was measured by HPLC. The difference between the measured and calculated HbA1c was calculated (delta HbA1c).

Results: Twenty four children wearing glucose sensors had HbA1c tests during the study period (20 were wearing Freestyle Libre and 4 Dexcom G5). The mean laboratory HbA1c was 7.85% (SD 1.39, Range 5.8 to 12%). The mean predicted HbA1c was 7.66% (SD 1.52, Range 5.3 to 11.4%). The mean delta HbA1c was 0.18% (SD 0.58, Range -1.1 to +1.4%), with a tendency for the prediction to be lower than the measured HbA1c in 67% of cases. The mean delta HbA1c for the Freestyle Libre was 0.1% and for the Dexcom G5 0.7%. The estimated HbA1c was within 0.5% of the laboratory HbA1c 50% of the time and within 0.75% 79.2% of the time. Bland Altman Analysis confirmed there was no relationship between the level of HbA1c and the delta HbA1c, or between percentage sensor data captured and delta HbA1c.

Conclusions: There is a tendency for estimated HbA1c to be lower than the measured HbA1c but the mean difference is small. The delta HbA1c is significant in a few individuals but there was no correlation with lower sensor wear time or higher HbA1c. The sensor download provides a useful estimate of the HbA1c and is within 0.75% of the measured HbA1c 79.2% of the time. With increasing sensor accuracy the estimated HbA1c may eventually replace the need for a 3-monthly HbA1c blood test.

P315
Real world use of CGM among adolescents and young adults with type 1 diabetes (T1D): reduced burden, but little interest in data-analyses

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Since September 2016 continuous glucose monitoring systems (CGM) are reimbursed by health insurance companies in Germany for patients with an insulin therapy. The rate and quality of use of CGM-systems among young people were assessed.

Participants of a German Diabetes Camp for young people with T1D aged 16-25 yrs. (Camp D) were invited to anonymously answer a structured questionnaire on their glucose monitoring habits and satisfaction with use of their glucose monitoring system (11 Items), their clinical data, and diabetes distress (PAID-5).

Overall 308 young people (83% response-rate) (age 21.4±3.5 yrs., diabetes-duration 10.1±5.9 yrs., 73% female, HbA1c 7.7±1.5%, 60.6% CSII) participated. Of them 29.5% used rtCGM, 45.8% iscCGM and 24.4% only SMBG. HbA1c was highest among those with SMBG (8.0 ±1.9%) compared to iscCGM (7.7±1.4%) and rtCGM (7.7±1.4%) but differences were not significant (p=0.356). Diabetes distress total score was not associated with the method of glucose monitoring (p=0.62) (mean PAID-5 score: 6.2±4.4).

Participants using either CGM-system reported of better well-being (97.6%) compared to SMBG, higher satisfaction (88.2%), better feeling of security (80.3%), important new information (62.0%); few young people reported of inconvenience (7.0%) or disturbances (11.0%) due to alarms of rtCGM. Regularly independent CGM-data analyses at home were reported by 19.1% of young people, their HbA1c was significantly lower compared to other CGM users (7.2±1.2% vs. 7.7 ±1.4%; p=0.04).

In this huge, but selected sample of participants of the German Camp D 2018 75% were using a CGM-system continuously. It contributes to significant improvement in several aspects of their everyday life, but was not associated with reduced diabetes distress or better glycemic outcome as long as the young people don't analyze the CGM-data regularly. Structured education and motivation at regular out-patient visits to analyze CGM-data regularly and effectively are necessary.

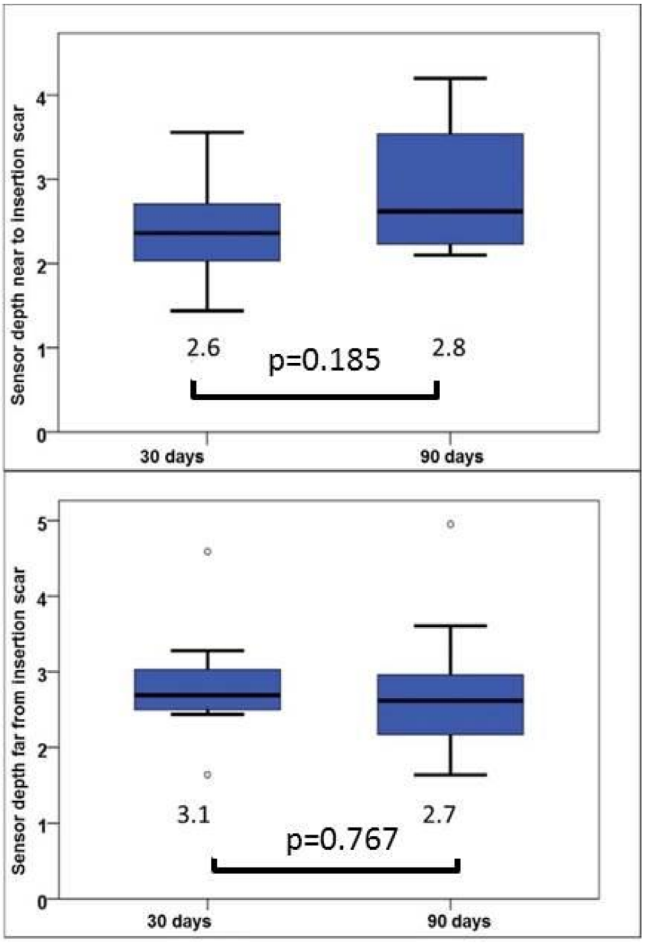
Poster Tour 22 - Telemedicine & Digital Support, Pumps & CGM, and Automated Insulin Delivery

P316
Safe use of eversense CGM in children and adolescents: the fear no hypo study

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Introduction: The "Eversense XL®" sensor is a subcutaneously inserted rtCGM system which lasts up to 180 days. Actual smartphones can be used as a data receiver sent by an on body transmitter with vibration alerts. As of today, it is only approved for use in adults.



[Sensor depth at the sensors' ends near and far from insertion location after 30 and 90 days shows no]

Method: Five children (6-12 years) and 10 adolescents (13-17 years) received the sensor subcutaneously. After a 30-day blinded period, the sensor was used in an unblinded mode for further 90 days. Main measurements were HbA1c, sensor glucose data, ultrasound examination of the sensor depth as well as adverse events that occurred throughout the study.

Results: Fifteen patients (7 male, 12 CSII/3 MDI, diabetes duration 5.5 ±3.4 years) had the sensor inserted and completed the study. All adolescents had the insertion at the upper arm. The children had insertions on the hip, belly or upper arm. No severe hypoglycemic events occurred. Except for a local skin reaction to sterile strips in one adolescent, no complications at the insertion site were observed. There was no change in HbA1c from baseline to the end of the study (7.61±1.12% vs. 7.25±1.43%, p=0.138) although the point estimate decreased by 0.36 percentage points. The subcutaneous sensor showed no migration in depth (2.6 vs. 2.8 mm and 3.1 vs. 2.7 mm at both ends of sensor).

Conclusion: The Eversense System also appears safe in the pediatric population.

Due to the different type of adhesive (silicone-based) from other glucose sensors and the possibility to take the transmitter off on a daily basis, Eversense can be an opportunity to patients with severe reaction to adhesives.

This investigator initiated trial was financially supported by Senseonics.

P317
Strategies to enhance new CGM use in early childhood (SENCE): results from a randomized clinical trial of continuous glucose monitoring (CGM) in young children with type 1 diabetes (T1D)

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Objective: T1D care in youth is challenging, especially for families of young children (YC). The SENCE study assessed if CGM alone or CGM combined with family behavioral intervention (FBI) providing psychoeducational support would improve glycemic control compared to BG monitoring (BGM) alone in young children with T1D.

Methods: The 6-month SENCE study enrolled 143 YC 2-< 8 yrs old with T1D and HbA1c 7.0-< 10.0% who were not currently using CGM from 14 sites (median age 5.9 yrs, median T1D duration 1.9 yrs, 50% male, 68% non-Hispanic white, 35% pump users). After baseline surveys and masked CGM wear (Dexcom G5), participants were randomized to CGM alone (n=44), CGM+FBI (n=50), or BGM (n=49). Primary outcome was CGM measured time in target (70-180 mg/dl) over the 6 months. Real-time CGM data were matched to masked CGM data collected in BGM group for 7 days at wks 6, 13, 19 and 26. Analyses used intent-to-treat linear models adjusted for baseline measures of interest and clinical center; p-values adjusted for multiple comparisons.

Results: Of 143 enrollees, 137 (96%) completed the 6-month study. At follow-up there were no significant differences in time-in-target range, hyperglycemia or HbA1c (Table). Both CGM and CGM+FBI groups had significant reductions in hypoglycemia (time < 70 and time

	Baseline		26 Weeks		P-Value
	CGM (N=73)	BGM (N=79)	CGM (N=68)	BGM (N=72)	
Hours of Data – *Median (Q1, Q3)*	302 (269, 324)	311 (268, 380)	376 (262, 475)	428 (380, 477)	
Glucose Control – *Mean (SD)*					
% Time in Range	37% (13%)	36% (12%)	43% (15%)	35% (12%)	<0.001
Mean Glucose	209 (36)	212 (36)	199 (36)	217 (35)	0.002
Coefficient of Variation	42% (7%)	42% (7%)	39% (6%)	42% (7%)	0.01
Hyperglycemia –*Mean (SD)*					
% Time > 180 mg/dl	58% (15%)	59% (15%)	54% (18%)	61% (14%)	0.009
% Time > 300 mg/dl	18% (12%)	20% (12%)	14% (11%)	21% (12%)	<0.001
Hypoglycemia – *Median (Q1, Q3)*					
% Time < 70 mg/dl	3.2% (1.3%, 7.7%)	3.7% (1.7%, 6.7%)	2.2% (1.0%, 5.0%)	3.2% (1.9%, 6.2%)	0.02
% Time < 54 mg/dl	1.0% (0.4%, 3.2%)	1.3% (0.3%, 3.0%)	0.7% (0.2%, 1.4%)	1.3% (0.5%, 2.4%)	0.002

[Table]

< 54 mg/dl, Table); CGM+FBI also had significantly lower rates of severe hypoglycemic events vs. BGM (P=0.03). Compared with BGM and CGM alone, CGM+FBI had significant reductions in parent burden (P< 0.02) and fear of hypoglycemia (P< 0.05).

Conclusions: Use of real-time CGM either alone or combined with FBI over 6 months reduced time in hypoglycemia and severe hypoglycemic events in YC with T1D, but did not improve time in target range or HbA1c. The FBI supporting CGM use had benefits for parent well-being. There is a need for further investigation into how families of young children with T1D can optimize CGM use.

P318
Loss of continuous glucose monitor coverage is associated with an increase in HbA1c

A. Addala[1], D.M. Maahs[1], D. Scheinker[1], P. Prahalad[1]

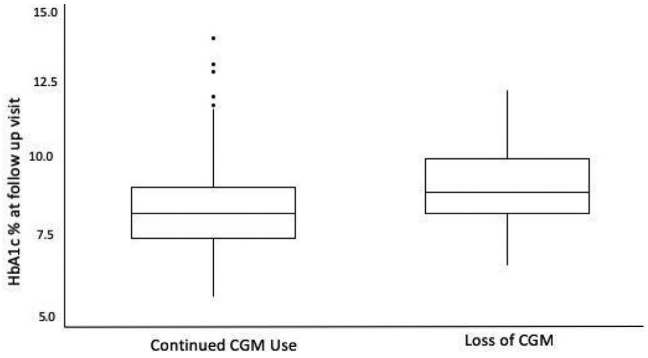
[1]*Stanford University, Pediatric Endocrinology, Stanford, United States*

Objective: Continuous glucose monitor (CGM) use is associated with improved glucose control and quality of life outcomes. In the United States, insurance coverage determines many management choices for people with type 1 diabetes (T1D). Public insurance, the use of which is associated with lower socioeconomic status, has more restrictive CGM approval policies. We seek to determine frequency of CGM loss in patients with public insurance in our clinic and to evaluate the impact of CGM loss on hemoglobin A1c (HbA1c).

Methods: The charts of 84 patients who met inclusion criteria (T1D, public insurance, and had initiated CGM use) were reviewed. HbA1c at CGM initiation and follow up visits, CGM use at follow up visits, and reasons for CGM discontinuation were collected. CGM use at each of the follow up visits was compared to the visit prior and was categorized into: (1) *Continued* CGM use: CGM use at both the prior and current visit, or (2) *Loss* of CGM: CGM use at the prior visit but *not* at the current visit. Wilcoxon rank sum was used to compare mean HbA1c amongst the two types of visits.

Results: There were 247 follow up visits (35 Loss, 212 Continued) at which HbA1c was measured. 31 patients discontinued CGM use in at least one follow up visit (61% due to insurance coverage; 39% due to patient preference). Before initiation of CGM, average HbA1c was 8.5% ±1.5. Average HbA1c was significantly lower in the continued CGM use visits, 8.3%±1.4, than in loss of CGM visits, 9.1%±1.3, p=0.002 (Figure 1).

Conclusions: HbA1c at the visits following loss of CGM was significantly higher—statistically and clinically—than HbA1c at the visits where CGM use was maintained. These data support the importance of sustained and uninterrupted coverage of CGM for publicly insured children and adolescents with T1D.



[Figure 1: Mean HbA1c for each group. HbA1c in continued use group is statistically lower at p=0.002.]

P319
Time in range in a large cohort of children with type 1 diabetes using glucose sensor and multiple daily injection or insulin pump treatment

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Objective: To compare time in range (TIR) in children with T1D on MDI or IP therapy in clinical practice.

Methods: A multicentre study was conducted between January and May 2019. Inclusion criteria were diagnosis of T1D for more than 1y, the use of glucose sensor (GS), on MDI or IP therapy excluding hybrid or full close-loop systems. During a planned visit, GS were

	Regression coefficients	95%CI	p
Age (y)	0.27	(-0.01;0.55)	0.058
Sex (M vs F)	-0.29	(-2.10;1.52)	0.752
Diabetes Duration (y)	-0.53	(-0.84;-0.23)	0.001
Physical activity (h/w)	0.07	(-0.31;0.44)	0.730
HbA1c (mmol/l)	-9.70	(-10.68;-8.72)	<0.001
Treatment (IP vs MDI)	4.49	(2.49;6.49)	<0.001
CHO counting (Yes vs No)	3.10	(1.15;5.06)	0.002
Time wearing GS (%)	0.12	(0.05;0.19)	0.001

[Factors associated with Time in Range]

downloaded by each centre with a reference system. GS included Dexcom G4, G5, G6, Medtronic Enlite, Guardian, and Abbott Freestyle Libre. TIR was defined as GS-measured percentage of time 70-180 mg/dl. Comparisons between groups were evaluated by Wilcoxon rank sum test or Chi-square test when appropriate. The association of TIR with children´s clinical characteristics was analysed by linear regression analysis.

Results: Overall 738 cases were analysed, 343 on MDI and 395 on IP, median age 13y and 12y respectively. Median TIR was 59.5 % in children on IP and 49.0% on MDI (p< 0.001). IP was associated with lower HbA1c (56 vs 60 mmol/l, p< 0.001), lower time with GS-hyperglycemia >180 mg/dl (35.6% vs 43%, p< 0.001), no difference of time < 70 mg/dl between groups. Number of severe hypos and DKA episodes were similar between groups. Longer diabetes duration was associated with lower TIR. Higher TIR was a result of use of IP, CHO system, and longer GS wearing.

Conclusions: This study highlights modifiable factors for improving TIR in children with T1D.

P320
Correlational analysis of 5AM glucose in the Tidepool Big Data Donation Project

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Objectives: We used datasets gathered from the Tidepool Big Data Donation Project to evaluate how real-life early morning glucose levels at 5AM and rates of change at 5AM relate to daytime glucose levels. We also evaluated whether having a stable, in-range glucose at 5AM affected overall glucose control throughout the day.

Methods: We identified 21,315 days of CGM data from 120 participants with T1D, mean age 22 years (range 3-66yrs). 5AM was chosen as an initial point as it would allow for analysis of early morning glucose levels likely prior to breakfast insulin. The rate of change (ROC) was calculated from 20 minutes before to 20 minutes after 5AM. For each day of data we calculated 5AM-11PM daytime (Day) mean glucose, % time < 70mg/dL, % time in range (TIR, 70-180mg/dL), % time >180mg/dL and coefficient of variation (CV). We included all days that contained >95% of the expected CGM data (1 value every 5 minutes).

Results: The mean 5AM glucose was 148 (range 39-401, limited by CGM reporting). Due to the large size of the dataset, all explored correlations reached statistical significance (p < 0.05). The 5AM glucose value had a moderate correlation with mean glucose, TIR, and % time >180 mg/dL. The 5AM absolute ROC was only weakly correlated (R < 0.2) with all other measured endpoints. The correlation of daytime CV was strongest when compared to % time < 70 mg/dL and only very weak when compared to 5AM glucose.

Conclusions: This real-life data supported conclusions that have been seen in smaller studies. Early morning glucose is a predictor of average glucose throughout the day but plays very little role in the variability of glucose once the participant starts to eat or go about normal daily activities. Glucose variability during the day was correlated with an increased risk for hypoglycemia.

P321
An ideal artificial pancreas (AP) system: comparing preferences of youth with type 1 diabetes (T1D) and parents

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Objectives: With emergence of advanced diabetes technologies, patient and parent expectations for an ideal AP system may differ. We interviewed children, teens, and young adults with T1D and parents of youth with T1D to explore their desired AP features.

	5AM Glucose	5AM Absolute ROC	Day Mean Glucose	Day TIR	Day % <70 mg/dL	Day % >180 mg/dL
5AM Glucose	---	---	---	---	---	---
5AM Absolute ROC	0.164	---	---	---	---	---
Day Mean Glucose	**0.510**	0.106	---	---	---	---
Day TIR	**-0.472**	-0.120	-0.902	---	---	---
Day % <70 mg/dL	-0.199	0.026	-0.414	0.105	---	---
Day % >180 mg/dL	0.493	0.110	0.945	-0.980	-0.301	---
Day CV	0.024	0.130	0.158	-0.274	**0.338**	0.195

[Correlation Matrix]

Methods: Semi-structured interviews were conducted with 39 youth, ages 10-25, and 28 parents at two U.S. diabetes centers. Interviews were audio-recorded, transcribed, and coded using thematic analysis. Youth (72% female, 82% white) were (M±SD) age 17.0±4.7 years, with T1D duration 9.4±4.9 years and HbA1c 8.4±1.1%; 79% were pump users and 82% were CGM users. 89% of parents were white and 96% were mothers.

Results: Youth and parents generally agreed that an ideal AP system would function without much effort from the patient, be small and discreet, and would personalize insulin dosing and alerts. However, youth mainly desired: the ability to personalize system aesthetics, less disruptive and less frequent alerts, and a system that would manage changing glucose levels autonomously. Parents desired a system that would not only reduce physical burden, but relieve emotional stress on their child by reducing the number of separate devices and encouraging their child's unrestricted freedom and normalcy. Parents also wanted the ability to remotely monitor and override the system.

Conclusions: Youth and parents agreed on some features for an ideal AP system, but had key differences in their expectations of how an AP system would benefit diabetes management. Youth mainly preferred to reduce physical efforts and burdens of management, while parents emphasized a unique desire to reduce emotional burdens. AP designers must understand and address both patient and parent preferences to maximize future AP uptake and reduce burdens for youth with T1D and their families.

P322
Pros and cons of Minimed 670G hybrid closed-loop system: first 6-month experience in Italy

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Introduction: After a long lead-in period, artificial pancreas (AP) technology is well on its way to revolutionizing the treatment of diabetes, but no AP is currently approved. Recently data about the use of a hybrid closed-loop (CL) insulin delivery has been presented.

Objectives: We evaluated pros and cons of Minimed 670G system, (Medtronic, CA, USA) in the market in Italy since late October 2018.

Methods: We prospectively analyzed data of all patients who started the system from November 2018 to May 2019. Main outcome is the time in range (TIR). Secondary outcomes are HbA1c change from baseline, time in hypo, time in hyper (>160 mg/dl), insulin total daily dose (TDD), %bolus and %basal rate, coefficient of variation (CV).

Results: After 1-6-month follow-up, 88 patients (mean age 13±4 yrs, range 7-20 yrs, diabetes duration 7±4 yrs) had a TIR of 65.5±9.7% when considering 70-160 mg/dl, and 74.3±11.1 mg/dl when considering 70-180 mg/dl. HbA1c significantly improved (7,22±0.74 vs 7.56 ±1.1, p=0.02). Time in hypo, in hyper and CV were respectively 2.1 ±1.7%, 32.4±11.5, and 35.3±9.1% (n.v. < 36%), perfectly in line with recommended target. TDD is 45.5±21.8 U/day, with a bolus and basal rate very similar (49 vs 51%).

