ISPAD + APEG 2015

POSTER SESSIONS

Poster Tour 1: General Endocrine

P1

Transient pseudohypoaldosteronism: not every salt losing crisis in infants is congenital adrenal hyperplasia

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Salt losing crisis in an infant is a medical emergency and is usually due to congenital adrenal hyperplasia (CAH). However, significant hyponatremia and hyperkalemia can occur in the context of urosepsis and mimic the presentation of CAH. We report three male infants (age 34, 32 and 28 days) who presented with salt losing crisis and were subsequently diagnosed with transient type 1 pseudohypoaldosteronism (TPHA1). They were born at term with mean birth weight of 3.44 kg; however none of the infants had regained their birth weight. Two infants had an antenatal diagnosis of bilateral hydronephrosis. All three infants had urinary tract infection (E. Coli, Staphylococcus aureus and Enterobacter) with pyelonephritis which required treatment with parental antibiotics. A normal 17OHP and adequate cortisol responses ruled out congenital adrenal hyperplasia. Tubular resistance to aldosterone was indicated by elevated renin and aldosterone and confirmed pseudohypoaldosteronism. The condition was transient and sodium levels normalised in 2 days in one infant and in 4 days in the other two infants with treatment. Imaging demonstrated hydronephrosis and vesico-ureteric reflux in 2 infants and the infants require ongoing nephrology follow up. Investigations are summarised in Table 1.

	Case 1	Case 2	Case 3	Normal range
Serum Na	119	110	128	134–144 mmol/l
Serum K	3.9	8	6.4	3.4–6 mmol/l
Cortisol	380	920	940	80–600 nmol/l
17OHP	3.3	3.2	1.3	<5 nmol/l
Renin	27,800	126	259.7	5–100 mU/l
Aldosterone	33,400	7,540	22,100	300–1500 pmol/l

This case series illustrates that THPA1 is precipitated by urinary tract infection or urinary tract anomalies in early infancy and responds rapidly to intravenous saline and antibiotics. Urine analysis and renal ultrasound should be performed in any infant with salt wasting and hyperkalemia to allow early recognition of THPA1 thus preventing avoidable complications and inappropriate medication.

P2

Adrenal insufficiency in a child following unilateral excision of a dual-hormone secreting phaeochromocytoma

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Phaeochromocytomas are a rare clinical entity, with dual hormone-secreting lesions particularly uncommon, seen in <1%. ACTH is the most common hormone co-produced, and is potentially lethal if not diagnosed.

We present the case of a previously well 10-year-old boy, who presented acutely with a hypertensive crisis and was found to have a unilateral, non-syndromic phaeochromocytoma. Medical stabilization of his hypertension was challenging, and took three weeks to achieve, before proceeding to unilateral adrenalectomy. Post-operatively the child experienced severe fatigue and was subsequently confirmed to have adrenal insufficiency. He improved markedly with hydrocortisone replacement therapy, which is on-going 6 months post-operatively. In retrospect this likely represents unrecognized, sub-clinical ACTH-dependent Cushing's syndrome secondary to an ACTH/or precursor dual-hormone secreting phaeochromocytoma.

Dual hormone secreting phaeochromocytomas with ACTH/or a precursor may cause secondary adrenal insufficiency following surgical removal. The concurrent features of Cushing's syndrome can be mild and easily overlooked, particularly in children, presenting diagnostic and management pitfalls. As concomitant syndromes of hormone excess are rare in phaeochromocytomas; the diagnosis requires a high index of suspicion. Serial/Diurnal cortisol levels, ACTH measurement ± low dose dexamethasone suppression (when clinically stable, appropriate adrenergic blockade in place, and well supervised), can all be considered as needed.

P3

Varied spectrum of DAX1 mutations in three Indian children

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Background: X linked Adrenal hypoplasia congenita (AHC) is a life threatening disorder of adrenal gland development caused by mutations in the DAX1 gene. It has a wide phenotypic variation in presentation. Affected boys can present in infancy or childhood. Rare features like precocious puberty have also been described. A high index of suspicion for DAX1 mutation must be entertained in a child with an X linked family history, especially when other common causes of adrenal insufficiency have been ruled out.

Objective: To undertake molecular genetic analysis of the DAX1 gene in three Indian children presenting with protean manifestations of AHC.
Methods: Patient 1: presented with Addison's disease at age 6 years. Three male relatives had died in infancy or childhood, suggesting X linked heritability.