Conclusions: 670G system seems effective to achieve a high TIR. A systematic educational pathway, as the one used by 640G users, could help reach these results, overcoming some constrains 670G system has (fixed glycemic target at 120 mg/dl, only simple bolus, etc.), and teaching patients how to avoid too many calibrations or to calibrate in uneasy times. It is solacing to know that we already have useful tools for the best possible care of our patients with type 1 diabetes while we wait for the commercial availability of an AP or a more performant hybrid CL system.

P323
Feasibility of a basal rate and carb ratio learning algorithm for closed-loop insulin delivery systems (artificial pancreas)

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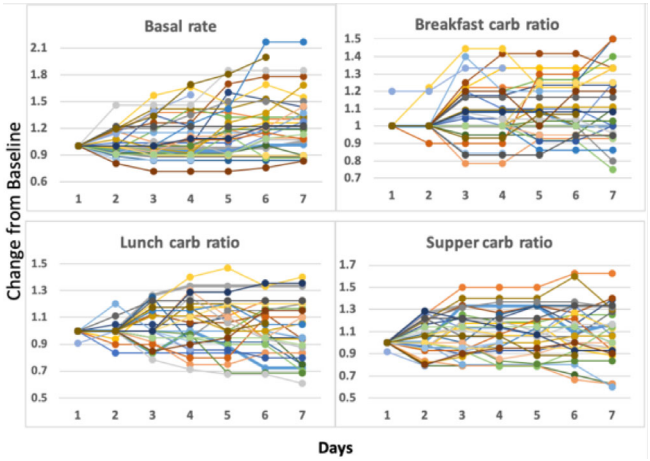
Objective: Optimizing basal rates and carb ratios may improve the performance of closed-loop insulin systems (artificial pancreas). We tested the feasibility of a learning algorithm for a closed-loop system that updates daily basal rates and carb ratios.

Methods: We performed a randomized crossover trial at Camp Carowanis, a camp for youth with diabetes, in Quebec, Canada and included campers aged 8-21 years with type 1 diabetes on pump therapy. Participants underwent (i) 2 days of closed-loop insulin therapy and (ii) 6 days of closed-loop insulin therapy accompanied by the learning algorithm, with the order of the interventions randomized. During the closed-loop insulin therapy with the learning algorithm intervention, basal rates and carb ratios were updated daily based on the learning algorithm's recommendations. All algorithm recommendations were reviewed for safety by a physician.

Results: Thirty-four campers (age 13.9±3.9, 53% female, HbA1c 8.3% ±0.2) were included. 96% of algorithm recommendations were approved by camp physicians. Changes in basal rate ranged between -21% to +117%. Breakfast, lunch and supper carb ratio changes ranged between -17% to +40%, -36% to +37%, and -35% to +63%, respectively. The mean changes made by the algorithm were a 26% increase in basal rates, and a 10%, 1% and 9% increase in breakfast, lunch and supper carb ratio, respectively. Time in target (3.9-10 mmol/L) between the closed-loop therapy (55%) was similar to the closed-loop therapy with learning algorithm intervention (55%;

p=0.71). Similarly, the number of hypoglycemic events did not differ between the interventions (0.8-0.9 events per day; p=0.63).

Conclusions: The learning algorithm is feasible, safe, and its recommendations were mostly agreed upon by pediatricians experienced in diabetes care. It may provide an alternative to manual pump setting adjustments. Longer studies are required to assess long-term efficacy.



[Figure: Learning algorithm changes in basal rates and carb ratios for all patients (n=34)]

P324

Open-source hybrid closed-loop android artificial pancreas system: IN SILICO clinical trials with the UVA/Padova type 1 diabetes simulator proof safety and efficacy

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Objective: AndroidAPS (AAPS) is Open Source Hybrid Closed Loop changing temporary basal rates. The extension of AAPS algorithm uses "supermicroboluses" (SMB) which works on the same principle as super bolus, borrowing insulin from the future. The system issues small micro bolus and turns off basal for next 30 min if needed. This allows adjusts the blood glucose faster than with the temporary basal rate increase. We used the UVA/PADOVA T1D Simulator to *in silico* test the efficacy and safety of AAPS and to explore benefit of SMB on glycaemic control.

Methods: In 100 randomly selected T1D patients with different glycaemic profiles we *in silico* tested five different configurations of AAPS: 1. Temporary basal rates changes only, 2. SMB with full premeal boluses, 3. SMB with half premeal boluses, 4. SMB with carb announcement only, and 5. SMB with no interaction by the patient-fully closed-loop. All configurations were tested for different glycaemic targets (5.0-6.5 mmol/L) with sensitivity variation ±30%. Following parameters of glycaemic control were analysed: TIR-time in range 3.9-10 mmol/L, TIT-time in target 3.9-7.8 mmol/L, TIHypo-time in hypoglycaemia < 3.9 mmol/L and mean glycaemia (MG).

Results: Insulin dose adjustment by basal rates only showed TIR 92% [range 84-98], TIT 62% [range 39-83], TIHypo 0.7% [range 0-5] with MG 7.4±1.2 mmol/L. The best results were reached with SMB with full premeal boluses: TIR 92% [range 86.5-97.3%], TIT 64.1% [range 44.9-83.6], TIHypo 0.4% [range 0.07-1.7], MG 7.2±1.1 mmol/L. However, SMB with half prebolus (TIR 92%, TIT 57%, MG 7.4±1.1mmol/L); SMB with carb announcement (TIR 88%, TIT 54%, MG 7.8 ±1.1mmol/L) and fully closed-loop (TIR 89%, TIT 54%, MG 7.5 ±1.1mmol/L) reached excellent results also including TIHypo < 1%.

Conclusion: *In silico* testing of all configurations of AAPS proved to be effective and safe. The best configuration was the SMB with full premeal boluses that showed great potential which is worth to be tested *in vivo*.

P325

Safety and efficacy of initializing a Control-IQ automated insulin delivery system with total daily insulin

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Introduction: Closed-loop systems improve time in range (TIR) in patients with type 1 diabetes (T1D). However, the impact of

	Home			Camp		
	Control	MyTDI	p-value	Control	MyTDI	p-value
% below 54 mg/dL	0.1 [0-0.3]	0.9 [0-1.2]	0.131	0 [0-0]	0 [0-0.7]	0.21
% below 70 mg/dL	0.9 [0.3-1.9]	2.4 [0.7-3.7]	0.347	1.4 [0-2.4]	3.8 [0.5-4.7]	0.057
% between 70-180 mg/dL	68.9 ± 8.9	70.2 ± 14.4	0.175	78.4 ± 12.8	76.5 ± 8	0.43
% above 250 mg/dL	6.3 ± 4	6.6 ± 7.4	0.42	3.7 ± 5.1	3.9 ± 5.1	0.52
Average BG (mg/dL)	156.5 ± 14.9	152.9 ± 21.2	0.145	144.3 ± 24.6	141.3 ± 13.1	0.30
Average daily carbohydrate intake (grams)	276.5 ± 94.5	192.6 ± 115.4	0.056	280 ± 43	254.6 ± 143.5	0.9
TDI (units)	48.2 ± 11.2	54.9 ± 29	0.46	38.8 ± 11.3	50.9 ± 27.5	0.6
% time in closed-loop	94.8 [92.1-96.9]	94.9 [89-95.8]	1	98 [91.5-99.2]	98.2 [97.4-99.7]	1

[Comparison of MyTDI with Usual Parameters]

initializing the system with different parameters has not been explored.

Objectives: To assess the safety and efficacy of initializing the Tandem t:slim X2 Control-IQ (C-IQ) insulin pump using parameters based on total daily insulin ("MyTDI") in adolescents with T1D under usual activity and during periods of increased exercise. We hypothesized that use of MyTDI parameters would result in similar TIR (70-180 mg/dL) as standard C-IQ use.

Methods: Adolescents with T1D aged 12-18 years were placed on C-IQ for five days at home using their usual parameters. Upon arrival to a three-day ski camp, participants were randomized to either the control group or the MyTDI group. Parameters in the MyTDI group were calculated using standard formulas based on average total daily insulin over the baseline period. Use of the C-IQ system and randomization parameters continued for five days following camp. Continuous glucose monitor based outcomes were analyzed using repeated measures: baseline vs camp or home.

Results: 20 participants were enrolled and completed the study, but two participants were excluded from the analysis (absence from ski camp & illness). Results are reported in the Table. TIR was similar between both groups at home and at camp. Time < 70 mg/dL was slightly higher in the MyTDI group vs. control group at camp (3.8% vs. 1.4%, p=0.057). MyTDI users with bolus/TDI ratios >50% tended to show better TIR than users with ratios < 50%: 67% vs 83%, p=0.108. All participants maintained an average of 95% time in closed loop, range: 84.1-100%.

Conclusions: MyTDI is a safe, effective, and easy way to determine insulin parameters for use in the C-IQ artificial pancreas. Future modifications to account for the influence of carbohydrate intake on MyTDI calculations might further improve TIR.

Posters on Display – Pumps & CGM, and Automated Insulin Delivery

P328

Evaluation of near me video consultation for the paediatric diabetes clinic in Highland, Scotland

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Introduction: NHS Near Me is a video consultation platform facilitating remote outpatient consultations in rural areas. The paediatric diabetes team in Highland, Scotland, serves a remote and rural population, and is starting to utilise the Near Me platform for video clinics. Near Me reduces the need for families or medical staff to travel long distances for clinic, but may adversely impact on the doctor-patient relationship and communication. There was therefore a need to assess whether patients were satisfied with this method of consultation.

Objective: The study assessed the level of parent and child satisfaction with Near Me diabetes consultation.

Methods: A questionnaire with 13 multiple choice questions was given to families following a Near Me consultation with the paediatric diabetes team. The evaluation form was adapted from a questionnaire previously used to assess patient satisfaction with diabetes video consultation. The video consultation was led by medical staff in Inverness, while the Paediatric Diabetes Specialist Nurse and Dietician were at the clinic in person with the patient. The forms were filled out by parents and children who were old enough to fill out the form independently.

Results: 26 individuals filled out an evaluation form (21 parents and 5 children). 17 of the 26 respondents gave positive responses to all statements (agree or strongly agree). 5 respondents reported technical difficulties with sound and/or picture quality. 3 respondents felt that the lack of physical contact in a video visit could be a problem for managing diabetes and did not feel that a Near Me clinic was a good way of consultation.

Conclusions: Most families who were seen remotely by Near Me were satisfied with the consultation. The platform can be hampered by technical difficulties, but could successfully be used in remote and rural areas when medical staff cannot readily travel to patients while retaining a good doctor-patient relationship.

P329

Diabetes heroes - the power of knowledge: a web-based serious game for Brazilian children with type 1 diabetes (T1D)

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Introduction: Although knowledge is not considered a health determinant with a strong association with behavior change, it may help youth with T1D to understand their condition and motivate them to pursue optimal glycemic control. Serious games (SG) based on theoretical frameworks might effectively address this health determinant.

Objectives: To present a web-based SG designed for Brazilian children about T1D knowledge and self-care.

Methods: A theoretical framework guided the SG development, in which the user-centered design approach and health behavior theories were applied. Children participated in focus groups sessions to report their needs and game ideas related to T1D knowledge and self-care. Usability testing with paper and medium fidelity prototype were conducted with diabetes educators, technology experts and children with T1D. The evaluation had high validity in content validation and the research team is improving identified failures of its design.

Results: The SG presents an immersive narrative where health professionals and a mascot from a "knowledge center" guide and support the avatar. To win the power of knowledge the player needs to accomplish 3 entertaining tasks (short-term goals): to maintain a glycemic balance over a day, to order foods into 4 groups and to travel inside the body breaking foods into small pieces and take its energy to the cells using the insulin. The tasks were designed to promote gradual learning and children sense of competence and autonomy. Rewards and positive feedback are provided throughout the game to motive them. In this way, health determinants as goal setting, extrinsic-intrinsic motivation and social support assist the knowledge determinant through meaningful learning experiences.

Conclusions: The SG presents gameplay strategies based on children needs, ideas and behavioral theories which might increase the game effectiveness and promote an empowering self-management.



[Diabetes Heroes - the power of knowledge]

P330
Advantages and difficulties in using sensor-augmented pump therapy with predictive insulin suspension in pediatric patients with type 1 diabetes

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Objectives: Many articles have shown less hypoglycaemia by using sensor-augmented Pump Therapy with Predictive Insulin Suspension in Children with Type 1 Diabetes. But we found no data on implementation difficulties at home encountered by the caregivers.

Methods: Between March 2017 and Mars 2018 we included 13 patients, average age 5,3 years.

All patients are using the Minimed 640 G system with SmartGuard technology.

The only inclusion criteria was hypoglycemia.

The sensor was initiated at the hospital, with a Pediatrician or a nurse after 1 week and every month. Sending the data regularly allowed changing settings for a better glycemic equilibrium. All patients are followed every 3 months, had HbA1C until March 2019

Results and discussion: Both hypoglycaemia and glycated hemoglobin decreased in most patients and remained stable.

The nurse spent very much time during the installation, the calibrations, to resolved data downloads issues, to creat documents for the parents and the school.

The nurse also had to solved technical difficulties related to the sensor with many alarms, mainly related to calibration.

The documents provided by Medtronic did not detail the technical problems we encountered.

The pediatrician also spent very much time answering messages and calls at least one time a week to ajust pump settings.

The experience of the health care team is very important and we have learned over time to "let the pump work"

Technical difficulties decrease with time in each child with less calls to the hospital.

Conclusion: Our study showed the reduction of hypoglycaemia and the decline of the HbA1C but especially the practical difficulties of setting up for the medical teams, paramedical and children and their parents. Despite the technical difficulties all children and parents want to keep using the system because it's changed their lives.

P331
Does commencing on an insulin pump improve glycaemic control in paediatric patients?

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Introduction: Long-term outcomes in diabetic patients are associated with good glycaemic control. In the UK, the National Institute of Clinical Excellence recommends the use of insulin pump therapy, however, these are very expensive and may not result in improved patient outcomes.

Objectives: The aim of our study was to examine if commencing insulin pump therapy resulted in improved glycaemic control.

Methods: Paediatric patients on insulin pumps at our centre were identified in November 2017. Demographic data was collected from each patient. Glycaemic control (HbA1c) was assessed at intervals prior to and post commencing pump therapy. Mean HbA1c was calculated and changes in HbA1c were examined for associations with gender, age when pump therapy was commenced and deprivation score. Unpaired t-test was used for statistical analysis.

Results: Sixty-six patients fit our inclusion criteria, with data available for forty-seven (71%) patients. Mean HbA1c at 12 months prior to commencing insulin pump was 59 mmol/l. Mean HbA1c at 6, 12 and 18 months following starting the pump was 60 mmol/l at each time point.

There were no significant differences in HbA1c from 12 months prior to pump therapy to 18 months post therapy. There were no statistical differences for gender (p value 0.14) or age at commencing pump therapy (p value 0.83) at 12 months after commencing pump therapy.

Prior to commencing pump therapy, patients from a more deprived area had significantly worse glycaemic control (p value of 0.03) but at 12 months post pump therapy there was no significant difference (p value 0.35).

Conclusions: In our cohort of patients, commencing on an insulin pump did not result in improved glycaemic control. It is therefore difficult to justify the use of such expensive medical treatment for our patients! We need to work with our patients to determine how we can better support and empower them to manage their diabetes whilst on pumps, in order to improve their long-term outcomes.

P332
Predictive low-glucose suspend feature of insulin pump therapy reduces hypoglycemia during fasting in ramadan among adolescents with Type 1 Diabetes mellitus

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Introduction: Severe hypoglycemic episodes during the daytime of Ramadan fasting is the most feared complication encountered by patients with diabetes.

Objectives: In two case series we investigated the effect of the SmartGuard technology with predictive low glucose suspend (PLGS) system on the frequency of hypoglycemia in adolescents with T1DM who wished to fast Ramadan.

Methods: Two female patients 15 and 17 years, duration of diabetes 3.5±2.9 years, pump therapy for 1.53±0.99 years, used MiniMed 640G system (Medtronic, Northridge, CA) and the device alert thresholds were set for alert on low at 70 mg/dL (3.9 mmol/L) and high at maximum 250 mg/dL (13.9 mmol/L).

Results: A significant reduction of time spent below 70 mg/dL (3.9 mmol/L) without rebound hyperglycemia was observed with a

mean total duration suspend 82±14min, of which 32% lasted for < 5 min, and 5.3% lasted for a maximum of 1 hour 23 min. Low alarms was 0.8±0.2 per day and 52.8% began in the afternoon between 12pm - 6pm. There was an increase in time spent within target between 70 mg/dL and 140 mg/dL (7.8 mmol/L) consists of 88.4% of day. Sensor average was 132 ± 34 mg/dL. AUC of time spent below 70 mg/dL was 0.3 ±0.1. No severe episodes of hypoglycemic events occurred nor DKA and none of the patients broke their fast.

Conclusion: The PLGS insulin suspension was associated with a significant reduction of number of hypoglycemic events with no serious adverse effects in adolescents with T1DM. Fasting is safe with 'suspend before low' feature of insulin pump.

P333
Evaluation of the use of freestyle glucose monitoring sensor in children and young people with type I diabetes mellitus at diagnosis and established

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Introduction: Type 1 Diabetes Mellitus (T1DM) is a chronic condition affecting 35,000 Children and Young People (CYP) under the age of 19 years. Self-Monitoring of Blood Glucose levels is key in maintaining and improving control. The introduction of Flash Glucose Monitoring Sensors (FGMS) have demonstrated to be safe and accurate in the paediatric population. This provides new opportunities for HealthCare Professionals (HCP) to improve quality of life in CYP with T1DM.

Objectives: We aimed to test the use of FGMS in our cohort of CYP with T1DM to identify if there was an improvement in HbA1c at 3 months and maintained at 6 and 9 months of continuous use.

Methods: Data was retrospectively collected from Electronic Patient Records between June 2017-2018. There were 100 CYP with T1DM, of which 50 were commenced on FGMS. Funding was sought appropriately prior to commencement. CYP and families were made aware that funding can be withdrawn after a 6-month trial period if outcomes were unmet. HbA1c at the start of the trial was compared with HbA1c at 3, 6 and 9 months.

Results: HbA1c at the start of the trial was 65.1 mmol/mol; which showed an 8.1% improvement at 3 months, 12.3% at 6 months and 12.8% at 9 months. 67% discontinued the use of the FGMS, as qualitative evidence reported it to be unreliable. 2 of these children, recommenced the FGMS. The use of FGMS at diagnosis leads to improved control in newly diagnosed CYP with T1DM.

Conclusion: Our data shows a reduction in HbA1C after 3 months of continuous sensor use which is maintained at 6 and 9 months. The improvement in HbA1c is marked if the sensor was started within 6 months of diagnosis compared to those who have had T1DM for longer. Education is crucial before the start of the sensor so that families and CYP are well equipped to get the best out of it. The use of outcomes-based criteria set by the CCG acts to incentivise families, CYP and HCP to improve control.

P334
Evaluation of the quality of life and patient satisfaction using external insulin pump therapy Medtronic 640G vs Minimed Veo in people living with type 1 diabetes: an Indian scenario

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Introduction: With the increasing awareness about insulin pump therapy in developing countries and more emphasis on improving quality of life (QoL) more patients living with type one diabetes are now encouraged to switch from Medtronic Veo to most up-to-date MiniMed 640G with Smart Guard technology. However, there has been lack of significant data available from developing countries to compare the shift to the newer generation insulin pump models.

	Male (n=20)	Female (n=30)	Total (n=50)
Average age at start of trial	13.6	11.3	12.8
HbA1C pre-sensor (mmol/mol)	75.1	64.2	65.1
HbA1C at 3 months (mmol/mol)	88.5	62.4	59.8
HbA1C at 6 months (mmol/mol)	58.3	58.3	57.1
HbA1C at 9 months (mmol/mol)	52.2	57.7	56.8
June 2018-19, 6 new patients were commenced on FGMS			
HbA1C pre-sensor (mmol/mol)	84.5	65	71.5
HbA1C at 3 months (mmol/mol)	40	54.3	49.5
HbA1C at 6 months (mmol/mol)	46	52.3	50.5

[Comparing HbA1C at 3, 6 and 9 months between males and females with use of FGMS]

Objective: To evaluate the quality of life and satisfaction with the therapy in patients living with type 1 diabetes after introducing the Medtronic MiniMed 640G insulin pump.

Methods: The research group consisted of 50 patients >12 years of age living with type one diabetes mellitus who were being treated with MiniMed 640G insulin pump for at least 3 months. Patients were previously being treated with Paradigm® 722/MiniMed® Veo insulin pump. Two questionnaire surveys were used to evaluate QoL (Survey 1) using PedsQLTM 3.2 Diabetes and patient satisfaction authorial survey (Survey 2 - consisted of 11 questions, 2 closed and 9 semi-closed-ended). At the end of three months the patients were evaluated to answer additional questions comparing the two pumps - overall financial burden, ergonomy, glycemic variability and adaptation to their lifestyle.

Results: Complete details will be presented at the conference.

Conclusion: A comparison describe the superiority of Medtronic 640G with higher patient satisfaction and improved QoL with disadvantages of higher expenditure and overall financial burden. It has been well established the 640G allows a significant reduction in A1c without increasing hypoglycemia.

P335
E-health to support adolescents with type 1 diabetes

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Aim: The main objective of this multi-disciplinary research is to develop, test, and evaluate a care program using e-health for adolescents with type 1 diabetes.

Methods: The study design is quasi-experimental and adolescents (13-16 years) with type 1 diabetes, HbA1c >57 mmol/mol and recommended to use continuous glucose measurement (CGM) by the diabetes team at Skåne University hospital, Sweden will be eligible for the study.

All adolescents have access to use different CGM system. Within the intervention group the paediatric diabetes nurses will be a CGM-follower during defined periods and based on the information of the adolescents' glucose level use different modes of communications including video, text messengers, and pictures to the adolescent when needed. The diabetes nurse will be able to provide remote guidance regarding medication in concrete situations, with access to current glucose levels, and what food is at hand, and be proactive when measurements indicate problems.

The use of e-health for adolescents using CGM systems will be compared to usual care of CGM use in terms of metabolic control, adverse events, quality of life, self-efficacy, family impact and cost-effectiveness. Data will be collected at baseline, six and 12 months from inclusion. Cost-effectiveness and cost-utility analysis use the primary outcome of adolescents' metabolic control (measured by HbA1c) and health-related quality of life as outcome measures; direct and indirect costs will be calculated.

Conclusions: In the diabetes care, the majority of adolescents use CGM for better metabolic control and psychosocial outcomes. By the use of e-health we are directing the support to the vulnerary early and middle adolescents period, a group in great need of support, a support that do not interrupt their daily life more than necessary and with a way of communication where they are the most skilled.

P336
Comparison of glycaemic variability in adult with Type 1 Diabetes on insulin pump and insulin injection

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Aim: To study the glycaemic variability by AGP between insulin pump and insulin injections with time in target, time below target and time above target during trek in Manali, Himachal with type 1 diabetics.

Method: The 2nd T1d challenge 2018 was held at Chandrakhani pass, Manali, India, where 24 adults across India participated. Out of these numbers, 10 were on insulin pump and rest 14 on insulin injections. AGP was applied to each of them for 5 days during the trek.

Inclusion: Type 1 diabetes

Within the age group of 16 to 20years

Ready to give consent for 13,000ft trek

Physically fit for trek

Exclusion Criteria: Type 2 diabetes, GDM

We took 24 number of type 1 diabetes patient for 13,000ft trek from all over India whom we applied AGP on the 1st day of trek for the 5day of trek. There were 10 Type 1 diabetics with insulin pump and 14 on Insulin injection.

Result: After 5 days of AGP data we came to result that the patient with insulin pump had less variability in comparison with insulin injection. Patient with insulin pump were 48% time in target in AGP, 36% time below target and 16% time above target. The target range were set between 72mg/dl to 160mg/dl. Same way patient on insulin injection were 34.1% time in target, 33.9% time below target and 31.4% time above target.

We concluded that the patient on insulin pump that to on extreme physical active condition had minor variation rather than on injectable insulin, thus in regular day to day life they will have better time in target range then insulin injection. Insulin pump is a better choice of treatment for type 1 diabetic.

72mg/dl to 160mg/dl	On Insulin Pump	On Insulin injection
Time in Target	47.4%	34.1%
Time above Target	16.6%	33.9%
Time below Target	36%	31.4%

[Percentage Time in target]

P337

Are glucose monitoring systems beneficial in a real-world environment?

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Introduction: The use of glucose monitoring systems (GMS) in patients with type 1 diabetes (T1D) is exponentially growing in New Zealand, despite having to be self-funded and initiated by families. In the research setting or when structured education is provided the benefits of GMS in increasing time in range (TIR) and reducing episodes of hypoglycaemia are evident.

Objectives: The purpose of this project was to determine if the use of GMS at a "free-living" summer camp results in more TIR and reduces the frequency of hypoglycaemia.

Methods: Thirty-three children with type 1 diabetes aged 7-12 years attended a week-long residential diabetes summer camp. Sixty-four percent of children were using GMS (18/21 using Freestyle Libre; 3/21 using Dexcom G5), whilst 36% self-monitored blood glucose (SMBG). All changes in insulin doses were recommended by a health professional. Written records of glucose levels, insulin doses, and carbohydrate eaten were reviewed retrospectively. TIR was calculated as the percentage of glucose results within 3.9-10 mmol/L at each meal and snack time (6 times points per day). Hypoglycaemia was defined as a glucose level < 3.9 mmol/L.

Results: Children who used a GMS had a lower mean baseline HbA1c of 62 mmol/mol compared to 71 mmol/mol for those SMBG. Those using GMS had more TIR at main meals (64% vs 56%), conversely those doing SMBG had more TIR at snack times (79% vs 65%). On average there were 5 hypoglycaemic events per day for the GMS group and 4.8 hypoglycaemic events per day for the SMBG group. One child (SMBG) had a severe hypoglycaemic event requiring IV-glucose.

Conclusion: Surprisingly, GMS were non-superior to SMBG in achieving TIR or reducing hypoglycaemia in children with T1D. Camp highlights the challenges, for clinicians in particular, of maintaining glucose levels in target range in a "free-living" environment. The need for education about the most effective use of GMS is also indicated.

P338

Continuous Glucose Monitoring System (CGMS) in well controlled children with type 1 diabetes

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Introduction: Numerous studies have demonstrated clinical benefits in multiple patient populations of using CGMS.These systems are thougt to be associated with a reduction in time spent in hypoglycemia, glycemic variability as well as the hemoglobin A1c(HbA1c) level from 0,18 to even 0,5%. According to International Society for Pediatric and Adolescent Diabetes (ISPAD) 2018 a target HbA1c is less than 7.0%.

Objectives: The aim of the study was to assess the effectivness of CGM on metabolic control in children with type 1 diabetes with well controled disease prior to the study.

Methods: Medical records of 110 children (53 girls) with mean age of 10.41±3.58 years, diabetes duration for at least 150 days (mean 5,16 ±4.05 years) mean HbA1C 6.96±0.89% treated with sensor-augmented insulin pump between March and December 2019 were retrospectively analyzed. Following parameters were collected: HbA1C, BMI, basal and total daily insulin dose (TDD) before and at least 150 days after CGM implementation. Patients with a follow-up duration shorter than 150 days were excluded.

Results: Afer the median 287±82,48 days follow-up of using CGMS we did not find statistically significant differences concerning HbA1c at the end of follow-up. The mean Hba1c level was 7.022±0.98% (p=0.1140).We observed significant higher TDD at the end of observation comparing to baseline (0.73± 0.28 units/kg vs 0.77± 0.24 units/kg; p=0.0207). Similar results was seen accordingly to basal insulin requirement per kg(0.24±0.11 units/kg vs 0.28±0.12units/kg; p< 0,0001) and in proportion to TDD (33,25± 11,29% vs 36,73 ± 12,91%; p=0,0089). Also we found significant BMI raise (18.34 ±3.37 vs 19.05±3.48;p< 00001).

Conclusions: The use of CGMS in children and adolescents with good T1D control resulted in long-term good diabetes control despite the increase in BMI and insulin requirement. It is necessary to give attention to the nutrition of children and adolescents with type 1 diabetes to avoid excessive weight gain.

P339

Sensor augmented pump therapy effects glycemic variability

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Introduction: Sensor augmented pump therapy (SAP) decreases glycemic variability (GV) and helps to prevent hypoglycemia.

Aim: To evaluate the effect of SAP therapy on GV; percentage of time in range, time spent in hypo and hyperglycemia.

Method: Mean pre and post SAP therapy HbA1c; glycemic variability (CV and SD) and percentage of Levels 1 and 2 hypo-hyperglycemia and TIR were evaluated in type 1 diabetic patients followed up between Jan 2016 and Nov 2018.

Results: Mean age and duration of DM was 12,25 ± 0,62 and 5,75 ± 4,68 years (0.17 to 19 years). 21 of the patients were male (47.7%) and 23 were female (52.3%). No significant difference was found in BMI SDS of the patients before and after SAP therapy (-0,16±0,81 and 0,28±0,74). Twenty (45.5%) of the patients were using standard insulin infusion pump therapy (IPT), 16 (54.5%) were on MDI, and 8 were newly diagnosed at the initiation of SAP therapy. Insulin doses (U / kg), bolus and basal insulin ratios were similar in pre- and post SAP therapy after new diagnosis diabetics were excluded. No significant difference

was found between the mean HbA1c of the IPT patients in the previous year and first year after SAP therapy on the 3rd,6 th and 12 th month (7.32% ± 0.71%, 7.32% ± 0.99% and 7,25± 0.85%).

Mean level 2 and 1 hypoglycemia and level 2 and 1 hyperglycemia rates were 0,55±0,52 % and 2,13±1,26 %; 9,32±10,33% and 20,14 ±6,27% consecutively. The rate of normoglycemia was 68,63±13,56 % after SAP therapy.

In the 1-year follow-up period, mean glycemic variability index was measured at 3-month intervals. Although there was no statistically significant decrease in CV values, CV decreased from 36% to 33%. Secondary glycemic variability index SD decreased from 59.4 to 56 (p> 0.05)

Conclusion: As a result SAP therapy decreases GV while preventing hypoglycemia as shown by the decrease in SD and CV. With SAP therapy TIR was > 65 % and the time spent in hypoglycemia was very low

P340
Continuous glucose monitoring / flash glucose monitoring in type 1 DM. Local unit experience at Glan Clwyd Hospital, Wales

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Background: Use of Continuous Glucose Monitoring (CGM) or Flash Glucose monitoring (FGM) has increased in children with type 1 diabetes without a conclusive evidence of sustained improvement in HbA1c.

Aims: To assess whether use of CGM/FGM improves HbA1c. To review admissions, complications and impact on the quality of life.

Methods: Retrospective study of 33 Type 1 diabetic patients on CGM/FGM. Data collected from the case notes and Twinkle database system. A survey questionnaire was sent to parents/patients to assess the impact on quality of life.

Results: Indications for starting CGM/FGM were severe hypoglycemia, age and parental anxiety, reduced hypoglycaemic awareness, difficult glycaemic control and professional sports. Patients were divided into four baseline HbA1c cohorts, < 53 mmols/mol (n=6), 54-69 mmols/mol (n=17), 70-85 mmols/mol (n=6) and >85 mmol/mol (n=4). Most patients in the first two cohorts showed no significant improvement or slight increase in HbA1c at 6 and 12 months. In 70-85 mmols/mol cohort, 33% had significant reduction in HbA1c at 6 months (>11 mmol/mol). 100% patients with baseline HbA1c of >85 mmol/mol showed significant reduction in HbA1c at 6 months. There was a significant reduction in number of hospital admissions from diabetes related problems during the 12 months period after using CGM/FGM in comparison to the 12 months period prior to CGM/FGM use (3 vs 12, 75% reduction). On Patient/parent satisfaction survey, majority stated that they were very satisfied with the use of CGM and it improved their quality of life. 14% reported problem with signal loss and in one patient the sensor was broken and embedded in the skin requiring surgical removal.

Conclusion: Patients with baseline HbA1c >70 mmomls/mol show significant reduction in HbA1c at 6 months after starting CGM/FGM. 75% reduction in hospital admissions. Broken sensor embedded in skin requiring surgical removal is an unusual complication which has not been reported before.

P341
Metabolic control and variability in children with diabetes mellitus type 1 users of insulin infusion pump with predictive insulin suspension

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Introduction: In 2017, the use of public funds was approved to finance the use of insulin pumps with an integrated sensor in the case of use microdoses and hypoglycemia unawareness. It has to be implemented in a multidisciplinary way in centers that have pediatric endocrinology, nurses, psychologist and nutritionist

Objective: Evaluation of the metabolic control and variability in children with Diabetes type 1 who use insulin continuous infusion pump with predictive suspension of insulin after a year of use

Methods: Follow-up study in children with Diabetes Mellitus type 1 users of Medtronic minimized 640G smart guard technology, which includes the function of predictive suspension of insulin and who were in a multidisciplinary monitoring. The values of glycosylated hemoglobin (HbA1c), previous and after a year were compared; We analyzed the difference between the first month and a year of pump use in the average of exposure to hyperglycemia (AUC> 140mg / dl) and the average exposure to hypoglycemia (AUC < 70mg / dl). We analyze the coefficient of variation (CV) and the correlation with age, dosis of insulin and metabolic parameters.

Results: Fifty six children were followed up, 39% female, average age 9,42 years ± 4,4, time with diabetes 4 years 6 months ± 2,7 years. The HbA1c prior to the pump was 7,6 ± 0,65 and a year 6,79 ± 0,32 (p < 0.05), AUC> 140mg / dl at the first month was 37,52 ± 14.42 vs at one year 24,7 ± 10,4 (p < 0.05); AUC < 70mg / dl first month was 0,22±0,19 and at year 0,45±0,45 (p < 0.05). Factor significantly associated with CV was AUC< 70 mg/dL (p< 0.05).

Conclusions: In this follow-up, a continuous infusion pump with predictive insulin suspension was found to improve metabolic control of patients at one year of follow-up. The fact that CV it was associated with lower AUC< 70, reinforces the idea of the importance of aiming to reduce glycemic variability to lower the risk of hypoglycemia.

P342
"Diabetes in your face". Experiences of people with type 1 diabetes during altitude hike in tropical rainforest using continuous blood glucose monitoring: a qualitative study

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Objectives: "The League of DiAthletes Global Challenge" was a 3-day trek of people with type 1 diabetes (T1D) in moderate altitude of Costa Rican mountains, with significant humidity and high temperature. To help to maintain safety during the trek, all participants used Continuous Glucose Monitoring (CGM). The aim of this study is to explore the experience of this challenge and CGM use in people with diabetes.

Methods: 11 semi-structured interviews were conducted just after the 47-km long trek to explore participants experiences. Thematic analysis was used to analyse the transcripts.

Results: All participants accomplished the challenge with no adverse events such as severe hypoglycaemia or DKA. For all "hikers" the main goal was to minimize hypoglycaemic events, therefore their main intervention was to reduce insulin before and during the trek. Difficulties in diabetes management included "too intense lowering of insulin doses" and technical issues. Other challenges included weather conditions, as well as physical and psychological difficulties. Participants highlighted the importance of prior preparations, Health Care Professional's (dietitian's and endocrinologist's) advice, and the advantages (effectiveness, safety, confidence, ability to react quickly, more engagement in diabetes control) and disadvantages of CGMs (continuous focus on diabetes, too much engagement, overreacting). All participants emphasized the importance of peer support.

Conclusions: According to our knowledge, T1D experience of altitude hiking in humid tropical forests has never been explored. The results of this study can inform planning and preparations to similar endurance.

Poster Tour 8 - Childhood Obesity & Type 2 Diabetes, Associated Diseases, and Other Forms of Diabetes

P343

Bone turnover markers during the remission phase in children and adolescents with resent onset type 1 diabetes

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Objectives: The study aimed at investigating if bone turnover is affected shortly after the diagnosis of Type 1 diabetes (T1D) to investigate the potential relationship between the bone turnover markers and the remission phase.

Methods: Patients were examined within 3 months of diagnosis and 6 and 12 months after the initial visit. Osteocalcin (OCN) and procollagen type 1 amino terminal propetide (P1NP) were markers of bone formation and C-terminal cross-linked telopeptide (CTX) a marker of bone resorption. The balance of formation and resorption were represented by OCN/CTX and P1NP/CTX ratios. All bone parameters were converted into Z-scores using new national references. Remission phase was defined as stimulated C-peptide > 300 pmol/L or insulin dose-adjusted HbA1c < 9 (IDAA1c = HbA1c (%) + 4 * TDD (IE/Kg/day)).

Results: 75 patients (33% girls) with newly diagnosed T1D (7.7-17.5 years of age) were included. As expected C-peptide decreased between visits (P< 0.001 for both). HbA1c was 54.1 mmol/mol at visit 1, significantly lower at visit 2 (50.3 mmol/mol) and no different from visit 1 at visit 3 (53.1 mmol/mol).

OCN Z-score was significantly decreased at all three visits (P< 0.001 for all) and the same was seen for P1NP Z-scores (P< 0.001, P=0.005 and P< 0.001). Oppositely, CTX Z-scores were significantly increased in all three visits (P=0.001, P< 0.001 and P=0.003). Both ratios were significantly decreased in all three visits (all P< 0.001). No difference in bone turnover markers or ratios were demonstrated between those within and out of remission (either definition) at any visit.

Conclusions: For the first time we show that already during the first year of T1D bone formation markers are decreased whereas the bone resorption marker CTX is increased. These findings clearly point towards the development of impaired bone health from the diagnosis of T1D. There is no apparent association to the remission phase and other mechanisms in T1D must be involved.

P344

Prevalence and predictive factors for celiac disease in children after type 1 diabetes diagnose

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Objectives: Routine screening for celiac disease (CD) in children with type 1 diabetes (T1D) is common but when to screen is not well established. The aim of this study was to investigate the prevalence of CD in relation to diagnosis of T1D and to find predictive factors for CD.

Material and methods: In the current study we included all 5300 children (age 0-18) diagnosed with T1D 2005-2012 in the Swedish national BDD-study (Better Diabetes Diagnosis-study). Patients were followed 4-10 years. Most patients were screened for CD at onset of diabetes and thereafter yearly. Age at T1D diagnosis, gender and HLA genotype were compared to date of CD diagnosis.

Results: At the end of 10 years follow-up, 10.5% were diagnosed with CD, 2.8% had known CD before T1D diagnosis, 2.9% were diagnosed within the first year, assumed to have been screened at T1D diagnosis, 1.8% developed CD the second, 1.0% the third and 0.6% the fourth year after T1D diagnosis. Thereafter, 0.11%-0.46% were diagnosed yearly with CD. In children 0-5 years old at T1D diagnosis the prevalence of CD was 17 %, whereas 12.5% were diagnosed with CD after T1D.

Children diagnosed with CD after T1D were statistically significantly younger than those with CD before T1D and those with T1D only. The majority of children with CD before T1D were girls, while no gender difference was seen for those diagnosed after T1D. Children homozygous for HLA DQ2 had the highest HLA-risk for CD both before and after T1D.

Conclusion: CD in patients with T1D most often develop before the diagnosis of T1D or during the first 2 years after T1D onset, but in children below 5 years at T1D diagnosis, the risk of CD is markedly elevated after the T1D diagnosis. We propose that screening routines should be based on risk of CD after T1D diagnosis, where age at onset and HLA DQ2/ HLA DQ2, but not gender are risk factors.

P345

Decreased bone turnover favoring bone resorption in children and adolescents with Type 1 diabetes after the remission phase

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Objectives: To fully understand the development of impaired bone health in adult Type 1 diabetes (T1D) we investigated selected markers of bone turnover in Danish children and adolescents with T1D using Z-scores from a novel Danish reference material.

Methods: A total of 173 participants (47% girls) aged 7.7-17.5 years with T1D duration > 1 year participated. Bone formation markers analyzed were osteocalcin (OCN) and procollagen type 1 amino terminal propetide (P1NP). C-terminal cross-linked telopeptide (CTX) was included as a bone resorption marker. Further, the ratios OCN/CTX and P1NP/CTX were included to represent the balance between formation/resorption. Bone mineral density (BMD) was assessed by dual-energy X-ray absorptiometry. All variables were presented as Z-scores.

Results: Median age of participants was 13.9 (IQR: 4.9), median diabetes duration was 3.5 (IQR: 4.7) years and mean HbA1c was 62.6 mmol/mol (± 14.4). Mean total daily insulin dose was 0.85 IE/kg (± 0.27) and 108 (62.4) % were treated with insulin pump. Mean BMD was 0.08 (±0.99) not different from healthy peers (P=0.283). Mean OCN Z-score was -0.68 (±1.31), mean PINP Z-score was -0.33 (±1.03) and the mean CTX Z-score was -0.43 (±1.10). All three markers of bone turnover were significantly decreased compared to healthy peers (P< 0.001). The mean P1NP/CTX Z-score was 0.09 (±1.34) and the OCN/CTX Z-score was -0.28 (±1.39). Whereas the mean P1NP/CTX ratio did not differ from healthy peers (P=0.374) the OCN/CTX ratio was significantly lower (P=0.010). CTX, but not OCN and P1NP, was negatively associated with HbA1c values (P=0.003).

Conclusions: Our study shows that both markers of bone formation and bone resorption are significantly decreased in children and adolescents with T1D. Although the BMD was no different from the references, the decreased OCN/CTX ratio favor bone resorption indicating a predictive role of bone turnover markers, valuable in the understanding of T1D induced bone disease.