Patient 2: presented in infancy with AHC and developed hypogonadism on follow up.

Patient 3: presented with AHC in infancy and developed peripheral precocity at 7 months.

Molecular genetic analysis: Both DAX1 exons and flanking intronic sequences were amplified using previously described primers by standard techniques. Sequencing of amplified PCR fragments was performed.
Results: DAX1 gene sequencing revealed the following results.

Patient 1: A single nucleotide deletion (G) at codon 39/40 resulting in a premature stop codon at position 83(p.G40AfsX44).

Patient 2: A novel nonsense mutation in the C terminal region of the protein (p.Ser259X).

Patient 3: A nonsense mutation in exon 1 of the DAX1 gene (p.Trp291X).
Discussion: This report highlights the varied phenotypes of X linked AHC and the fact that a high index of clinical suspicion is needed for diagnosis. An X linked family history may provide a clue but its absence should not exclude the clinical possibility of a DAX1 mutation. Precocious puberty though rare is a part of the spectrum of this disease and may represent a transient period of Leydig cell hyperactivity followed by permanent hypogonadism in adult life.

P4
Do pancreatic functions predict cardiac and liver iron loading in transfusion-dependent beta thalassemia major adolescents using cardiac and liver T2-star (T2*)magnetic resonance?

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Background: Regular and frequent red blood cell transfusions have significantly increased the life expectancy of patients with β-thalassemia major (β-TM). However, when no appropriate chelation therapy is available, patients accumulate iron in the heart, liver, spleen, pancreas, and endocrine glands, leading to progressive organ dysfunction.
Objective and hypotheses: To assess the correlation between cardiac and hepatic T2*MRI findings with the endocrine and exocrine pancreatic functions in known β-TM patients.
Method: A total of 44 children and adolescents β-TM patients and 44 healthy controls were investigated via: serum amylase, lipase, triglyceride index, oral glucose tolerance test, and T2* MRI to assess iron content in the heart and liver.
Results: Overt diabetes was found in 9.4% and 45.5% of patients had impaired fasting glucose. Median cardiac T2* was 22 ms (12–31 ms) and LIC was 6 ms (4–9 ms). CardiacT2* was less than 10 ms in 21.4% indicating heavy load with iron in cardiac tissues. There is a significant decrease in serum amylase (87.5 IU/l vs. 63.5 IU/l, p = 0.003) and lipase (94 IU/l vs.70 IU/l, p = 0.056) among enrolled patients in comparison to control group. Thalassemic diabetic showed low serum amylase (32.5 vs. 59.5, p = 0.0005), serum lipase (39.5 vs. 68, p = 0.0007), low cardiac T2* was found (7 ms vs. 22 ms, p = 0.0006) and low LIC (2 ms vs. 6 ms, p = 0.0006) than other β-TM patients without diabetes. Inverse correlation was found between triglyceride index with cardiac T2* ($r = -0.376$, p = 0.014) and low LIC ($r = -0.376$, p = 0.014 respectively) but not with serum lipase ($r = -0.099$, p = 0.533), ($r = -0.222$, p = 0.1570) and serum amylase ($r = -0.191$P=0.225), ($r = -0.053$, p = 0.738) respectively.
Conclusion: Follow up of thalassemic patients with impaired fasting glucose together with intensive chelation therapy may help to prevent the development of cardiac and hepatic siderosis.

P5
A case of partial trisomy 3p and multiple pituitary hormone deficiency: previously unreported clinical association

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Background: Duplication of the part of short arm of chromosome 3 is a rare but clinically well-described syndrome in literature. These Patients present with characteristic facial features, intellectual disability, developmental delay and multiple system anomalies. We report a case of partial trisomy 3p with multiple pituitary hormone deficiency, a unique association not reported previously.
Case: A 27 months old female presented with growth failure, global developmental delay and hypotonia. She was morbidly obese with severe constipation, low energy level, hair loss and anorexia. On examination, she had she had a depressed nasal bridge, short nose, mid face hypoplasia and other facial dysmorphic features consistent with partial 3p duplication. She had dull and sparse hair, dry skin and redundant skin folds from weight loss. Genetic analysis confirmed a pathogenic de novo duplication of Chromosome 3p26.2p24.1 and a benign maternally inherited duplication of chromosome 12q22.