P346
The impact of celiac disease on clinical course in children with type 1 diabetes

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Introduction: Type 1 diabetes (T1D) and celiac disease (CD) are chronic, autoimmune diseases with a well-known association. CD is more prevalent in T1D patients compared to the general population and have in previous studies been indicated to impair metabolic control in T1D patients.

Objectives: Our aim was to compare the clinical course in children with known resp. undiagnosed CD to that of children with T1D only, at T1D diagnosis, one-year and two-year follow-up. Additionally, we studied the metabolic control in relation to HLA-DQ2 status in patients with double diagnosis.

Methods: In our study, 3743 Swedish children < 18 years diagnosed with T1D between 2005 and 2010, and part of the Better Diabetes Diagnosis study were included. Patients were divided into groups according to time of CD diagnosis in relation to T1D diagnosis and the association between outcomes (HbA1c, BMI, DKA and C-peptide) and double diagnosis versus T1D alone were explored. HbA1c levels and BMI were further analysed at one- and two-year follow up.

Results: CD was present in 401 children (10.7%). Of these, 100 children (25%) were diagnosed with CD prior to T1D (group 1), 112 (28%) had an undiagnosed CD at T1D onset (group 2), 75 (19%) were diagnosed with CD 1-2 years after T1D (group 3) and 114 (28%) were diagnosed with CD >2 years after T1D (group 4). HbA1c at diagnosis of T1D and follow up showed no association to double diagnosis in any group. Individuals in group 1 had a statistically significant lower BMI at one and two-year follow-up compared to patients with T1D only. No difference in DKA prevalence or C-peptide levels were found related to double diagnosis. Neither HbA1c nor BMI was associated to HLA-DQ2 status.

Conclusion: CD is a common comorbidity in children with T1D but neither known nor diagnosed CD at T1D diagnosis or for 2 years seem to have any impact on the clinical course at T1D diagnosis or follow up. Nor did metabolic control predict the development of CD after T1D diagnosis.

P347
Assessement of pyridoxial 5'- phosphate (PLP) in children newly diagnosed with type 1 diabetes mellitus

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Introduction: Type I diabetes is considered a multifactorial disease . Many factors participating T1D and leading to autoimmunity to islet antigens, among them the protein glutamic acid decarboxylase, GAD-65.Pyridoxial 5'-phosphate (PLP) which is the active form of vitamin

B6, is formed from vitamin B6 by the action of pyridoxal kinase. Interaction of GAD65 with PLP is necessary for GAD65-mediated synthesis of the neurotransmitter γ-aminobutyric acid (GABA).PLP is also a required cofactor for dopamine synthesis by L-aromatic decarboxylase (L-AADC). Both GAD65 and L-AADC are expressed in pancreatic islets.

The aim of the work: was to assess pyridoxal 5'-phosphate level in children newly diagnosed with T1D.

Subjects and Methods: Our study included 2 groups;Group 1 included 50 children newly diagnosed with T1D, randomly selected from the pediatric endocrinology outpatients' Clinic, Minia University Children Hospital and Group 2; apparently healthy 50 children, age and sex matched to the diseased group as a control group.They were sibling of the diseased groups.They were subjected to thorough history taking, clinical examination and laboratory investigations included: blood glucose level (fasting and postprandial),glycosylated Hemoglobin (HbA1c %),fasting C-peptide level and PLP level.

Results: PLP, the diabetic group had significantly lower levels of PLP than the control group .PLP had insignificant weak positive correlation with fasting blood glucose and significant weak and fair positive correlations with postprandial blood glucose and fasting C-peptide and a significant positive weak correlation with HbA1c %.

Conclusion: In this study, it is proposed that deficiency in PLP, the activated form of vitamin B6, might contribute to appearance of T1D. There is some indirect evidence in the literature.If this hypothesis turns out to be correct T1D could be prevented to some degree by change of lifestyle conditions including nutritional measures

P348

Type 1 Diabetes and epilepsy in childhood and adolescence: Do Glutamatic Acid Decarboxylase autoantibodies play a role? Data from the German/Austrian/Swiss and Luxembourgian DPV Registry

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Objective: The association between diabetes and epilepsy is controversial. Glutamatic Acid Decarboxylase autoantibodies (GADA) are involved in the pathogenesis of type 1 diabetes (T1DM) and in the pathogenesis of some neurological disorders. Therefore, GADA are considered to be a possible link between T1DM and epilepsy. We intended to analyze the impact of GADA on demographic and metabolic parameters in patients with T1DM and epilepsy.

Methods: We searched the standardized diabetes patient follow-up registry DPV for patients with T1DM ≤ 20 years, for the additional diagnosis of epilepsy, and for positive, resp. negative GADA. Patients were divided into two groups (Epilepsy+GADA positive; epilepsy +GADA negative). HbA1c, insulin dose, and frequency of ketoacidosis and hypoglycemia with coma - aggregated over the most recent patient visit - were compared, adjusted for sex, duration of diabetes, and age at diabetes onset. Logistic regression was used to analyze the relationship between epilepsy and GADA with odds ratio adjusted for sex, duration of diabetes, and age at diabetes onset. Statistics were carried out with SAS 9.4.

Results: Diagnostics concerning GADA were documented in 31,644 patients ≤ 20 years. We found 367 patients ≤ 20 years with T1DM and epilepsy. The comparisons between the groups are shown in Table 1. Epilepsy was not significantly more frequent in GADA-positive patients (odds ratio 0.96 (95% CI 0.78 - 1.19).

Conclusion: In young patients with T1DM, epilepsy does not seem to be more frequent in GADA-positive patients, also after including adults with onset of T1DM ≤ 20 years into the analysis. GADA-positive patients had significantly better HbA1c-values than GADA-negative patients, even after additionally adjusting for potential

Parameter	T1DM and Epilepsy, GADA positive	T1DM and Epilepsy, GADA negative	p-value
Number of patients	209	158	
Age at analysis [years]	16.82 (12.97-17.76)	16.63 (12.60-17.73)	1.00
Age at diabetes onset [years]	9.26 (5.67-11.70)	7.37 (4.54-11.29)	0.51
Male patients	46%	60%	0.15
Duration of diabetes [years]	6.15 (3.82-9.07)	7.49 (3.66-10.03)	1.00
Insulin dose [units/kg/d]	0.88±0.02	0.93±0.02	0.13
HbA1c [mmol/mol]	64.53±1.27	69.19±1.50	0.02
Diabetic ketoacidosis (events/patient/year)	0.03±0.01	0.03±0.01	1.00
Hypoglycemia with coma (events/patient/year)	0.03±0.38	0.05±0.64	0.28

[Characteristics as median with quartiles or proportion; adjust. Values ± SEM with adjust. for sex, duration of diabetes, and age at diabetes onset]

confounders, such as pump usage and migrant background. An explanation for this phenomenon cannot be derived from our analyses.

P349
Monogenic causes and associations of diabetes in a cohort of diabetic children: single center experience

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Objectives: Although monogenic causes and associations of diabetes are reported in less than 10 % in pediatric populations, the facts like unknown monogenic etiologies, sparsity of data about genotype-phenotype correlations and undiagnosed cases among patients treated for type 1 and 2 diabetes are making the research in this area valuable. The purpose of the study is to depict the distribution of individual monogenic variations in a group of diabetic subjects diagnosed in childhood with potential of causative relationship with the disease.

Methods: The study population comprises of diabetic and prediabetic subjects in follow-up in a pediatric diabetes center in West-Anatolia. Indications for genetic analysis were autoantibody negativity, non-progressive dysglycemia, persistent detectable c-peptide, familial accumulation of diabetes cases, slow progression to insulin dependency, neonatal diabetes and syndromic features. DNA was isolated from the peripheral blood samples of cases and NGS was performed for each case. Segregation analyses were started in mutation positive patients. Descriptive statistics are used.

Results: The total background diabetic population includes 577 apparently type 1, 124 other forms and 8 prediabetic cases. To date 43 cases with monogenic variations were identified. The biggest subgroup was GCK-MODY (11 cases) as expected. KCNJ11 was observed in 6 ; HNF1A, CEL and ND1 in 4 cases each. There were 3 BLK, 2 ABCC8, 2 BBS, 1 KLF, 1 HNF1B, 1 PAX, 1 ABCD1, 1 EIF2AK1, 1 FXN variations. One patient with consanguinity in multiple generations had concomitant HNF1A, HNF4A and WFS1 mutation. None of the cases with canalopathy had neonatal diabetes.

Conclusions: Frequency and presentation of our cases is not similar to reported case series in the literature except for GCK. The prevalence and clinical pictures have to be studied among different populations.

P350
Characteristics of monogenic diabetes registers within the ENDO-ERN network

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European Reference Networks - ENDO-ERN are networks of reference centers across Europe, built to manage patients with rare endocrine disease. Among 71 ENDO-ERN participants, 28 centers from 15 European countries follow rare cases of diabetes.

The aim of this study was to map existing registries of monogenic diabetes (MD) and describe the standard care of children with MD at these centers.

Methods: All participating centers were asked to fill in an on-line questionnaire containing 34 questions focused on the basic characteristics of existing registers, care of patients with MD and the availability of genetic investigation.

Results: Out of 28 centers, 16 (57%) originating from 12/15 countries responded. A national register of diabetes, including patients with MD is present in 9/12 countries. A register, specifically intended for genetically proved monogenic diabetes, is available only in 5/12 countries. In total, data from 1429 children was registered in 2018. Basal molecular genetic investigation of MD was available in 11/12 participating countries, although in most countries, samples from children with neonatal diabetes (ND) are sent for investigation in Exeter, UK. Genetic investigation is reimbursed by health insurance companies in 5/12 countries, by research grants in 3/12 countries, by state funded health care systems in 2/12 and by the patients themselves in 2/12. The participating centers care for over 760 children with MD (54 children with ND). For many patients, these centers serve as a diagnostic center, report them to the register and starts the treatment. Follow-up care is provided by regional clinics. All centers used the ISPAD guidelines for diagnosis and treatment, 7/16 have special transition programs.

Conclusion: Data from a minority of patients with MD are available in existing registries, which implies the need to improve awareness and participation in MD registries.

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P351
Clinical and genetic characteristics of permanent neonatal diabetes mellitus in Beirut, Lebanon

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Introduction: Permanent neonatal diabetes mellitus (PNDM) is a rare genetic condition. Mutations in the KATP channel genes (*ABCC8*, *KCNJ11*) and the insulin gene (*INS*) are the most commonly reported causes. There are no reports on PNDM from Lebanon to date.

Objective: To describe the clinical and genetic characteristics of patients diagnosed with PNDM in Beirut, Lebanon.

Methods: A retrospective review of the patients with PNDM, followed at the American University of Beirut, and the Chronic Care Center, Beirut, Lebanon from Nov 2010 - May 2019. Sanger sequencing of candidate genes was performed based on clinical presentation at Exeter University.

Results: Ten patients were identified, 80% from consanguineous parents, age at diabetes presentation 3 hrs-17 weeks (Table 1). Two patients were diagnosed with *KCNJ11* mutations, 4 with Wolcott-Rallison syndrome (WRS) (*EIF2AK3* mutations), 2 with homozygous *GCK* mutations (siblings), and one with Thiamine Responsive Megaloblastic anemia (*SLC19A2*). No mutation was identified in 1 patient. The 2 patients with *KCNJ11* mutations were successfully switched to sulfonylureas. All others are treated with insulin. The 4 patients with WRS had siblings that died in early infancy/childhood, mainly due to liver and kidney problems. Two patients with WRS suffered from multiple episodes of acute liver failure to date and were successfully treated. The patient with TRMA is receiving thiamine and insulin, however has very poor diabetes control. The 2 patients with *GCK* mutations are requiring insulin to maintain adequate glycemic control.

Conclusion: PNDM is more likely to be due to *EIF2AK3* mutations in consanguineous families in Lebanon. However, consanguinity does not preclude the possibility of a *KCNJ11* mutation. Early identification of the underlying genetic etiology in PNDM can improve clinical outcomes significantly and aid in early detection of associated co-morbidities.

P352
Prevalence of Maturity Onset Diabetes of the Young (MODY) among people with diabetes attending a tertiary care centre

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Objectives: To determine the prevalence and clinical profile of MODY among diabetic patients.

Methods: In this cross sectional study all consenting patients with previously diagnosed as T1 diabetes, T2 diabetes, or any other type of diabetes and age of onset 35 years or less, attending Endocrinology clinic of a tertiary care hospital in North India were considered for diagnosis of MODY. Total of 858 patients were included (447 males). All patients were screened for MODY using modified clinical criteria (Age at onset < 25 years, autosomal dominant inheritance, absence of

Patient	Age at DM presentation	Birth weight, g	Consanguinity	Type	Gene	Nucleotide variant	Protein effect	Type	Age at most recent visit, Associated conditions
1	8 weeks	3000	No	Heterozygous	KCNJ11	c.602G>T	p.Arg 201Leu	Missense	6 2/12 yrs , None
2	40 days	2200	Yes	Heterozygous	KCNJ11	c.124T>C	p.Cys 42Arg	Missense	11 6/12 yrs , Learning difficulties, ADHD
3	11 weeks	2800	Yes	Homozygous	EIF2AK3	c.3190C>T	p.Arg 1064Ter	Nonsense	6 yrs, Liver disease, Sensorineural hearing loss, Skeletal dysplasia, Poor growth
4	45 days	3050	Yes	Homozygous	EIF2AK3	c.3190C>T	p.Arg 1064Ter	Nonsense	3 7/12 yrs, Anemia, Liver disease, Skeletal dysplasia
5	50 days	2100	Yes	Homozygous	EIF2AK3	c.1560G>A	p.Trp 520Ter	Nonsense	14 mo, None
6	40 days	not available	Yes	Homozygous	EIF2AK3	c.2562dup	p.Ile855fs	Frameshift	Lost to follow-up
7 & 8 (siblings)	3 hrs 2 days	1620 1260	Yes	Homozygous	GCK	c.1148del	p.Ser383fs	Frameshift	3 7/12 yrs, None 15 yrs, None
9	35 days	2100	Yes	Homozygous	SLC19A2	c.237C>A	p.Tyr 79Ter	Nonsense	3 yrs, Hearing deficit, Anemia
10	17 weeks	3600	No	Homozygous	Non detected				10 yrs, None

[Clinical and Genetic Characteristics of Patients with PNDM]

Parameter	MODY (Mean ± SD)	NON MODY (Mean ± SD)	p-value
Age at Onset (Years)	14.16 ± 5.61	23.80 ± 8.71	0.000
Current Age (Years)	17.51 ± 6.76	28.10 ± 9.10	0.000
BMI (Kg/meter square)	21.01 ± 4.77	23.50 ± 4.96	0.000
Duration of DM (Years)	3.60 ± 4.14	4.82 ± 4.77	0.048
Acanthosis Nigricans or Skin Tags	5/65 (7.7%)	163/624 (20.7%)	0.006

[Comparison of MODY group by clinical and biochemical characteristics.]

diabetic ketoacidosis and insulin requirement within the first two years of diagnosis). Patients were subjected to Serum C-Peptide level and anti- GAD65 antibody levels and those with negative GAD65 and positive C peptide were subjected to the amino acid polymorphism (SNP) in HNF1α.

Results: The prevalence of MODY as per the criteria defined above was found to be 7.7%.The mean age at onset of diabetes was lower in MODY compared to Non MODY patients and patients with MODY were younger, leaner and had lower frequency of features of insulin resistance in the form of skin tags and acanthosis nigricans ($p < 0.05$), as shown in table below. In 40 patients of clinically identified MODY who were subjected to the amino acid polymorphism (SNP) of Ala>Val on codon 98 in HNF1α gene (MODY 3), the mutant genotype was seen in 50% of patients.

Conclusion: Our findings indicate the existence of at least some forms of MODY among diabetic patients attending our center that were previously undiagnosed. Recognition of MODY by clinician is an important step towards proper case identification and management of such patients. A high index of suspicion is required to diagnose cases of MODY as misdiagnosis and inappropriate treatment may have a significant impact on QOL with increased cost and unnecessary treatment with insulin.

Poster Tour 16 - Childhood Obesity & Type 2 Diabetes, Associated Diseases, and Other Forms of Diabetes

P353
Genetic determinants of intellectual disability in K_{ATP} channel neonatal diabetes

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Introduction: The K_{ATP} channel has a key role in insulin secretion but mounting evidence has revealed that mutations can lead to intellectual disabilities.

Objectives: Neonatal diabetes is associated with high neuropsychiatric morbidity in a genotype-phenotype dependent manner. However, the specific impact of different mutations on intellectual functioning is not sufficiently characterized. Specifically, only a few subjects with developmental delay have been comprehensively assessed creating a knowledge gap for patients carrying the heaviest burden.

Methods: We here assessed intellectual functioning and mental health of the complete Norwegian population of K_{ATP} channel neonatal diabetes. Eight children (five with p.V59M (*KCNJ11*), associated with an elevated risk of severe neurological features) were assessed using age- matched controls with type 1 diabetes. The investigations included a physical- and motor developmental examination, cerebral MRI, psychometrical examination and questionnaires assessing intellectual capabilities and psychiatric morbidity.

Results: By examination, five children carrying the p.V59M genotype all displayed moderate intellectual disability. This disability showed no significant association with the time of sulfonylurea initiation. Consistent with previous studies other genotypes were associated with minor cognitive impairment and attention deficit hyperactivity disorder. Furthermore, we uncovered indications of non-verbal learning disorders and visuospatial problems for the entire cohort. Cerebral MRI verified normal brain anatomy in all but one.

Conclusions: We here presented a comprehensive assessment of intellectual functioning in the largest cohort of p.V59M subjects of any study to date. The intellectual disability revealed in subjects with this genotype changes the interpretation of psychometrical measures. This directly impacts the subjects' diagnosis and carries important consequences for the treatment and care of this patient group.

P354
Genetic etiology and estimated prevalence of neonatal diabetes mellitus in the Czech Republic

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Objectives: Recognition of genetic etiology of neonatal diabetes mellitus (NDM) enables to tailor the management of each patient. We aimed to identify the estimated prevalence of NDM and to clinically and genetically characterize cohort of patients presenting with NDM from the Czech Republic, a population with low rate of consanguinity.

Methods: We retrospectively collected data from 22 subjects (14 males) that were diagnosed with NDM before 6 months of age and were referred to our reference centre for genetic testing in years 2010-2018. We collected clinical data from the clinicians and genetic examination was done using Sanger and whole exom sequencing.

Results: Median gestation age (GA) in our cohort was 37 weeks (range 25-42) with mean birth weight (BW) 2025 g (±901 g). Median age at diagnosis was 13 days (range 1-180) and median blood glucose was 25.7 mmol/l (range 11.3-45). 8/22 subjects were premature - median GA for this subgroup was 27 weeks (range 25-36) with mean BW 1139 g (±595 g), 7/8 of them had transient NDM (median duration 11 days, range 3-28 days). In total, genetic etiology was identified in 10/22 subjects (45.5%). Most frequent were KCNJ11 (4/22, 18.2%) and ABCC8 (3/22, 13.6%) variants. 5/7 of KCNJ11 and ABCC8 cases were successfully switched to SU, 2/4 KCNJ11 cases had DEND sy with only partial reaction to SU. We found one variant in GATA6 and one in FOXP3 causing IPEX sy, this subject underwent curative bone marrow transplantation at 3 months of age. In the premature subgroup, we found genetic background in only one patient - microduplication of 6q24.1q24.2. The prevalence of NDM in the Czech Republic in years 2010-2018 was 2.2 cases of NDM/100,000/year.

Conclusions: The prevalence of NDM is similar to other populations with low consanguinity. Most common were variants in KCNJ11 and ABCC8. The detection of genetic background in the premature subgroup was very low. The study is supported by the research grant NV18-01-00078.

P355
A mathematical model to determine optimal oral glucose tolerance test timepoints for identifying prediabetes in individuals with cystic fibrosis

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Objectives: To compare 1 hr vs. 2 hr glucose on oral glucose tolerance testing (OGTT) as a measure of insulin secretion and sensitivity derived from mathematical modeling in youth with cystic fibrosis (CF).

Methods: Data from 2 groups of youth with CF were analyzed: 1) a cross-sectional group with glucose (G) and insulin at 0, 30, 60, 90, and 120 min on OGTT and 2) longitudinal data from retrospective chart review of youth with >1 OGTT with 0, 1hG, and 2hG. In group 1, metabolic parameters sigma (primarily 2nd phase insulin secretion) and Si (primarily peripheral insulin sensitivity) were estimated by fitting the differential equations of a model for progression to diabetes (Ha et al, 2016) to the OGTT. β-cell mass and 1st-phase secretion were reduced to account for group-wide low insulin secretion. Participants were grouped by 1hG (< /≥155 mg/dl) vs traditional 2hG (< /≥140 mg/dl) criteria for normal glycemia/prediabetes. Boxplots were compared between groups. In group 2, linear mixed effect (LME) models were applied to identify 1hG cutpoints that predict prediabetes, and the model of Ha et al was applied.