Investigations showed undetectable Insulin Growth Factor-1, low 8 am cortisol 137 nmol/l ($N > 250$), ACTH 3.1 pmol/l and low normal FT4. Low dose 1 μg Synacthen test precipitated severe hypoglycaemia with no GH response (4.6 mIU/l) and peak cortisol 488 nmol/l ($N > 550$). She was diagnosed with biochemical GH deficiency and central adrenal insufficiency. Diagnosis of central hypothyroidism was also made based on her symptoms. Treatment with hydrocortisone, thyroxin and growth hormone resulted in significant improvement in energy levels, growth velocity and constipation.
Discussion: Children with partial chromosome 3p duplication have a clinically recognizable syndrome with multiple system anomalies but hypopituitarism has not been described in literature before. However, early mortality has been reported in 50% by 6 months and could be due to undiagnosed adrenal insufficiency. To our knowledge, this is the first case of 3p duplication with coexistent pituitary deficiency.

P6
Persistent hyperinsulinemic hypoglycemia of infancy evaluation – is HYNIC TOC an alternative to 18F DOPA?

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Background: Evaluation of Persistent Hyperinsulinemic Hypoglycemia of Infancy(PHHI) requires accurate anatomic diagnosis for appropriate medical/surgical management. 18F DOPA PET scan is used to localize the disease in pancreas, but is not available in many

centers. We also are highly restrained by the availability of investigations for evaluation of PHHI, especially 18F DOPA.
Objective: We hypothesised HYNIC TOC as a new material for evaluation of PHHI in place of 18F DOPA for localising the disease in pancreas and tried to find its applicability as well as genetic and phenotypic correlation.
Method: Neonate born LGA with birth weight 4.8 kg had hyperinsulinemic hypoglycaemia(critical sample insulin-67.07 microU/ml). Workup done for other causes of hypoglycemia were negative. Hypoglycemia was persistent with high dextrose requirements and refractory to oral diazoxide therapy(upto10 mg/kg/days). But he responded to octreotide subcutaneous injection at 5 μg/kg/days. His genetic work up was done at Exeter Labs, UK which showed compound heterozygous mutation in ABCC8 gene (location exon 2 and intron 20; Missense and aberrant splicing) inherited from both the parents. These clinical course and genetic reports suggested diffuse involvement of pancreas causing hyperinsulinism, but we were restrained by the non availability of 18F DOPA in India. So PET scanning was done using a new radionuclide material called HYNIC TOC.
Results: HYNIC TOC PET/SPECT scan showed diffuse uptake of radionuclide material in the pancreatic tissue suggesting diffuse nesidioblastosis.
Conclusion: HYNIC TOC, used in the diagnosis of neuroendocrine tumors in adults widely can be tried in children with PHHI where 18F DOPA is not available, suggested by the correlation we found. Also, the properties like high in vitro and in vivo stability, rapid blood clearance, predominant renal excretion, improved image quality, lower radiation dose and EASY AVAILABILTY may make it an ideal material for this indication.

P7
Congenital hyperinsulinism in a newborn with a novel paternally inherited heterozygous mutation (p.E1517G) in the ABCC8 gene

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Background: Congenital hyperinsulinism (CHI), a clinically and genetically heterogeneous disease, is the most common cause of persistent hypoglycemia in infancy.
Case presentation: Here we describe an Egyptian male neonate first order of birth born to non-consanguineous healthy parents. At day one of age he presented with severe hypoglycemia and generalized seizures. At the time of hypoglycemia (16 mg/dl) insulin and C-peptide levels were increased (insulin 72 (6–25 uIU/ml; C-peptide, 7.8 (1.1–3.3 ng/ml), leading to the diagnosis of hyperinsulinaemic hypoglycaemia (HH).Serum growth hormone, cortisol, ammonia and lactate were normal. Patient was given glucose infusions and regular feeding hourly to maintain normoglycemia. The patient was discharged and an out-patient follow-up was instituted without any treatment. However, recurrent episodes of hypoglycemia were noticed. Medications (Hydrocortisone and Nifedipine) had no substantial effect on glycemic profile. Another treatment was started on Diazoxide 10 mg/kg/day with increasing dosage up to 25 mg/kg/day. This treatment was not effective and repeated episodes of hypoglycemia were observed 2–3 times a day. As parents refused surgery, Hydrochlorothiazide was added with substantial improvement of glycemic level. The child now is one year old growing well with no neurodevelopmental delay. Sequence analysis has identified a novel heterozygous missense mutation, p.E1517G (c.4550A >G) of the ABCC8 gene inherited form the father. As the p.E1517G mutation has been paternally inherited a focal lesion is possible, no mutation was identified in the mother.
Conclusion: Heterozygous paternally inherited ABCC8 mutations can lead to CHI which was responsive to medical treatment alone.