Results: In group 1, 65 CF youth were included: n=27 (42%) M, mean±SD age=13.5±3.5 yrs, BMI z-score=-0.06±0.8, FEV1=94±17%, 1hG=211±62 mg/dl, 2hG=157±49 mg/dl. Sigma did not differ between those with 2hG < 140 vs. ≥140 (p=0.08). However, sigma was lower in those with a high vs low 1hG (p=0.009) despite normal 2hG. There was no difference in sigma or Si between those with high 1hG vs those with prediabetes or diabetes. In group 2, 192 CF youth were identified and followed for a mean of 3.7±1.9 yrs from initial OGTT. With LME, mean 1hG=166mg/dl when 2hG=140 mg/dl. Those with low 1hG (< 166mg/dl) had higher sigma compared to those with high 1hG (p< 0.0001) despite normal 2hG.

Conclusions: Traditional 2hG diagnostic criteria on OGTT misses individuals at high risk for CFRD. An elevated 1hG better identifies at risk individuals than 2hG.

Figure 1a.

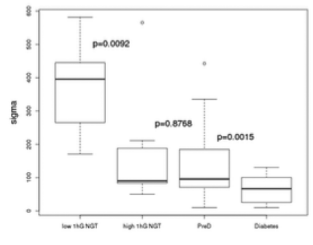
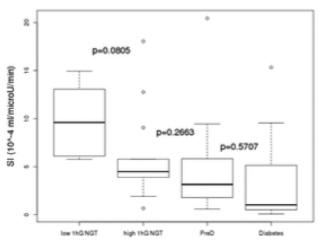


Figure 1b.



[Group 1 a) Sigma and b) Si differences in CF youth with low 1hr, high 1hr, prediabetes, and diabetes]

P356
Clinical characteristics of patients referred for HNF1B testing - Polish population study

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Objectives: To analyze probands referred for *HNF1B* genetic testing and compare those with positive and negative findings.

Methods: Probands tested for *HNF1B* in years 2005-2018 were selected from Polish Registry for Pediatric and Adolescent (N=50). All genetic findings were reassessed according to the criteria of the American College of Medical Genetics and Genomics (ACMG). A structured medical interview was performed with all available individuals and/or their physicians. For each patient, *HNF1B*-score was calculated based on available clinical information.

Results: The study included 36 unrelated probands (28% lost to follow-up): 14 with pathogenic or likely-pathogenic variants in *HNF1B* (six whole-gene deletions, one indel, five single nucleotide variants), one with a variant of uncertain significance and 21 negative for *HNF1B*. HNF1B-score with recommended cut-off distinguished patients with and without *HNF1B* findings with 100% sensitivity and 47.6% specificity. Presence of polycystic kidneys (OR=9.17, 95% CI:1.87-44.92), pancreatic abnormalities (OR=15, 95% CI:1.55-145.23), elevated liver enzymes (OR=15, 95%CI: 1.55-145.23) best discriminated *HNF1B*-positive cases from the negative ones. Presence of impaired glucose metabolism coupled with kidney disease in the proband and one parent parent was also highly suggestive of *HNF1B*-findings (OR=11.11, 95%CI: 1.13 - 109.36).

Conclusions: Patients referred for *HNF1B* testing present very heterogenous phenotypes. Despite suggestive characteristics, many do not harbor mutations in *HNF1B* warranting further investigations into the genetic basis of the RCAD syndrome. Detailed medical interview may enable more accurate patient selection for targeted genetic testing.

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P357
Clinical and laboratory features of patients with heterozygous CEL mutation (p.I488T)

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Objectives: The enzyme carboxyl ester lipase (CEL) is normally secreted by the exocrine pancreas, and is diverted within the intestinal lumen to participate in the hydrolysis of dietary lipids. Variants of CEL gene resulting from germline and/or somatic mutations (nucleotide insertion/deletion or nonallelic homologous recombination) are expressed in the pancreas of patients with pancreatic pathologies such as chronic pancreatitis, MODY-8, pancreas malignities. We

aimed to investigate a possible correlation between CEL gene variants in patients with IGT and diabetes and clinical features.

Material and methods: 3 children aged 9-12 years and 3 adults aged 30-42 years

presented with hyperglycemia, abdominal pain, weight loss, polyuria and polydypsia were investigated. CEL gene was screened by next generation sequencing and results were evaluated in slico analysis. Fecal elastase levels were measured in all patients and their parents, and pancreas MRI was evaluated in all patients .

Results: We found heterozygous single base mutation (p.I488T,-CADD:25.6) in exon 10 of CEL gene in six patients and their parents. Fecal elastase, which is the hallmark of CEL deficiency, was very low in all patients. The same mutation and fecal elastase deficiency were found in the mother of one child and the father of two patients. Pancreatic lipomatosis was detected in two adult patients.

Conclusion: This mutation has not been reported in the literature in patients with MODY8. According to in slico analysis, this mutation is described most likely as disease causing variant.

P358
Permanent neonatal diabetes - characteristics, clinical and genetic diagnosis in Kosovo

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Neonatal diabetes mellitus (NDM) is a rare genetic condition with an incidence of 1 in every 150,000-500,000 live births, used to describe diabetes with onset before 12 months-of-age.

Background: Wolcott-Rallison syndrome (WRS) is caused by recessive EIF2AK3 mutations and characterized by early-onset diabetes, multiple epiphyseal dysplasia and other clinical manifestations, including recurrent episodes of acute liver failure, renal dysfunction, exocrine pancreas insufficiency, intellectual deficit, hypothyroidism, neutropenia and recurrent infections.

Aims: To describe a cohort of Neonatal Diabetes patients and discuss clinical manifestation, management and comorbidities.

Methods: Detailed phenotyping and molecular genetic testing were conducted in all patients.

Results: Nine patients were identified and genetically confirmed (5 girls and 4 males; mean age 2 months). 4 patients were identified with Homozygous mutation in gene EIF2AK3, Exon 13, protein p.Arg902Ter (p.R902*) and 3 patients died from fulminant hepatitis in the family were both parents were carrier of EIF2AK3 mutations, in total 7 patients with Wolcott Rallison syndrome. 1 patient was identified with *de novo* heterozygous mutations in *GATA6* gene (c.701delC) with clinical manifestation of exocrine pancreatic insufficiency, cardiac anomalies, agenesis of pancreas and billiary tract. 1 patient was identified with ABCC8 missense mutation, p.Pro1199Leu, in the SUR1 subunit of the KATP channel and transfer to sulphonylurea therapy has been successful.

Conclusions: Correctly identifying monogenic NDM has important implications for appropriate treatment, expected disease course and associated conditions, and genetic testing for at-risk family members. Liver disease in WRS is more frequent than previously described and carries high mortality. Early recognition of monogenic NDM allows for the implementation of appropriate therapy, leading to improved outcomes and potential societal cost savings.

P359
Case study of monogenic diabetes mellitus caused by *RFX6* mutation in a 14-year-old female patient

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Introduction: It is crucial to find genetic cause of diabetes mellitus to understand the glycemic regulation as well as the management of diabetes mellitus. Recently, the incidence of type 2 diabetes was increased explosively in children and adolescents. The underlying mechanism of childhood-onset type 2 diabetes mellitus may be different from the adult-onset type 2 diabetes. Therefore, it is important to investigate the genetic cause in children with type 2 clinical features.

Case: A 14-year-old girl was diagnosed as having type 2 diabetes mellitus. Initial HbA1c was 11.7%. Her weight was 66.3kg (95 percentile) and height was 148.3cm (3 percentile). Acanthosis nigricans was detected in neck and axillary areas. Blood glucose, insulin, and C-peptide were 345 mg/dL, 27.2 uIU/mL, and 8.7 ng/mL, respectively. There was neither ketonuria nor acidosis. Blood lipid profile showed 200 mg/dL of cholesterol, 45 mg/dL of HDL cholesterol, and 144 mg/dL of triglyceride. Thyroid function was normal, and there was no autoantibody related to type 1 diabetes mellitus. She was managed with long-acting insulin and oral hypoglycemic agent. Her mother was already diagnosed as diabetes mellitus. To find the candidate gene, targeted exome sequencing which included 29 genes associated with monogenic diabetes was performed. Nonsense mutation of the gene *RFX6* was found (c.2661T>A, p.Tyr887*). Her mother showed the same mutation of *RFX6* gene. The gene Regulatory factor X6 (*RFX6*) is known to be associated with the development of beta cells in the pancreas and plays an important role in the biosynthesis and secretion of glucose-dependent insulinotropic polypeptide (GIP). In the presence of the *RFX6* gene mutation, the GIP decreases after a meal, resulting in impaired insulin secretion.

Conclusion: This study reports a case with monogenic diabetes mellitus caused by *RFX6* mutation in a 14-year-old female patient.

P360
The clinical and genetic characteristics of permanent neonatal diabetes mellitus (PNDM) in the State of Qatar

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Background: Neonatal diabetes mellitus (NDM) is a rare condition that occurs within the first six months of life. Permanent NDM (PNDM) is caused by mutations in specific genes that are known for their expression at early and/or late stages of pancreatic beta- cell development, and are either involved in beta-cell survival, insulin processing, regulation, and release. The native population in Qatar continues to practice consanguineous marriages that lead to a high level of homozygosity. To our knowledge, there is no previous report on the genomics of NDM among the Qatari population.

Objectives: The aims of the current study are to identify patients with NDM diagnosed between 2001-2016, and examine their clinical and genetic characteristics.

Methods: To calculate the incidence of PNDM, all patients with PNDM diagnosed between 2001 and 2016 were compared to the total number of live births over the sixteen-year period. Whole Genome Sequencing (WGS) was used to investigate the genetic etiology in the PNDM cohort.

Results: PNDM was diagnosed in nine (n=9) patients with an estimated incidence rate of 1: 22,938 live births among the indigenous Qatari. Seven different mutations in six genes (*PTF1A*, *GCK*, *SLC2A2*, *EIF2AK3*, *INS*, and *HNF1B*) were identified. In the majority of cases, the genetic etiology was part of a previously identified autosomal-recessive disorders. Two novel *de novo* mutations were identified in *INS* and *HNF1B* genes.

Conclusion: Qatar has the second highest reported incidence of PNDM worldwide. The majority of PNDM cases present as rare familial autosomal-recessive disorders. Pancreas associated transcription factor 1a (*PTF1A)* enhancer deletions are the most common cause of PNDM in Qatar, with only a few previous cases reported in the literature.

P362
Searching for monogenic forms of diabetes among consanguineous families using whole exome sequencing (WES): lessons learned from an Iraqi Kurdish cohort

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Objectives: The genetic spectrum of monogenic diabetes differs according to the level of consanguinity. While MODY and monoallelic neonatal diabetes prevail in low-consanguineous areas, syndromic diabetes with an autosomal recessive mode of inheritance is typical for high-consanguineous areas. WES offers a promising tool to identify novel gene variants and even new candidate genes.

Methods: We studied 46 Kurdish consanguineous families with children affected by a diverse spectrum of endocrine conditions. Among them, four families had children with non-autoimmune diabetes. These children underwent WES with subsequent bioinformatic analysis and confirmative Sanger sequencing.

Results: We elucidated causative gene variants in three families. (1) A girl with diabetes since age 12 years, hypertrichosis, acanthosis nigricans and dysmorphic features has a biallelic pathogenic variant p.Thr937Met(c.2810C>T) in *INSR* causing leprechaunism. (2) Two siblings with short stature and diabetes (girl since age 7 years, boy since age 12 years) carry a novel biallelic variant p.Ile863Met(c.2589C>G) in *WFS1* causing Wolfram syndrome. (3) A 12-year old girl with short stature, diabetes, hepatosplenomegaly and camptodactyly has a biallelic variant p.Leu349Serfs*56(c.1045delC) in *SLC29A3* known to cause histiocytosis-lymphadenopathy plus syndrome. (4) We have not yet elucidated the cause of neonatal diabetes and congenital hypothyroidism in two brothers.

Conclusion: WES enables the elucidation of pathogenic variants in genes that cause syndromic diabetes. Consanguineous families represent a reservoir for the discovery of new causative genes. However, complex phenotypes (e.g., diabetes and hypothyroidism as in family 4) burden the hunt for causative variants, as even phenotypically similar siblings share a whole set of biallelic gene variants that may independently co-contribute to their clinical presentation.

Acknowledgements: This study is funded by AZV grant number NV18-01-00078.

Poster Tour 23 - Childhood Obesity & Type 2 Diabetes, Associated Diseases, and Other Forms of Diabetes

P363
Targeted sequencing identified rare genetic variants in non-syndromic early-onset obesity among Taiwanese children

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Objectives: Childhood obesity is an emerging health issue around the world and poses threats on an affected individual's lifelong morbidities. Despite its high heritability particularly shown in early-onset cases, the genetic causes remain largely unknown. Genetic contributions should be clarified when individualized therapeutic interventions are needed. The aim of this study was to identify the genetic causes of obesity among a clinical cohort of Taiwanese patients using high-throughput sequencing targeted at the satiety pathway.

Methods: Patients aged 4-18 years with a body mass index (BMI) ≥95th percentile for age and sex were recruited from a pediatric endocrinology clinic. A multiplex polymerse chain reaction (PCR) method was used to amplify the targeted genetic regions pre-selected in the leptin/melanocortin pathway. Pooled genomic libraries were barcoded and sequenced on an in-house next-generation sequencer. Further, we used integrated computing programs to call out the rare genetic variants (GVs) with an allele frequency < 0.1% in the East Asian population. All the identified GVs were confirmed by the Sanger sequencing.

Results: In 7 out of 48 obese patients surveyed, we identified a total 7 GVs that were rare in allele frequency and predicted to be likely pathogenic. These rare pathogenic GVs were scattered in 7 different genes, i.e. POMC, PCSK1, SIM1, NTRK2, MAGEL2, M3CR and FTO genes. No homozygosity or co-occurrences of these GVs were found. There was no difference in BMI and eating behaviors between those with and without these GVs.

Conclusions: Heterozygous GVs in the satiety pathway may explain a portion of early-onset obesity among Taiwanese children. Genetic testing with the use of high-throughput sequencing is feasible in identifying the genetic causes and therefore could be helpful to individualize the health care for the obese children. Further research is needed to validate the molecular functions of these GVs.

P364
Spinning the habit-loop : childhood obesity

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Introduction: Habitual excessive eating is the most significant contributory factor in childhood obesity.

We explored options to remodulate this habit loop by providing and reinforcing alternatives to excessive eating habit

Objectives:

- To identify & follow a cohort of patients where "excessive eating" was the only cause for obesity in a child.
- To demonstrate the "habit-loop" of excessive-eating, using "Cue-Routine-Reward" (Craving) model.
- To replace the routine of excessive eating by healthier, feasible and individually appealing alternatives (healthier food, recreational activity, recognition)
- To quantitatively re-access the BMI and spin the loop with continued positive re-enforcements.

Methods: A community based hospital, run by public health England and funded by NGO was chosen to recruit patients. 210 patients were identified, where "excessive eating" was the only identifyable factor.

A team of dieticians & psychologists then explained and demonstrated the "habit-loop",

Cue (thought /sight / smell of food) — routine (Excessive eating) — reward (satisfaction)

We, subsequently, simply offered patients to replace ROUTINE (Excessive eating) with a healthier, feasible & acceptable alternative, like:

- healthier food (list recommended by dietician)
- recreational activity (list recommended by psychologist)
- alternative routines (list recommended by parents / patients themselves)

Results: 210 patients were followed over 2 years, managed by multidisciplinary team based at community NHS base.

Average reduction in body weight was 22%, (average BMI reduction of 18%)

Most importantly, compliance was good and cost was minimal.

Conclusions:

- Most cases of childhood obesity are due to habitual "excessive eating"
- This habit loop can be remodulated by providing a structured, evidence-driven list of "alternative" routines to spin the **CUE-ROUTINE-REWARD habit loop**.
- This model is easy to set-up, has excellent compliance rate and minimal cost implications.

P365
Body fat and insulin sensitivity predict endothelial function and subendocardial viability in healthy, non-hispanic white adolescents

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Background and Objectives: Cardiovascular disease has its origins in adolescence. Endothelial dysfunction, arterial stiffness, and decreased endocardial oxygen supply: demand ratio are early functional markers of cardiovascular risk. This study was designed to determine their relationship to inflammatory and metabolic markers in healthy, non-Hispanic, white adolescents.

Subjects and Methods: 34 of 75 subjects were female. Age was 15.0 ±1.7 years and body mass index (BMI) was 22.0±5.8 kg/m^2 (mean ±SD). Reactive hyperemia (RH) was measured using venous occlusion plethysmography. Arterial tonometry was used to measure the augmentation index (AIx_{75}) and the Buckberg subendocardial viability ratio (BB). Blood samples were taken to measure inflammatory and lipid markers and oral glucose tolerance test was used to assess insulin sensitivity (ISEN) and secretion.

Results: RH was not related to age or sex and decreased as BMI, BMI percentile, percent body fat (FAT%), waist circumference and fat mass increased but was not related to fat-free mass. RH also decreased with increased neutrophil count but was not related to white blood cell count, CRP, IL6, lipids, ISEN, insulin secretion, disposition index, endothelin 1, or PAI-1. BB was higher in males and was positively related to insulin sensitivity and negatively related FAT% and white blood cell count even when accounting for age and sex. When FAT% and ISEN were considered together, ISEN and sex but not FAT% continued to predict BB. BB was negatively related to heart rate. When heart rate was included both heart rate and ISEN, but not sex, predicted BB. AIx_{75} was not related to any of the body habitus or metabolic variables.

Conclusions: These results demonstrate that increased fat mass and decreased insulin sensitivity are related to poorer vascular function and cardiac risk in healthy adolescents. Endothelial function is related to body fat while cardiac muscle oxygen supply is related to insulin sensitivity.

P366
Leptin gene methylation status in Egyptian infants

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Background: Obesity results from interactions between environmental and genetic factors. To date, more than 40 genetic variants have been associated with obesity and fat distribution. However, since these variants do not fully explain the heritability of obesity, other forms of variation, such as epigenetics marks, must be considered. DNA methylation is one of the best-understood epigenetic mechanisms and an important programming mechanism of the genome, in which cells and tissues can adapt to past and present environmental exposures. The methylation of the leptin gene promoter suppresses its expression and decrease in leptin production is highly associated with obesity

Objectives: The study aimed to study the leptin gene methylation status in six-month-old cohort of Egyptian infants.

Methods: The study was carried on 50 infants aged 6-month-old, attending the outpatient clinic of Alexandria University Children's Hospital. All infants joined the study were subjected to full history taking, thorough clinical examination stressing on anthropometric measurement. Peripheral blood samples were taken for genetic analysis to study the methylation status of leptin gene promoter by methylation-specific polymerase chain reaction (MS-PCR) at 31 nt at 51 nt loci.

Results: Out of 50 infants, 25 were exclusively breastfed and 25 were artificially fed. A significantly higher percentage of formula fed infants were methylated in leptin gene promoter at 31 nt locus compared with breastfed infants. Also, infants with methylated leptin gene promoter at t 51nt locus had significantly higher weight for length standard deviation score compared to infants with un methylated gene.

Conclusion: Leptin gene is unmethylated in breastfed infants compared to formula-fed infants. So epigenetics mechanisms could play a role in development of obesity.

P367
High-fat diet accelerates extreme obesity with hyperphagia and severe glucose intolerance in female heterozygous *Mecp2* null mice

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Introduction: Rett syndrome (RTT) is a neurodevelopmental disorder caused by mutation of the methyl-CpG-binding protein 2 (*MECP2*) gene, and has been associated with obesity. MeCP2 has a critical role for regulation of transcription.

Objectives: The aim was to elucidate the mechanism underlying the obesity observed in female heterozygous *Mecp2* null mice, a model of RTT.

Methods: We examined the change in molecular signaling of food intake regulation in the reward system and hypothalamus, and eating behavior of female heterozygous Mecp2 null mice (Mecp2$^{tm1.1Bird/J}$, *Mecp2*$^{+/-}$ mice) fed a normal-chow diet (ND) or a high-fat diet (HFD) for 12 weeks since 4 weeks of age.

Results: *Mecp2*$^{+/-}$ mice fed a ND (*Mecp2*$^{+/-}$-ND mice) did not showed obesity and hyperphagia. However, *Mecp2*$^{+/-}$ mice fed a HFD (*Mecp2*$^{+/-}$-HFD mice) showed extreme obesity with hyperphagia since 7 weeks of age, and severe glucose intolerance and insulin resistance. A conditioned place preference test revealed that *Mecp2*$^{+/-}$ mice greatly preferred HFD than WT mice. *Mecp2*$^{+/-}$-ND and *Mecp2*$^{+/-}$-HFD mice showed significantly decreased *tyrosine hydroxylase* mRNA levels in the ventral tegmental area, and decreased dopamine receptor and *dopamine and cAMP regulated phosphoprotein 32* (*Darpp32*) mRNA levels in the Nucleus accumbens compared with those of WT-ND and WT-HFD mice. *Mecp2*$^{+/-}$-HFD mice showed most severe dysfunction

of dopamine reward system in the four groups. *Mecp2*$^{+/-}$-ND mice did not showed dysregulation of food intake in the hypothalamus. However, proopiomelanocortin (POMC) protein expression in the hypothalamus was significantly lower in the *Mecp2*$^{+/-}$-HFD mice than in the WT-HFD mice, although phosphorylation of STAT3 in the hypothalamus was higher in the *Mecp2*$^{+/-}$-HFD mice than in the WT-HFD mice.

Conclusions: The HFD induced severe dysregulation of food intake in the dopamine reward system and hypothalamus and accelerated extreme obesity with addiction-like eating in the *Mecp2*$^{+/-}$ mice.

P368
The usefulness of genotyping of celiac disease specific HLA among children with type 1 diabetes in various clinical situation

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The aim of study was to determine the usefulness of HLA DQ2/DQ8 genotyping in children with type 1 diabetes in various clinical situations: as a screening test at the diabetes onset, as verification of the diagnosis in doubtful situations and as a test allowing to estimate the risk of developing CD in future.

Materials and methods: The study group included: children with newly diagnosed diabetes (group I, n=92, prospectively collected), children with CD with villous atrophy (group II, n=30) and children with potential CD (group III, n=23). Genetic tests were performed (commercial test, PCR, REX) and clinical data were collected in all children.

Results: The results of genetic tests confirmed the presence of typical haplotypes HLA DQ2/DQ8 in 94% children with diabetes (group I) and in 100% of children with diabetes and CD (group II and III). Comparative analysis of the distribution of HLA DQ2/DQ8 haplotypes in groups did not show any differences. Allele DRB1*04 (linked with HLA DQ8) was significantly less common in children with diabetes and CD (group I vs group II and III, 56.5% vs. 24.5%; p=0.001). The probability of developing CD in DRB1*04-positive patients was 4-times lower (OR 0.25; 95% CI: 0.118-0.529; p=0.001). DRB1*04 was also significantly less frequent in children with villous atrophy compared to potential CD (13% vs 39%; p=0.03). The age of diabetes onset in children who developed CD was significantly lower (5.41 vs 9.99 years, p< 0.05) and the probability of developing CD below 3.5 years was 3-times higher (OR 2.868; 95% CI: 1.304-6.309; p=0.008).

Conclusions: Genotyping HLA DQ2/DQ8 as a negative screening has limited use in assessing the risk of CD at diabetes onset, and does not allow to verify the diagnosis of CD in doubtful situations. The presence of the DRB1*04 allele modulates the risk of CD - significantly reduces it and can predict a potential form.

P369
Is there a connection between type 1 diabetes and autism? The prevalence of autism in children with type 1 diabetes and differences in phenotype and biomarkers at diabetes diagnosis

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Objectives: Sweden is known for having a high prevalence of Type 1 diabetes (T1D), an autoimmune disease with unknown triggers and diverse characteristics between patients. Studies have investigated the comorbidity between Autism Spectrum Disorder and T1D with conflicting results.

The aim of this pilot study was to examine the possibility of a connection between T1D and ASD. For this, the prevalence of ASD in children with T1D was studied and the gender distribution, age, HLA-risk type, autoantibody profile, HbA1c, and C-peptide at T1D diagnosis were compared in patients with only T1D to those with comorbid ASD.

Methods: Information on HLA, islet autoantibodies (GADA, IA2A, IAA, and ZnT8A), C-peptide and HbA1c were gathered from The national Better Diabetes Diagnosis database, generating a study population of 1340 patients with diabetes debut between 2005 and 2017, in Scania, Sweden. Medical records were examined to find patients with comorbid ASD. The prevalence of ASD was compared with the healthy childhood population (1% reported by previous Swedish publications), and the autoantibody profile and HLA risk group in patients with T1D with and without ASD was compared with Fischer´s exact test.

Results: A total of 1210 patients had T1D, whence 36 patients (26 boys) with comorbid ASD. The prevalence of ASD in patients with T1D was 3% higher than the prevalence of ASD in comparison with the general population (1%). Comorbid T1D and ASD were more common in boys (3.8%) than girls (1.9%) (*p=0.045*). There was no significant difference regarding autoantibody profile, HLA-risk group, HbA1c or C- peptide between the two groups.

Conclusion: The pathogenesis behind both T1D and ASD is not fully elucidated. Our results of an increased prevalence of ASD in the T1D population promote further research on a possible connection between the two diagnoses. A larger study cohort would be of interest to evaluate the difference in HbA1c, C- peptide, autoantibody profile, and HLA-risk group.

P370
Anti-GAD associated auto-immune neurological disease in children with type 1 diabetes mellitus: a case series from Scotland

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Introduction: Glutamic-acid decarboxylase (GAD) 65 is an intracellular protein found in the central nervous system (CNS) and in pancreatic β-cells. Antibodies to GAD (anti-GAD) are found in 80% of patients with type 1 diabetes mellitus (T1DM) and, rarely, anti-GAD can be present in auto-immune neurological disorders. We present three cases from Scotland of patients with T1DM, who developed different forms of auto-immune neurological disease associated with raised anti-GAD.

Case presentations:

Case 1: An 8-year old boy presented with an episode of cerebellar ataxia prior to his diabetes diagnosis aged 11. He represented aged 17 years and was diagnosed with anti-GAD associated cerebellar ataxia. Cases 2 and 3 developed neurological symptoms after diabetes onset.

Case 2: A 7-year old boy presented with choreiform movements and behavioural changes. His abnormal EEG and raised anti-GAD prompted a diagnosis of auto-immune encephalitis (AIE).

Case 3: A 9-year old girl presented with focal seizures with laryngospasm and facial weakness. Raised anti-GAD and abnormal positron emission tomography scan confirmed the diagnosis of AIE.

Results: Case 2 was treated with steroid therapy and symptoms resolved after six months. The other two patients responded to IV immunoglobulin (Ig). A recurrence of seizures in case 3 was successfully treated with further IVIg. Two patients are neuro-developmentally normal, while case 2 remains cognitively impaired, which was noted prior to diagnosis of AIE and T1DM.

Discussion: The link between pancreatic and CNS anti-GAD effects remains unclear. Anti-GAD may be a marker of auto-immune disease rather than directly pathogenic. Most patients with T1DM have anti-GAD, but a minority develop neurological disorders. Conversely, most patients with anti-GAD neurological disorders do not develop T1DM. In patients with T1DM presenting with neurological symptoms this rare aetiology should be considered as there may be important treatment implications.

P371
The relationship between insulin-like growth factor-1 and markers of bone turnover in children and adolescents with T1D for > 1 year

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Objectives: Type 1 diabetes mellitus (T1D) have been linked to impaired height, but in a new large study, height is not affected. Insulin-like growth factor-1 (IGF-1), a mediator of growth hormone, have been reported decreased in T1D. Markers of bone turnover have also been shown to be affected in children and adolescents with T1D but only rarely investigated in relations to IGF-1.

Methods: IGF-1 was measured by Human IGF-1 immunoassay from Quantikine®. To convert results into appropriate paediatric Z-scores, results were converted into NIBSC/WHO 02/254 values (NIBSC/WHO (02/254) value = 1.54 x Quantikine IGF-I value). Markers of bone formation osteocalcin (OCN) and procollagen type 1 amino terminal propetide (P1NP), and the bone resorption marker C-terminal cross-linked telopeptide (CTX), were converted into Z-scores using new national references.

Results: A total of 249 participants (47% girls) with a mean HbA1c of 63.3 mmol/mol had IGF-1 measured. Of these, 164 had Z-scores of the bone turnover markers evaluated. Mean IGF-1 Z-score was 0.59, significantly higher than the reference population (P< 0.001). Z-scores for all three bone markers were decreased compared to the reference population (P< 0.001 for all). Unadjusted, IGF-1 Z-score were positively correlated to both OCN Z-score (P=0.014) and P1NP Z-score (P=0.031). HbA1c was negatively associated to IGF-1 adjusting for daily insulin dose, weight and IGFBP-3 (P=0.004). Participants with the highest quartile of IGF-1 had a tendency toward higher bone turnover markers, and CTX- and P1NP Z-scores no different from healthy peers.

Conclusions: In contrast to previous reports, we demonstrate increased IGF-1 Z-scores, perhaps reflecting the improved T1D treatment. There was a significant and positive relationship between IGF-1 and both OCN- and P1NP Z-scores but not with CTX Z-score. Those with the highest quartile of IGF-1 only had decreased OCN Z-scores indicating a more beneficial turnover of bone when IGF-1 is high.

P372
Thrombogenicity in children with type 1 diabetes - a case control study

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Objectives: Type-1 diabetes(T1D) is associated with atherothrombosis and accelerated risk of cardiovascular disease. Limited data exist on thrombogenicity in T1D children. We aimed to investigate thrombogenicity in T1D children compared to controls, gender differences and associations to HbA_{1c}.

Methods: The study comprises 314 T1D children and 120 healthy controls, followed for 5 years. Tissue-factor-procoagulant-activity(TF-

PCA), tissue-factor-pathway-inhibitor(TFPI), prothrombin-fragment 1+2(F1+2) and D-dimer were analysed with ELISA-methods.

Results: F1+2, D-dimer and TF-PCA did neither differ between the groups nor correlate with HbA_{1c} in T1D. TFPI levels were significantly higher in T1D children than controls, both at inclusion and at follow-up (both p< 0.001). In the T1D children TFPI correlated to HbA_{1c} at both time-points (r=0.221 and r=0.304, both p< 0.001). T1D children with the highest quartile of HbA_{1c} (inclusion >9.0%/ 5 years >9.8%) had an odds ratio of 2.1 (95%CI 1.2, 3.8), and 5.4 (2.8,10.2), respectively, for having high TFPI levels compared to the three lower quartiles. Diabetic-females using oral contraceptives(OC), had significantly elevated levels of F1+2, D-dimer and TF-PCA, and lower TFPI levels at follow-up (all p< 0.005) and diabetic-females had significantly lower TFPI levels (p=0.017) and higher F1+2 compared to males (p=0.052), after adjusting for use of OC.

Conclusion: The current study shows comparable thrombogenicity in T1D children compared to controls over a five years period, indicating that T1D children are not at high thrombotic risk at this low age. However, the elevated levels of TFPI in T1D children compared to controls, also related to hyperglycaemia, are probably reflecting increased endothelial activation. Diabetic-females were more procoagulant than males. Our findings underscore the significance of T1D children, especially women, to aspire optimal blood glucose-control also with regard to thrombogenicity.

Posters on Display – Childhood Obesity & Type 2 Diabetes, Associated Diseases, and Other Forms of Diabetes

P373
HbA1c progression and risk factor analysis in youth with type 2 diabetes

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Youth with type 2 diabetes (T2D) develop early treatment failure to metformin. Identification of risk factors for poor glycemic control can alter treatment plan and reduce diabetes-related complications.

Objectives: To determine HbA1c (A1c) progression in youth with T2D and identify risk factors for poor glycemic control.

Methods: We performed Kruskal-Wallis test, Spearman correlation, repeated ANOVA, latent growth models, and pairwise two-sided multiple comparison analyses on registry data from 211 patients who attended a dedicated T2D clinic in an urban children's hospital.

Results:

1. Demographics: The mean age of our cohort was 16.6±2.6 years, with a median diabetes duration of 2.3±2.6 years. 80% self-identify as Hispanic.
2. A1c progression: Mean A1c improved within the first 7 months after diagnosis but started to rise thereafter. By 24 months, the mean A1c was indistinguishable from the initial A1c. Only 58% of patients achieved the A1c target of 7% one year after diagnosis. Latent growth analysis showed a divergent response in A1c by 7 months: A1c declined rapidly for subjects who attained glycemic control (A1c< 6.5%) at one year, but remained elevated for subjects with uncontrolled diabetes (A1c>8%) at one yr.
3. Risk factor analysis: The presence of DKA at diagnosis was not associated with A1c level at one year. The level of A1c and urine microalbumin at diagnosis, as well as reduction in BMI correlated positively with A1c outcome at one year. Amongst subjects who were prescribed metformin, the addition of multiple daily injections had little impact on glycemic outcome compared to those on basal insulin only.

Conclusions: Our findings highlight the heterogeneity in clinical response early in the treatment of youth with T2D. Risk factors for uncontrolled diabetes include elevated urine microalbumin at diagnosis and lack of A1c improvement by 7 months. Simplified insulin regimen may render comparable glycemic control as intense insulin regimen.

P374
Type 2 diabetes clinic improves quality of life, patient satisfaction and BMI

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Objectives: To evaluate quality of life (QL), patient satisfaction and Body Mass Index (BMI) in a comprehensive type 2 diabetes (T2D) clinic model for children and adolescents.

Methods: Pediatric quality of life (PedsQL), and patient satisfaction questionnaires (PSQ) were collected from patients and parents attending the type 2 diabetes clinic in a large pediatric hospital at baseline, and every 6 months. A linear mixed-effect model was used to test for the relationship between each outcome of interest (general QL and diabetes-related QL), with visit number after adjusting for patient characteristics. BMI was evaluated before and after participation in a community based weight management program and compared with matched controls that did not participate in the program. Wilcoxon sign-rank test was used to examine BMI differences from baseline to last follow-up. Somers' D with confidence intervals and clustering was utilized to assess the differences in BMI and HbA1c between subjects and controls, adjusting for repeated measure and matched control.

Results: Patients reported better scores in the PedsQL at 6 months post-enrollment in the T2D clinic compared to their baseline score (General p=0.002 and Diabetes related p=0.001). Older patients and patients with higher HbA1c reported lower PedsQL scores. Participation in the weight-management program stabilized BMI, compared to rising BMI in control subjects ($p=0.040$). In general, the scores for patient satisfaction were high.

Conclusions: The implementation of a comprehensive T2D clinic to treat youth has the potential to improve quality of life and mitigate weight gain in a population that is at risk of developing diabetes-related complications early in life. More data needs to be collected to evaluate long-term effects of our new clinic model in HbA1c.

P375
Insulin resistance in children and adolescents infected with helicobacter pylori

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Introduction: Helicobacter pylori (H.pylori) infection is a common bacterial infection that affects the gastric mucosa of humans and is associated with severe gastrointestinal pathologies. Moreover it is associated with other conditions such as atherosclerosis, some autoimmune diseases and insulin resistance

Objectives: To study insulin resistance in children and adolescents infected with H. pylori.

Methods: Fifty children with H. pylori infection, and fifty age and sex matched normal c children were included. inclusion criteria were included children aged from five to sixteen years with H.pylori infection based on positive endoscopic biopsies and histological identification of H.pylori organism. Cases were excluded if they were diabetic or have renal failure or recent gastrointestinal tract surgery or received

complete H.pylori eradication therapy for 14 days. All children were subjected to full history taking and complete physical examination and laboratory investigations including fasting plasma glucose and fasting serum insulin level with calculation of homeostasis model assessment of insulin resistance (HOMA_IR) and liver enzymes. Abdominal ultrasound was done to all patients to detect presence of fatty liver.

Results: 7 children of the H.pylori positive group and 2 children of the H.pylori negative group had insulin resistance. There was no statistically significant association between the H pylori positive patients and insulin resistance compared to the H.pylori negative patients.

Conclusion: There is no statistically significant association between H.pylori infection and insulin resistance in children and adolescents.

P376
Diagnosis of polyglandular autoimmune syndromes (PAS) in diabetic children and their siblings

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Introduction: Polyglandular autoimmune syndromes (PAS) are defined as a dysfunction of at least two endocrine glands. Patients with the autoimmune disease diabetes mellitus type 1 (DM1) are more likely to develop an additional autoimmune condition. Furthermore, autoimmune diseases are likely to be present in the family members of DM1 patients. The aim of this investigation was to assess the prevalence of PAS in pediatric patients with DM1 and their siblings.

Material and methods: This study included 75 DM1 patients, 105 siblings without DM1, and 77 healthy children without autoimmune diseases in their family history. The occurrence of autoimmune thyroid diseases, Addison´s disease, and autoimmune hypophysitis were detected through physical examination and laboratory tests; the presence of other diseases was determined through their medical history.

Results: One in five patients with DM1 were diagnosed with PAS (n=16, 21.3%), most commonly PAS type III (n=10, 13.3%). In all cases, DM1 was the first diagnosed disease. In addition, 10.7% (n=8) of DM1 patients were found to be at risk of PAS development, as determined by laboratory tests. In the sibling group, one female subject was diagnosed with PAS III and six subjects were diagnosed with Hashimoto's thyroiditis (HT). In the control group, two females were diagnosed with HT and one male had Graves' disease (GD).

Conclusion: Our findings suggest that DM1 patients are at increased risk of PAS and their siblings are predisposed to the development of autoimmune disorders. Screening for autoimmune diseases is advisable for DM1 patients and their siblings.

P377
Study of subclinical hypothyroidism in children with type 1 diabetes mellitus and its relation to lipid profile

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Introduction: Thyroid dysfunction (TD) is more prevalent in patients with diabetes than in the general population. Subclinical hypothyroidism (SCH) is defined as having serum Thyroid Stimulating Hormone (TSH) levels above the reference range with normal thyroid hormones.The unrecognized TD may negatively affect the glycemic control and add more risk to an already predisposing scenario of dyslipidemia, hypertension and cardiovascular diseases.

Objectives: The aim of this work is to study the frequency of SCH among children with Type 1 Diabetes Mellitus (T1DM) and to evaluate the potential association of SCH with dyslipidemia in these patients.

Methods: This study included 50 children and adolescents with T1DM attending the diabetic clinic in Alexandria University Children's Hospital, Egypt. Thorough history taking and clinical examination were done with emphasis on age and duration of diabetes, and symptoms suggestive of hypothyroidism. Laboratory investigations were done including HbA1C, thyroid function tests and complete lipid profile.

Results: The cases included 22 (44.9%) males and 27 (55.1%) females; their mean age was 11.7 years. Six Patients (12.4%) with T1DM has SCH. Only 2 of them had positive anti-thyroperoxidase antibodies (anti-TPO) and all of them were negative to anti-thyroglobulin (anti-TG) There were no significant differences between the patients with SCH and euthyroid patients regarding the sex, age, duration of diabetes,anthropometric measurements, glycemic control, total cholesterol, LDL-cholesterol and HDL cholesterol. Patients with SCH had statistically significant higher mean of TG than euthyroid patients. A significant positive correlation was found between TSH and serum triglycerides. There was no significant correlation between TSH and TC, LDL and HDL cholesterol.

Conclusions: SCH is common in children with T1DM so we recommend careful screening for SCH and associated dyslipidemia in order to attenuate the cardiovascular disease risk.

P378
The influence of glycemic control on the menstrual disturbances in patients diagnosed with type 1 diabetes before menarche

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Objective: We evaluated the influence of glycemic control in type 1 diabetes (T1DM) with correlates for the age at menarche, duration of diabetes prior to menarche (Diabetes Age at Premenarche-DAP) and associated menstrual irregularities.

Methods: We retrospectively analysed data from T1DM cohort, part of CDE registry, under follow up for atleast 2 years, of age 10-40 years. Descriptive and inferential statistics were used for statistical analysis.

	Age at time of evaluation of HbA1c (years)	Age at the time of T1DM diagnosis (years)	Duration of diabetes at common time point of evaluation (CTP) (years)	Age at menarche (years)	Diabetes Age at Premenarche -DAP (years)	HbA1c at the CTP (%)
Mean (SD)	21 (6.2)	9.1 (3.1)	12 (6.5)	13 (1.2)	4 (3.3)	8.6 (1.7)
Maximum	35	14	29	15	13	14
Minimum	1	1	1	10	0	5
95 % CI	19 to 22	8.2 to 9.9	9.8 to 13	13 to 13	3.1 to 4.9	8.1 to 9.1

[Characteristics of the T1DM cohort diagnosed, before menarche]

Results: 53 patients analysed as irregular menstrual cycles group (IRC) (n=15) and regular menstrual cycles group (RC) (n=38) (Table 1). 31 patients (58.4%) had DAP more than 4 years. Mean HbA1c in group DAP ≤ 4 years (8.5 %) was lower as compared to DAP > 4 years 8.7 % (p=0.77 NS). Seven T1DM patients (13.2 %) were diagnosed T1DM in the same year as that of menarche, of these three patients reported irregular menstrual cycles. Among these seven patients, mean HbA1c in three patients with irregular menstrual cycles was 9.3 %, was higher as compared to mean HbA1c of 7.2% in four patients who had regular menstrual cycles. Mean DAP in IRC was 3 years, lower as compared to that in the RC 4.4 years. Mean HbA1c in the IRC 9.2 % was higher than in RC group 8.3 % (p=0.07 NS). Either of co-morbidities hypothyroidism and celiac disease were reported in 18 patients (33.9%).