P8
Genetic results and outcomes of congenital hyperinsulinism: a case series at Putrajaya Hospital, Malaysia

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Introduction: Congenital hyperinsulinism (CI) is the most common cause of persistent hypoglycemia in infants. A delay in diagnosis leads to permanent neurologic damage. Mainstay of medical treatment is diazoxide. Infants who are unresponsive to diazoxide usually have mutations in the ABCC8 or KCNJ11 genes and often need pancreatectomy.
Objective and methods: To report seven of our patients with CI. Genetic study was done at Exeter,UK. Patient 3 and 4 had ^{18}F-DOPA PET scan and surgery done at Greifswald, Germany.
Results: Genetic mutations are described below. No common mutation was detected for patient 6 and 7. Patient 1 has hyperammonemia 268 μmol/l in keeping with GLUD1 mutation.
Conclusion: The management of congenital hyperinsulinism remains challenging. Molecular diagnosis plays an important role

Patient, Sex (M = male, F = Female)	Birth weight (kg)	Age onset	Genetic mutation	Current age (years)	Treatment	Outcome
1, F	2.2	4 months	Heterozygous novel missense mutation of GLUD1	6	Diazoxide 12 mg/kg/day	Reasonable control Mild developmental delay
2, F	3.7	Day 2	Homozygous ABBC8 frameshift mutation	4	Ryles tube (RT) feeding Diazoxide 15 mg/kg/day, SC octreotide 10 μg/kg/day	Global developmental delay Significant hypoglycemias Epilepsy, fit-free for 2 years, weaning off anti-epileptic, MRI showed ischaemic changes
3, M	4	Day 2	Heterozygous paternally inherited missense mutation in KCNJ11	3	Diazoxide-unresponsive 18F-DOPA PET scan showed focal uptake between head & body of pancreas 10% pancreatectomy at 1.5 years old	Cured post-op Normal development
4, M	4	Day1	Heterozygous paternally inherited frameshift mutation in ABCC8	1.5	Diazoxide-unresponsive SC octreotide 10 μg/kg/day 18F-DOPA PET scan-told large focal disease, no full report available Near total pancreatectomy at 7 months old	Reasonable control post-op with octreotide Global developmental delay
5, M	2.8	Day 5	Homozygous splicing mutation in ABCC8	2	RT feeding Diazoxide 15 mg/kg/day SC octreotide 10 μg/kg/day	Responsive to medications Normal development at 10 months old Defaulted follow-up
6, M	2.6	3 mths	None detected	8	Diazoxide 12 mg/kg/day	Satisfactory control Mild-moderate learning difficulties
7, F	4.8	Day 1	None detected	3 months	Pancreatectomy at 3 months old	Suspected Beckwith-Wiedemann Syndrome Passed away post-operatively

[Summary of genetic results, treatment and outcome]

in guiding treatment options and prognostication. Surgical management for focal disease is limited in our local settings because of unavailability of ^{18}F-DOPA PET scan.

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Flanagan S, Houghton Jayne, Ellard Sian, A.Hattersley (Molecular Genetic Laboratory, Royal Devon and Exeter, NHS Healthcare Trust, Exeter, UK)

P9

Novel heterozygous changes in Indian patients with gonadal dysgenesis and 46, XY karyotype

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Objectives: Male sex determination requires the coordinated expression of Y chromosome related gene (SRY) and some dosage sensitive autosomal genes. SRY, NR5A1, SOX9, DAX1, DHH & DMRT1 are some of the crucial genes involved in the determination of sex. Disorders of testicular development may occur due to the mutations in these genes.

Methods: Clinical, cytogenetic, psychological, histopathological, hormonal evaluation (LH, FSH & testosterone) & molecular analysis of SRY, NR5A1, SOX9, DAX1, DHH & DMRT1 genes was done in all patients.

Results: 15 patients were recruited in a period of 1 year. Age at presentation ranged from 6 days to 24 years. Five patients presented with chief complaint of primary amennorhoea and rest with ambiguous genitalia. Cytogenetic analysis revealed 46, XY karyotype. On pyschological evaluation their sex of rearing was found to be concordant with their assigned sex. Eight patients had undergone gonadectomy and hispathological examination confirmed dysgenesis of gonads. The hormonal profile in these patients ranged from 0.24 mIU/ml to 37.72 mIU/ml for LH, 2.76 mIU/ml to 136.80mIU/ml for FSH and <0.025 ng/ml to 0.305 ng/ml for testosterone. Five patients were diagnosed with Complete Gonadal Dysgenesis, two with testicular agenesis and eight with Partial Gonadal Dysgenesis. On molecular analysis, we found two novel missense mutations (one in DMRT1 gene L139Q and another in high mobility group box of SRY gene V69E), two novel heterozygous transversions in NR5A1 gene (one in intronic region c.990 + 22C > A and another in untranslated region c.2790T >A) and some previously reported genetic changes (rs2229989, rs2297605, rs12115433, rs1889311, CM067706, rs10120967, rs10283445) in our patients.

Conclusions: Despite the knowledge of the role of these genes, the cause of gonadal dysgenesis is still unclear. This work underlines the need to do the molecular analysis of patients in order to establish a genotype phenotype correlation.

P10

Clinical profile of disorders of sexual development (DSD) cases in Surakarta City, Central Java, Indonesia

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Objectives: To know clinical characteristic of DSD cases in Surakarta City, Central Java, Indonesia.
Methods: Retrospective study from medical records in Moewardi Hospital/Sebelas Maret University and private clinic in Surakarta, Central Java, Indonesia from Januari 2013 to April 2015. Data of clinical examinations, chromosomal analysis, and final diagnosis were obtained.
Results: Forty one (41) cases of disorder of sexual development are selected from the medical records. The clinical examination results are micropenis (19), undescensus testiculorum bilateral (15), clitoromegaly (14), adrenal crisis (11), hypospadia (7), undescensus testiculorum unilateral (7), scrotum bifidum (6), ambiguous genitalia (5), vaginal agenesis (2), short stature (1), sinechia vulva (1). Karyotype was done in 15 subjects; 46 XY (4), 46 XX (7), 45 X (1), 45 X/46 Xr(X) (1), 46 XY/45 X (2). Final diagnosis were congenital adrenal hyperplasia (15), isolated micropenis (12), undescensus testiculorum bilateral (4), undescensus testiculorum unilateral (4), Turner syndrome (2), mixed gonadal dysgenesis (2), Mayer-Rokistanky Kaisser Hauser (1), Poland syndrome with vaginal agenesis (1).
Conclusions: Cases of disorder sexual development were frequently found from congenital development of ambiguous genitalia and incomplete development of sex anatomy.

P11

Age related reference ranges for the HCG stimulation test in children with suspected disorders of adrogenisation using data mining approach

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Introduction: The HCG stimulation test is an important investigation to assess testicular function in infants and children with disorders of sexual differentiation. Although this test has been used over many years, interpretive guidelines, particularly *age related* reference ranges are ill-defined.
Aim: To establish normal age related testosterone responses to HCG stimulation.
Methods: An audit of clinical and biochemical pathology records in 70 children given HCG stimulation tests was performed and reviewed according to age. Testosterone was measured by immunoassay in 63% of patients and subsequently by LC-MS/MS. DHT was measured by RIA throughout.
Results: The 72 h post HCG testosterone response was highly age related. The upper limit increased from about 15 nmol/l in the first week of life to about 28 at 3 months of age and then declined to <10 at 2 years until the commencement of puberty when maximal response was >10. The *minimal response to HCG* in normal patients will be discussed but was more difficult to define due to imprecise establishment of final diagnosis but was <5 nmol/l until onset of puberty.
Conclusion: While these interim results will assist interpretation of HCG stimulation tests this ongoing study will benefit from increasing accumulation of data across the entire pediatric age range and the increased accuracy of testosterone (and DHT) values determineds by LC-MS/MS.

Poster Tour 2: Associated Diseases

P12

Hypoglycaemia: prevalence and characteristics in non-diabetic adults with cystic fibrosis (CF), attending a centre in Australia

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Cystic fibrosis (CF) patients with exocrine pancreatic insufficiency have reduced alpha, beta and pancreatic polypeptide cell function. Prevalence of non-diabetic hypoglycaemia (hypo) in CF adults have been observed as 7–15%.