Conclusion: 28.3% of the study population reported irregular menstrual cycles. Glycemic control has independent association with menstrual disturbance. We report an early menarche in T1DM (13 years) as compared with mean age in non-diabetic Indian women (13.76 years). Aggressive glycemic control initiated at time diagnosis of T1DM and the duration of diabetes of till menarche- diabetes age at menarche, are differential determinants for prediction of menstrual irregularities. Our study was performed in a single center. Therefore, collaborative studies from varied ethnic populations are needed to confirm our findings

P379
Coexistence of medium chain acyl-CoA dehydrogenase deficiency (MCADD) and type 1 diabetes (T1D): a management challenge

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Introduction: MCADD is an autosomal recessive fatty-acid β-oxidation defect. In MCADD, during periods of fasting or acute illness, there are insufficient ketones to compensate for the glucose energy deficit. Thus resulting in a hypoketotic hypoglycaemia. Therefore the accumulation of toxic fatty acids can lead to encephalopathy and sudden death. Our management included avoiding prolonged periods of starvation, consuming high carbohydrate drinks during periods of illness, alongside reversal of catabolism and sustained anabolism by provision of simple carbohydrates. Coexistence of MCADD and T1D is rare and there is no causal association. A key goal of management in T1D is achievement of good glycaemic control to reduce risk of long-term complications. This can in some cases increase the risk of hypoglycaemia, which can be catastrophic in the presence of MCADD.

Case presentation: We report a 15-year old boy diagnosed with MCADD at age 16-months who later developed T1D at age 12. His MCADD was managed with a frequent feeding regimen and high carbohydrate drink for emergencies (SOS). T1D was managed with multiple daily injection therapy as he refused sensor augmented insulin pump therapy. To avoid long periods of starvation, he was allowed a free snack of 15g between meals and insulin for snacks more than 15g. Advice remained to continue to use his emergency regimen SOS 20 (which contains 40g carbohydrate) during acute illness. His blood glucose target was initially set at 5-9 mmol/l but this was later reduced to 4-7mmol/l. His HBA1c varied between 43mmol/mol (6.1%) and 66mmol/mol (8.1%). He has had no moderate or severe hypoglycaemia. His care was shared between the diabetes team and inherited metabolic disease specialists.

Conclusion: Our case describes practical aspects of balancing the concurrent risk of hypoglycaemia whilst trying to achieve good glycaemic control, when T1D and MCADD coexist. Shared care between the specialist teams is vital to keeping the patients safe.

P380
Usefulness of DQ typing for coeliac disease screening in children and adolescents with type 1 diabetes: Blackpool, UK experience

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Background: Children with type1 diabetes are at an increased risk of developing Coeliac disease. NICE (National Institute of Health and Care Excellence) recommends screening of all type 1 diabetic children with Tissue Transglutaminase (tTG) antibody. According to the ESPGHAN (European Society for Paediatric Gastroenterology Hepatology and Nutrition), both HLA DQ2/DQ8 and tTG should be tested to screen for Coeliac Disease in Type 1 diabetes. The recent 2018 ISPAD guideline, however, does not recommend DQ typing for screening of coeliac disease in type 1 diabetes.

The aim of our study was to investigate the frequency and distribution of coeliac-specific HLA genotypes in Paediatric and adolescent patients with type 1 diabetes and to assess the usefulness of this testing.

Study design: HLA genotyping was performed in paediatric and adolescent patients with type 1 diabetes in Blackpool Teaching Hospitals, England, UK. The test was done by next generation sequencing (NGS). In our ongoing analysis so far, out of 76 patients, HLA typing was carried out in 53 patients. Forty-nine (92%) showed positive HLA DQ2 and/or HLA DQ8 genotypes. Thirty-eight per cent carried DQ2, 17% were positive for DQ8 and 45% were heterozygous for both DQ2 and DQ8. Seven per cent had no coeliac specific HLA markers. Four patients (7%) were diagnosed with coeliac disease.

Conclusion: The majority of paediatric patients with type-1 diabetes has positive coeliac-specific HLA genotypes DQ2 and/or DQ8. We wish to analyse approximately 120 type-1 diabetic patients currently registered with us to get more data.

At the current level of analysis, we conclude that DQ typing is not currently indicated for coeliac disease.

P381
The frequency of celiac disease in patients with type 1 diabetes - assessment of the 7-year observational 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 frequency of CD in children with T1D in a 7-year-long observational study.

Methods: 810 children were included to the study (401 girls and 409 boys, age 9/12-18 years) who were patients of the Department of Endocrinology and Diabetology The Children´s Memorial Health Institute in 2012-2018. In all the patients a serological screening of CD was performed (concentration of antibodies against tissue transglutaminase (tTG-IgA) and/or tTG-IgG or deamidated gliadin peptides (IgG-DGP) - in case of a deficit of total IgA). For patients with positive antibodies biopsy of the small intestine to evaluate it histopathologically was proposed. CD was diagnosed in children with characteristic histological changes evaluated in a Marsh-Oberhuber scale as at least Marsh II or in case of no changes as potential CD. In case of no agreement for biopsy and high concentration of antibodies (at least 10x upper limit) the CD was also diagnosed.

Results: CD was diagnosed in 61 cases (7,53%) out of 810 children, only 3 cases were diagnosed before T1D onset. CD was more frequent in girls (n=33, 54,10%) than in boys (n=28, 45,90%) and in those with earlier T1D onset (mean age of T1D onset 5,40±3,80 vs 8,72 ±4,32 years). At the T1D onset CD was diagnosed in 16 patients (27,59%), in 38 (65,51%) during the first five years of T1D, and in 4 (6,90%) after 5 years.

Conclusions: Patients with T1D are at higher risk for CD developing and should be regularly, optimally once a year, tested for CD using screening serological tests. Most of patients develop CD during first 5 years after T1D onset. After this period screening should be continued, especially in patients with unknown serological status for CD. unknown serological status.

P382
Relationship between chronic pancreatitis and diabetes mellitus: a retrospective analysis of 200 ERCP investigations in diabetic patients

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Background: Patients suffering from insulin dependent and non insulin dependent diabetes(IDDM and NIDDM) frequently suffer from pancreatic exocrine dysfunction.This is mostly described as a diabetic complication. On the other hand, diabetes secondary to chronic pancreatitis (CP) might be more common than believed so far.

Aim and objectives: Our study aims to determine association between chronic pancreatitis(CP) and diabetes.In this study we evaluated pancreatograms of patients with known diabetes mellitus in order to detect ductal morphology changes characteristic for CP.

Methods: 200 patients were enrolled from diabetic clinic of Sir Ganga Ram Hospital Lahore and Mayo Hospital lahore. Consecutive diabetic patients admitted for ERCP for different reasons were evaluated retrospectively concerning ERCP findings, especially pancreatic duct changes, diabetes type, duration and therapy.

Results: 200 patients (100 male, 100 female; mean age 55 years) were studied (50 IDDM; 150 NIDDM). Pancreatic ducts were classified as normal in 25%, CP I in 23%, CP II in 30% and CP◦III in 20%. The duct changes did not correlate with diabetes type, diabetes duration, diabetes therapy or age.

Conclusion: Chronic Pancreatitis is defined by morphological and functional changes, it can be concluded that a substantial number of patients with a primary diagnosis of diabetes mellitus have Chronic Pancreatitis as a concomitant disease or, more likely, as a cause for their diabetic state.

Keywords: Chronic pancreatitis Diabetes mellitus

P383
An unusual case of dual metabolic pathology

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Background: Glutaric aciduria type 1 (GA1) is an autosomal recessive metabolic disorder due to disruption of glutaryl-CoA dehydrogenase

in which the body is unable to break down the amino acids lysine, hydroxylysine, and tryptophan. It is characterized by gliosis and neuronal loss in the basal ganglia and a progressive movement disorder that often begins in the first year of life. There is only one report of a toddler with GA1 and diabetes mellitus.

Case presentation: 8-6/12 yr old female with GA1 presented with emesis and lethargy and was noted to have hyperglycemia (486 mg/dl) with lactic and ketotic acidosis (bicarbonate 15 mEq/L, lactate of 5.6 mmol/L), A1c 9.1% and insulin of 6 uIU/ml. GAD 65 ab positive 757 nmol/L and negative insulin and IA-2 ab. She required intravenous insulin with 10% dextrose to normalize her acidosis. She continued to require insulin to maintain normoglycemia. She had high blood sugars during a prior admission, but this self-resolved. In the 14 months since diagnosis, she has had intermittent hypoglycemia unrelated to insulin administration requiring multiple ER visits and hospitalizations. She continues to have elevated A1c. Her family is not adherent to her metabolic diet.

Discussion: This case shows the difficult multidisciplinary management of simultaneous metabolic disorders. It is difficult to maintain stable glycemia if GA1 is not controlled on low lysine diet, leading to hypoglycemia. Hyperglycemia can also precipitate neuro-metabolic crises. Both GA1 and insulin therapy can cause hypoglycemia. GA1 causes reduced alpha-ketogluterate levels entering the mitochondrial matrix, blocking gluconeogenesis.

Conclusion: GA1 and diabetes have serious complications due to unstable glycemic profile if not adequately managed. Since glucose homeostasis is necessary, adherence to metabolic diet prescribed for GA1 and use of insulin treatment to prevent glycemic excursions are necessary.

P384
Prevalence of overweight and obesity among children with type 1 diabetes treated with a continuous subcutaneous insulin infusion and its clinical impact on diabetic control

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It is estimated that c.a. 20-25% of children and adolescents in Poland are overweight and obese. Coexistence of T1D and overweight or obesity increases the risk of late chronic complications of diabetes. The aim of the study was to assess the prevalence of overweight and obesity in children and adolescents withT1D treated with insulin pump and their metabolic control.

There were enrolled 270 patients (124 girls) with mean age 13±5.7ys, diabetes duration 5.7±3.3ys and HbA1c 7.2±1.3%. All of them were on insulin pumps for more than1y. Overweight was defined as a BMI≥85th pc and< 95th pc, obesity as a BMI ≥95th pc. We analysed levels of HbA1c, cholesterol, HDL, LDL, triglyceride (TG), vitamin D3 (VD), systolic (SBP) and diastolic (DBP) blood pressure. Total daily insulin (TDD) and basal insulin dose were also analysed. The population was divided into groups depending on body weights: lean (L), overweight (W), obese (O).

	n	Girls
ALL	270	124 (45,9%)
W&O	62 (22,9%)	33 (53,2%)
W	39 (14,4%)	17 (43,5%)
O	23 (8,5%)	16 (69,5%)

[Prevalence of overweight and obesity.]

Obese occurs statistically more often in girls than boys (69.6% vs. 30.4%) p=0,04. Group O compared with L had statistically: higher median HbA1c 7.9[7.4;8.8]% vs.6.8[6.3;7.5]%, p< 0.0001, lower median VD 20[15;25]ng/ml vs. 23[18;29]ng/ml, p=0.020, higher median SBP126[120;134]vs.119[110;127]mmHg. Statistically higher median SBP was seen in group W compared to L 126[120; 130]mmHg vs.118[110; 126]mmHg p=0.0008. There were no significant differences between groups in cholesterol, LDL, HDL, TG, TDD and basal insulin dose.

Insulin pump therapy did not cause a significant increase in body weight in children with T1D. In the analyzed group, overweight and obesity occurred with a similar frequency as in the general Polish pediatric population. Insulin requirement in overweight and obese children was not increased, but it was more difficult for them to achieve the recommended metabolic control. It was especially expressed in the obesity group. Increased SBP was more common in children with obesity and overweight. Obese children had a lower level of vitamin D3 than lean children.

P386
The hyperosmolar state mixed with DKA is underrecognised and more severe in children with limited mobility

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Introduction: The hyperosmolar hyperglycaemic state (HHS) is associated with high rates of morbidity and mortality yet poorly defined in the paediatric population and typically thought of as a complication of adolescents with type 2 diabetes mellitus or infants with neonatal diabetes mellitus.

Objectives: We aimed to determine the frequency of cases of HHS mixed with DKA occurring in the paediatric population presenting with DKA. We aimed to delineate clinical features of these cases which might help highlight at risk groups who may require different clinical management pathways.

Methods: We retrospectively reviewed DKA presentations over 2 years in 2 UK institutions. We examined the clinical features of each presentation.

Results: 41 sets of casenotes of DKA presentations were reviewed. 11 cases (27%) had features of both HHS and DKA. Of these we identified 3 cases (7% of cohort) with significant clinical features of HHS with DKA (mean osmolarity of 397mosm/kg). These 3 cases were all children with type 1 diabetes mellitus who had limited mobility and limited ability to access drinking water to maintain fluid homeostasis.
In addition we identified a further 8 cases of DKA which met at least 2 of the ISPAD 2018 criteria for HHS diagnosis (serum glucose >33mmol/l, obtundation and/or serum osmolarity of >320 mOsm/kg) but were not recognised or managed clinically as HHS. One of these cases also had significant rhabdomolysis and 3 cases had significant hypernatraemia (>160mmol/l).

Conclusions: We conclude that:

- DKA mixed with features of HHS is underrecognised in the paediatric population
- children with limited mobility (who do not have access to free oral fluids) are at higher risk of HHS mixed with DKA
- HHS should not be perceived as separate clinical presentation but rather as a part of the spectrum of DKA presentations
- fluid management in DKA should be adjusted in both type of fluid replacement and rates of fluid replacement according to the presenting osmolarity.

P387
Screening for complications and associated conditions in children with type 1 diabetes mellitus in the Netherlands: big differences in a small country

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Introduction: Children with type 1 diabetes mellitus need to be screened for chronic complications and associated (autoimmune) diseases. National guidelines for screening methods and frequency are not available, but the International Society for Pediatric and Adolescent Diabetes (ISPAD) gives recommendations in its guidelines. The ISPAD guidelines were updated in 2018 and one of the adjustments was the start of screening for chronic complications from the age of 11 years instead of 10 years.

Objectives: In this study, the screening policies of the Dutch pediatric diabetes centers were investigated and compared to the most recent ISPAD guidelines.

Methods: A questionnaire about screening method and frequency was send to all members (pediatricians and pediatric endocrinologists) of the Dutch committee for pediatric diabetes. The screening policies of the pediatric diabetes centers were compared to the ISPAD guidelines of 2018.

Results: 58% of all diabetes centers filled out the questionnaire; together these centers are responsible for the treatment of approximately 82% of all pediatric diabetes patients in the Netherlands. None of the diabetes centers exactly followed all recommendations of the ISPAD. The majority of the centers had a higher frequency of screening, did not personalise their policy to the individual patient or performed extra blood tests. For example, 23% of the diabetes centers performed a complete blood count annually, in all patients. 36% of the diabetes centers commenced screening for chronic complications at the age of 10 years, as recommended in the previous version of the ISPAD guidelines.

Conclusions: Dutch pediatric diabetes centers screen their patients on chronic complications and associated conditions very differently and not according to the international (and most recent) guidelines. A more individualized approach with respect to the newest ISPAD guidelines will diminish burden for the patient and costs as well.

P388
Dual diagnosis of type 1 diabetes and ADHD

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Objectives: Attention-deficit/hyperactivity disorder (ADHD) and type 1 diabetes (T1DM) are common diseases in children. Dual diagnosis of T1DM and ADHD might affect the management of T1DM. The aims of this study were to compare the following parameters between children with T1DM with or without ADHD: HbA1c, episodes of severe hypoglycaemia, diabetes ketoacidosis (DKA), quality of life (QOL), time in range (TIR) and glucose variability parameters.

Methods: T1DM patients aged 6-18 years were recruited. All parents filled a Diabetes QOL questionnaire. Glycaemic data was downloaded from glucometers, pumps and glucose sensors (CGM). Other data were retrieved from the medical files.

Results: The study cohort comprised 111 patients with T1DM: 27 with ADHD (24%) and 84 without ADHD (Control group). Mean±SD age of the ADHD group and Control group was 14.6±2.8 and 12.6 ±3.3 years, respectively (p=0.006). Mean HbA1c was significantly higher in the ADHD group, 8.5±1.2 % vs. 7.8±1.0 % (p=0.003). There was no difference in QOL and in severe hypoglycaemia or DKA events between the groups. Sixty-two patients used CGM, 13 (21%) with ADHD. TIR (70-180 mg/dl) was significantly lower in the ADHD group, 49±17% vs. 59±15% (p=0.05). In a regression model for age the following parameters retrieved from CGMs were significantly higher in the ADHD group vs. the Control group: mean glucose (p=0.024), SD of glucose (p=0.028), TIR (p=0.015), percentage time above 180 mg/dl (p=0.025), percentage time above 240 mg/dl (p=0.015), and in glucose variability parameters: ADRR (p=0.016), HBGI (p=0.009), MAGE (p=0.042). There were no differences in percentage time below 70 mg/dl and below 55mg/dl.

Conclusions: Coexistence of T1DM and ADHD during childhood leads to significantly higher HbA1c, TIR and glucose variability parameters compared to patients without ADHD. Healthcare providers should be aware of the difficulties of patients with T1DM and ADHD to cope with the current intensive treatment of diabetes.

P389
The prevalence of Type 1 Diabetes and Autistic Spectrum Disorder in Highland Region, Scotland, and its impact on glycaemic control and care needs

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Introduction: Current evidence regarding the co-existence of type 1 diabetes (T1D) and autistic spectrum disorder (ASD) is mixed. Within the paediatric diabetes clinic in Highland region, Scotland, a high proportion of patients with T1D had a co-existent diagnosis of ASD.

Objectives: To ascertain whether the prevalence of ASD in patients with T1D in Highland region is greater than the prevalence of ASD in the general school-aged population. The study also compared glycaemic control and level of support required in patients with T1D and ASD and patients without ASD.

Methods: Children with T1D in the paediatric diabetes clinic who had a diagnosis of ASD were identified by a retrospective notes review. This was compared with the prevalence of ASD in the school-aged population in Highland. The study compared HbA1c in patients with T1D and ASD and those without ASD, and also compared how many patients over the age of 12 years in each group required supervision with pumps or insulin injections at school.

Results: Out of 124 children aged 5-16 years with T1D, 15 were identified as having autism (12.1% [95%CI 3.7-16%]). The prevalence of autism in the general school-aged population is 2.2% (p< 0.0001). No significant difference was found in HbA1c in patients with ASD (58.9mmol/mol) compared to those without (58.0 mmol/mol) [p=0.6972]. 5% of T1D patients over 12 years of age without ASD required support with injections or pump compared with 60% with ASD.

Conclusions: Prevalence of ASD in children with T1D in Highland is greater than that of the general paediatric population, and greater than previously reported in the literature. The reason for this is not clear. Glycaemic control was similar in patients with ASD and those without. However, more help with injections and the general management of T1D was required in patients with autism, and this leads to increased need for support from the Diabetes multidisciplinary team and in school, and has implications for transition.

P390
Wolcott Rallison in two families in Alexandria University Children´s Hospital: same gene, different variants

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Background: Wolcott Rallison syndrome (WRS) is an autosomal recessive disorder caused by EIF2AK3 mutations. It is characterized by early-onset diabetes mellitus (DM), skeletal dysplasia and recurrent liver failure. We present two families having related parents with confirmed diagnosis of WRS in Alexandria University Children´s Hospital.

Case1: A boy diagnosed at 2 months with neonatal DM (NDM). At presentation, he had diabetic ketoacidosis (DKA), and firm hepatomegaly with normal liver functions. Genetic testing showed that he was homozogyous for an EIF2AK3 frameshift variant. On follow up, he had growth retardation and skeletal dysplasia. He was always neutropenic. He had a brother previously diagnosed with NDM at the age of 40 days, died at the age of 4 months with fulminant liver failure (hepatomegaly, jaundice, elevated liver enzymes), without having the chance to do genetic testing. At the age of 12 months, our patient presented with acute liver failure, admitted in Paediatric Intensive Care Unit on liver support therapy for 10 days and improved.

Case 2: A girl presenting with DKA at the age of 4 months, diagnosed with NDM. Genetic analysis revealed that our patient was homozygous for a novel EIF2AK3 missense variant. On follow up, she had neutropenia and growth retardation. She has a twin sister whose genetic testing showed no mutation. Their elder sister was also diagnosed with NDM, had a failed trial of sulphonyl urea. Unfortunately, genetic testing was not available at that time, she died at the age of 16 months with DKA. Both patients had no liver dysfunction.

Conclusions: WRS is the most common cause of permanent NDM in consanguineous populations. Genetic testing is important to confirm the diagnosis, and detect different mutation variants leading to different presentations. NDM patients with consanguineous parents, family history of an affected sibling, liver failure, skeletal dysplasia, neutropenia might be clues to early suspicion and diagnosis.

P391
SLC29A3 spectrum disorder associated monogenic / syndromic insulin dependent diabetes: multiple tragedies and herculean management challenges of an enigmatic multisystem pathology

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Introduction: Germline mutations in SLC29A3 lead to a range of recessive, clinically related syndromes: Pigmentary hypertrichosis and NON-AUTOIMMUNE INSULIN-DEPENDENT DIABETES MELLITUS (PHID) and H syndromes, familial Rosai-Dorfman disease, and sinus histiocytosis-lymphadenopathy plus syndrome, Faisalabad

histiocytosis etc. These groups of multisystemic disorders display very high clinical variability / overlap. CONSEQUENTLY, ALL SLC29A3-RELATED DISEASES SHOULD BE CONSIDERED A SINGLE ENTITY. Auto inflammation is increasingly recognized.

SLC29A3 gene encodes the equilibrative nucleoside transporter hENT3 expressed in mitochondria. Human equilibrative nucleoside transporter-3 (hENT3) spectrum disorder mutations impair nucleoside transport, protein localization, and stability.

Objectives: SLC29A3 spectrum "unconnected" multiorgan diseases, across 2 decades.

Methods: Since birth Male Deaf and dumb.

Age 2 Two Epididymal tumors; Sinus histiocytosis

Age 7 Non-Hodgkin's lymphoma

Age 10 TYPE 1 DIABETES MELLITUS

Age 14 Choroidal osteoma

Age 17 Anemia Hb 4.9 gm/dl; Short stature

Age 18 Renal calculi, hepatosplenomegaly

Age 21 Phalangeal flexion contractures, scleroderma like changes, deformed ears, cubitus valgus, dysmorphism, abnormal gait, musculoskeletal deformities, glaucoma [Rosai-Dorfman disease]

Age 21 MRI: Partial empty sella; Growth hormone deficiency; Hypergonadotrophic hypogonadism; Osteoporosis L1-L2 Z score BMD - 3.1

Age 24 Incipient nephropathy, microscopic hematuria

Age 24 ECHO Cardiac Histiocytomas; mediastinal lymphadenopathy

Results: Ht 147 cm; Wt 35.8 Kg; S C-Peptide 60 min p oral glucose< 0.3 ng/ml; TPoAb = Neg. Qid insulin 50 u/d; HbA1c 7.4%. SLC29A3 mutation

Conclusions: SLC29A3 is expressed in the human islet and recessive mutations are likely to result in beta cell failure. However mutations in this gene are not a common cause of ISOLATED autoantibody negative diabetes diagnosed in children less than 17 years. Infinite smiles .. despite all odds.

P392
Wolcott-Rallison syndrome in the Gulf & Levant: a case report and review of regional literature

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Background: Wolcott-Rallison Syndrome (WRS) is a rare disorder caused by recessive EIF2AK3 mutations that result in endoplasmic reticulum (ER) stress leading to apoptosis. It presents initially as permanent neonatal diabetes mellitus (PNDM), but has high mortality due to fulminant liver failure.

Case report: We present the case of a 6-week-old girl, born to consanguineous parents, who was diagnosed with PNDM following her presentation in diabetic ketoacidosis. Her initial management was very challenging. CSII was not possible, so she received basal bolus therapy with degludec and lispro, subsequently, adding glibenclamide, pending genetic studies. She is currently maintained on insulin degludec, detemir and lispro, as well as glibenclamide, and has excellent glycemic control (HbA1c 6.8%). She had negative GAD-65 and IA-2 autoantibodies. WRS was later confirmed by a homozygous nonsense mutation in EIF3AK3. This gene encodes protein kinase R-like endoplasmic reticulum kinase (PERK). PERK plays an important role in modulating the unfolded protein response, critical for protection against ER stress.

Although a rare cause of PNDM worldwide, WRS is highly prevalent in children of consanguineous parents in the Gulf and Levant. All patients present with neonatal diabetes. The majority (85%) will develop acute liver failure usually leading to early death. Other non-pancreatic manifestations include skeletal dysplasia, anemia, neutropenia, and hypothyroidism. Patients require close monitoring of liver function with any acute illness to facilitate early supportive measures.

Conclusion: We present a patient with PNDM secondary to WRS. WRS is the most common cause of PNDM in the Gulf & Levant, largely due to high rates of consanguinuity. Her diabetes has been successfully controlled on a complex treatment regimen and she has excellent glycemic control. However, her prognosis remains guarded owing to the future risk of liver failure.

P393
A case of double diabetes in a child presenting with conditions of both diabetic ketoacidosis and hyperglycemic hyperosmolar syndrome

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Background: As the prevalence of obesity in children has increased, some cases of type 1 diabetes have also features of type 2 diabetes and insulin resistance, which is referred to as double diabetes.

Case: We describe a 9-year-old girl who had a body mass index of 24.3 kg/m^2(98.3 percentile) before admission. She had had polyposia and polyuria. Because her appetite had been poor owing to gastroenteritis, she had been drinking many soft drinks. In the early morning of the admission day, she was unconscious and transferred to our hospital in an emergency state. She was in shock with a blood pressure of 62/40 mm Hg. The level of consciousness was E1V1M1 on the Glasgow Coma Scale. The laboratory findings were as follows: venous pH 6.894; urine ketone bodies 3+; serum blood urea nitrogen 58 mg/dl; serum creatinine 2.21 mg/dl; serum glucose 1221 mg/dl; serum osmolarity 376 mOsm/kg H_2O; hemoglobin A1c 11.4%; anti-GAD antibodies >2000 U/ml. Bolus doses of isotonic saline were administered followed by insulin infusion. After her condition recovered, intensive insulin therapy was initiated. However, she required a much higher dose of insulin than usual.

Discussion: She was given a diagnosis of as type 1 diabetes associated with both diabetic ketoacidosis and hyperglycemic hyperosmolar syndrome. As her type 1 diabetes was associated with obesity, double diabetes was diagnosed. From the type 1 diabetic point of view, lack of insulin induced hyperglycemia with ketone production and dehydration. From the type 2 diabetic point of view, insulin resistance and too much intake of soft drinks also induced hyperglycemia and severe dehydration. Dehydration exacerbated hyperglycemia vice versa and

a vicious circle developed, finally leading to a hypovolemic shock in this patient.

Conclusion: We should accurately understand the clinical conditions of newly onset type 1 diabetes in obese children with clinical features of type 2 diabetes, insulin resistance, or both.

P394
A girl with severe motor and intellectual disabilities who had hyperglycemic hyperosmolar syndrome associated with pancreatogenic diabetes mellitus

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Background: Patients with severe motor and intellectual disabilities sometimes have acute pancreatitis, attributed to mechanisms such as pancreatic morphological changes, acinar damage, and increased serum trypsinogen caused by malnutrition. Acute pancreatitis often develops in pancreatogenic diabetes mellitus. We describe a girl with severe motor and intellectual disabilities who had pancreatogenic diabetes mellitus associated with hyperglycemic hyperosmolar syndrome (HHS).

Case: The patient was a 14-year-old Japanese girl who had severe motor and intellectual disabilities. Acute pancreatitis developed at the age of 11 years. When she was 14 years old, the blood glucose level was 206 mg/dl, and the HbA1c was 6.8%, with no elevated islet-specific autoantibodies. She was not obese and she had chronic pancreatitis after the acute phase, leading to the diagnosis of pancreatogenic diabetes mellitus. We followed her up carefully without treatment. Three months after the diagnosis, she visited our hospital because of polyuria and tachycardia. Hyperglycemia (glucose: 1056 mg/dl), hyperosmolarity (osmolality: 368 mosm/kgH_2O), and no serum ketone bodies were noted. HHS was diagnosed. Prompt fluid replacement and continuous insulin infusion were begun. Computed tomography revealed acute exacerbation of chronic pancreatitis.

Discussion: Acute exacerbation of chronic pancreatitis leads to rapid progression of pancreatogenic diabetes. Because patients with severe motor and intellectual disabilities cannot drink by themselves when thirsty, dehydration easily progresses. Lack of glucagon in chronic pancreatitis suppresses ketone production. These factors led to HHS, not diabetic ketoacidosis, in our patient.

Conclusion: When pancreatogenic diabetes mellitus develops in patients with severe motor and intellectual disabilities, they are at high risk for HHS. We need to make efforts to diagnose HHS early by, for example, carefully monitoring their vital signs.

P395
A prenatal diagnosis in a family with neonatal diabetes

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Here we describe an Egyptian male infant, the first-born of consanguineous healthy parents.

The pregnancy was uneventful, and the baby was delivered vaginally at term. At 2 days of age he presented with severe hyperglycemia and was diagnosed as neonatal diabetes. On examination, he had microcephaly with OFC more than -2.5 SD below the mean, developmental delay, hypotonia, and epilepsy. At 2 months of age, the seizures were found to be a combination of focal seizures with secondary generalization and generalized seizures. Electroencephalographs (EEG) showed polyspikes and slow waves with burst suppression pattern. Brain magnetic resonance imaging revealed microcephaly with simplified gyration, cortical atrophy, hypoplastic corpus callosum, cerebellar vermis hypoplasia, and delayed myelination. The diabetes and epilepsy were difficult to control despite treatment with clonazepam and sodium valproate. The patient had repeated pneumonias with neurodevelopmental progress. No skeletal defects, liver or renal dysfunction were reported.

Genetic analysis identified a previously reported homozygous missense mutation in exon 3 of the immediate early response 3 interacting protein 1[IER3IP1] gene (p.L78P c.233T>C) confirming a diagnosis of (MEDS) syndrome. Parents are both heterozygous carrier for the mutation.

One year later, the mother got pregnant and a prenatal genetic testing for the fetus was offered to the parents. After informed consent was taken from them, testing on DNA extract from the amniotic fluid sample was performed and revealed that the fetus was homozygous for the IER3IP1 missense mutation, p.(Leu78Pro).

We report the first case of prenatal genetic testing in a family with neonatal diabetes in Egypt. Knowledge of the fetal genotype influences both prenatal and postnatal management of pregnancies allowing accurate and timely diagnosis for a pregnancy at risk of neonatal diabetes.

P396
High insulin requirements in a lean female with type 1 diabetes

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Introduction: A 7-year-old female presented with HA1c of 11.3%, BG >300 mg/dL, BMI at the 30%ile, and positive GAD-65 and IA-2 antibodies. She started on MDI insulin and initially had excellent glycemic control. However, her HA1c then began to rise, despite transition to pump therapy at age 11, reaching 12.4% at age 13. Insulin usage was ~2 U/kg/day consistently. She was noted to be fairly athletic and muscular, as were her father and sister. The paternal grandfather had diabetes.

Objective: Further study was taken to understand the cause of the patient´s high insulin requirement.

Methods: CGM was used to study the patient's glycemic control more carefully. Further labs were obtained. A DXA scan was performed to better characterize her body composition.

Results: CGM data revealed consistently elevated blood sugars with minimal variability. There were no episodes of hypoglycemia. Blood sugars were only in target 6% of the time. Her average was 273 mg/dL

with a standard deviation of 66. Based on this data, her basal rates were increased leading to some improvement. Laboratory studies showed a low random leptin of 1.7 ng/mL, fasting leptin of 3.7 ng/mL, LDL of 142 mg/dL, and triglycerides of 266 mg/dL. DXA showed a percentage fat z-score in the legs of -3.0. Based on this profile, congenital lipodystrophy was suspected. The patient was started on metformin with additional improvement in HA1c to 8.7%. Genetic testing is pending.

Conclusions: This patient has antibodies consistent with type 1 diabetes but demonstrates a much higher degree of insulin resistance than expected for age, body fat, and BMI. Given a family history of a muscular phenotype, we suspect this patient also has a mild form of lipodystrophy. We hypothesize that insulin resistance from lipodystrophy has led to increased insulin requirements in the setting of type 1 diabetes. She has benefited from higher basal insulin usage as well as metformin therapy to improve her insulin resistance.

P397
Thiamine-responsive megolablastic anemia related diabetes: long-term clinical outcomes in a large international case series from DPV and SWEET registries

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Objectives: To describe clinical presentation and outcomes in a large cohort of children diagnosed with thiamine-responsive megaloblastic anemia (TRMA) related diabetes.

Methods: The DPV and SWEET registries were used to identify cases. Extra information was obtained from a chart review of each case. Descriptive analyses with median and interquartile ranges and number (proportions) are presented for age at onset for diabetes and thiamine supplementation, current anthropometric characteristics, insulin and thiamine doses, A1C, hemoglobin levels and associated complications (deafness, vision, or neurological impairment).

Results: We identified 23 cases in the two registries (12 from DPV and 11 from SWEET). Twelve (52%) were males, and 18 (78%) had genetic confirmation of the TRMA diagnosis. Median age at diabetes onset was 1.4 yrs [0.8; 3.6], and the median age at thiamine initiation was 5.9 yrs [2.4;12.4]. Of those who had the information available (n=7) for the initial presentation, none presented in DKA. At their most recent visit, the median age was 14.3 yrs [8.1;17.5], diabetes duration 9.1 yrs [3.5;14.2], A1C 6.9 % [6.1;7.9] (52 mmol/mol [43;63]), insulin dose 0.9 units/kg/day [0.4;1.2], and thiamine dose 200 mg/day [100;300]. Only 3 were not on insulin. The majority had associated conditions: 21, 12, 10 with hearing, vision and neurological impairments respectively.

Conclusions: TRMA is a rare condition associated with non-autoimmune diabetes. This is the largest and longest case series of pediatric TRMA related diabetes reported to date. In the cohort, we confirmed that diabetes onset is often several years prior to initiation of thiamine supplementation. It remains unknown whether this is due to a later onset of anemia or a delay in diagnosis of TRMA syndrome. These patients remain in good metabolic control even after 10 years of follow-up. However, other complications of TRMA like hearing, vision and neurological impairment are frequent.

P398
Effect of growth hormone treatment in GCK-MODY patient

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Introduction: In general, diabetes is not a contraindication to growth hormone treatment (GHT) in chlidren, but in Poland it is exclusion criterion to join refund treatment program. Effect of growth hormone treatment on carbohydrate metabolism is well known, although hardly any studies about glycemic control in already diagnosed diabetic patients are available.

Five year old girl was admitted to our Endocrynology Department due to short stature (101cm, < 3 percentile), abnormal glycemia and hypothyroidism. Mutliple pituitary hormone deficiency was confirmed. HbAc was 6,3%. No clinical symptoms of diabetes were noticed. Laboratory tests revealed the following: impaired fasting glucose, impaired glucose tolerance, negative b-cell autoimmunity, low c-peptide level. Genetic testing confirmed GCK-MODY. A low glycemic index diet was applied. Patient was qualified to GHT and received a GH dose of 0.18mg/kg/week. Her HbA1c at the start of GHT was 6,1%. Glucose monitoring system - FreeStyle Libra was also applied. During a 21-month follow up: glycemic control was relatively good and stable (mean HbA1c 6,1%), mean glycemia based on FreeStyle Libra was below 150mg/dl, height gain was 20.4cm, insulin after glucose load (OGTT) increased (from 8.26 to 18.6). GHT did not worsen the glycemia beyond control and metabolic control was good, therefore girl was included in Polish refund GHT program despite of her diabetes.

Conclusion: GHT induce insulin increase in patient with GCK-MODY does not affect glucose levels if patient follows the diet and treatment rules. GHT improved guality of life of patient - girl gained the weith (25-50 percentile).

The long-term implications of GHT on glycemic control in diabetic patients are not widely known, therefore they should be closely monitored during and after the treatment.

P399
An unusual cause of diabetes found in a consanguineous family from kurdistan: H syndrome caused by a pathogenic variant in the SLC29A3 gene

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Introduction: The spectrum of genes causing monogenic diabetes differs according to geographic location. Rare autosomal recessive forms of syndromic diabetes are more prevalent in regions with consanguinity. One example is H syndrome, caused by pathogenic variants in the *SLC29A3* gene. It is characterized by cutaneous hyperpigmentation, hypertrichosis, hepatosplenomegaly, cardiac anomalies, camptodactyly, hearing loss, hypogonadism, antibody negative diabetes mellitus, short stature, lymphadenopathy and many other features that are still being described. Only a few families have been reported since it was first described. There may be a lack in its diagnosis due to delayed associations among its variable clinical features.

Patient and methods: A 12 year old girl was born to Kurdish parents who are first cousins. She was diagnosed with antibody negative diabetes mellitus at 8 years of age, has hepatosplenomegaly, hearing loss (from 5 years), hallux valgus, campylodactyly, short stature and mild aortic regurgitation.

DNA was analyzed by Whole Exome Sequencing. Potential variants were evaluated using the American College of Medical Genetics (ACMG) standards. Thereafter, selected pathogenic or likely pathogenic variants were confirmed using Sanger sequencing.

Results: A published pathogenic homozygous variant p. Leu349Serfs*56 (c.1045delC) was found in the *SLC29A3* gene in the proband. Her healthy parents are heterozygous and 3 healthy siblings are heterozygous or negative for the same mutation.

Conclusion: H syndrome may be more prevalent than estimated due to delayed associations between diabetes, short stature, delayed puberty and camptodactyly. There is an interesting phenotypic variability even in patients who share the same *SLC29A3* mutation. Even in regions with low consanguinity, it is important to consider syndromic diabetes when encountering a child with diabetes and other phenotypic features.

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P400
MODY3 with obesity and nodular erythema

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Objectives: Can MODY occur together with obesity and DKA? This combination is often considered to be impossible. The following case refutes this conviction. A patient had been being mistreated as one suffering from type 2 diabetes (T2D). After the mutation had been detected the treatment corresponding to MODY was applied and the patient got improved.

Methods: sequencing by Sanger was used (GCK and HNF1A genes).

Results: Overweight had been being observed since the patient reached the age of 8 years. The patient's FPG rose up to 7.0 mmol/l when the patient reached 8.5 years of age. A diet was recommended. Six months later, the patient's FPG reached 6.3-7.8 mmol/l. Metformin 1000 mg was recommended. When the patient was 10.5 years old, his HbA1C reached 8.9%. T2D was misdiagnosed and metformin was prescribed. When the patient reached 11.5 years old, nodular erythema was diagnosed; glucocorticoid therapy was carried out; glucose got increased up to 25.5 mmol/l and insulinotherapy was prescribed. The insulinotherapy was canceled after discontinuation of glucocorticoids occurred. Metformin was prescribed instead. The patient had got DKA 3 months later. The HbA1C reached 8,9%. Infusion therapy and insulinotherapy were treated. Two months later, the 12 years old patient was placed into our hospital.

We detected mutation c.392G>A p.R131Q gene HNF1A. SU is prescribed. The HbA1C reached 6,4% after 3 months.

Mother: 34 years old; the weight is normal; GSD. Insulin was canceled after giving the birth. No treatment and diet are being given now; HbA1C: 6.2%.

Grandmother: 58 years old; obesity; diabetes, insulin.

Conclusions: Although occurrence of obesity and ketoacidosis together with MODY is often considered to be impossible, adverse conditions can cause this combination for certain patients. Basing on the family anamnesis, we suggest the poor compensation of diabetes during the perinatal phase contributed to the patient's early MODY manifestation.

P401
Successful sulfonylurea treatment of an adolescent with a transient neonatal diabetes due to a 6q24 mutation

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Follow-up	0 months	3 months	6 months	9 months	12 months	15 months	18 months
HbA1c [%]	6,1	6,2	6,0	5,9	6,1	6,4	6,1
Height [cm]	106,1	109,7	113,5	118,5	121,5	124,4	126,5

[Observations]

Introduction: Chromosome 6 abnormalities are a common cause of transient neonatal diabetes (TNDM). According to current ISPAD Guidelines 2018 and shown by the publication of Garcin et al. (Pediatric Diabetes 2018) chromosome 6 linked neonatal diabetes is amenable to sulfonylurea treatment (SU).

Case presentation: We present a now 14-year-old boy who was born at 34 weeks of gestation. Primary hyperglycemia occurred on the 8th postnatal day. Initially a continuous intravenous insulin infusion was started followed by an insulin pump therapy until full remission after 6 months of treatment. Genetic testing showed a loss of methylation on 6q24 according to TNDM. Regular controls of HbA1c were recommended.

Diabetes relapsed at the age of 14 years with an HbA1c of 13.7%. A multiple daily injection therapy was initiated. The parents contacted our Diabetes Center for a second medical opinion and asked for an alternative therapy. Under consideration of the genetic results, and referring to literature, we suggested an off-label SU treatment.

With admission to our clinic, after 6 weeks of insulin therapy, HbA1c was 8.7%, daily insulin requirements were 0.7 IU per kg body weight. Based on protocol of SU administration by Garcin et al. SUs were increased gradually while the insulin dose was tapered. After 2 months of exclusive SU therapy (0.3 mg/kg) HbA1c was 5.7%. So far, no undesirable side effects of SU occurred.

Conclusion: SUs can be a safe and efficient alternative therapy in treatment of children and adolescents with 6q24-related TNDM. The opportunity of oral treatment underlines the importance of genetic testing as the results may have a major effect on diagnosis, clinical procedure and therefore quality of daily life of the affected children and their families, in our case an insulin free treatment so far.