Aim: The prevalence and characteristics of hypoglycaemia in non-diabetic adults with CF was reviewed.

Method: A retrospective audit (2013) included pre transplant CF adults ≥18 years (n = 275), excluding diabetic/impaired glucose tolerant patients (n = 84). Audit group n = 191. Hypoglycaemic patients (plasma glucose ≤3.9 mmol/l), were compared with normal glucose tolerant (NGT) controls.

Results indicate prevalence of non-diabetic hypo in total CF population was 28/275 patients (10.2%). No differences were identified between hypo and NGT control groups for age, gender, genotype, liver disease and lung function. Mean BMI was significantly less in hypo group (21.96 kg/m^2 SD 3.01) compared to controls (24.04 SD 4.63) (p = 0.023). The hypo group had significantly higher pancreatic insufficiency (p < 0.001). Characteristics of the hypo group: mean onset 21.75 years (SD 7.09), mean length of diagnosis 5.46 years (SD 4.56), 89% symptomatic adrenergic reactions, 11% asymptomatic. Most common hypo triggers: fasting/insufficient carbohydrates or delayed meal (61%). Common prevention strategies included regular low glycaemic index (GI) carbohydrates and higher protein items (75%).

Conclusion: Non diabetic hypoglycaemia is relatively common in adult CF patients. Risk factors include a lower BMI and pancreatic insufficiency; attention should be also given towards identification of hypo triggers including fasting or delayed meals. Further work is required to evaluate the impact of hypoglycaemic prevention and management strategies.

P13

Effectiveness of high dose (stoss) oral vitamin D supplementation with or without additional daily vitamin D in children with cystic fibrosis

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Objectives: Current Vitamin D replacement protocols in children with cystic fibrosis (CF) have not been able to achieve optimal 25-hydroxyvitamin D (25(OH) D) levels. We aimed to evaluate the effectiveness of high dose (stoss) oral vitamin D supplementation with and without additional daily vitamin D.

Methods: A retrospective case-note review was conducted for 136 children with CF attending to a single paediatric cystic fibrosis clinic (0–18 years, 75 males) for the period Nov 2012–Sept 2014 where 25 (OH) D levels were collected. In November 2012 a stoss protocol was adopted where children with inadequate 25(OH) D (defined as <75 nmol/l) were supplemented with a single dose of 200,000–500,000 IU Vitamin D (depending on age and 25(OH) D level) [Protocol 1]. In Oct 2013 the protocol was revised to include in addition to the supervised stoss dose a daily 1000 IU vitamin D (Protocol 2).

Results: Vitamin D deficiency was observed in 98 out of 136 children (72%). 73 received stoss therapy. Serum 25(OH) D levels ≥2 months post stoss were available for 53 children. Both protocols increased mean ± SD 25(OH) D levels significantly (71.2 ± 25.3 nmol/l vs. 56.5 ± 8.7 nmol/l, p < 0.001) with 49% (26/53) achieving adequate vitamin D status. There was no significant difference between protocol 1 and 2 in vitamin D levels post stoss (70.9 ± 26.3 nmol/l vs. 71.7 ± 24.1 nmol/l, p = 0.9) or the proportion of children no longer vitamin D deficient (50% vs. 47%, p = 0.9). There was no significant difference in post stoss vitamin D levels between pancreatic sufficient and insufficient children (85.3 ± 33.0 nmol/l vs. 68.3 ± 22.8 nmol/l, p = 0.06).

Conclusion: Stoss therapy significantly increases 25(OH) D levels regardless of protocol used, however 51% of children did not achieve an adequate vitamin D level. There was no difference in 25(OH) D levels post-therapy between 2 protocols. Further investigation is required to improve the effectiveness of vitamin D supplementation in children with CF.

P14

Influence of insulin therapy on nutritional status and pulmonary function in children and adolescents with cystic fibrosis related diabetes

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Objectives: Cystic fibrosis related diabetes (CFRD) is associated with more severe pulmonary disease and worse nutritional status which effects life expectancy of cystic fibrosis (CF) patients. Insulin is the only recommended therapy. Increase in FEV1 with reversal of chronic weight loss was evident during 12 months of basal insulin therapy. The aim of our study was to determine whether insulin therapy would improve pulmonary function and nutritional status in children and adolescents with CFRD.

Methods: Retrospective data from total of 40 CF patients managed at University Children's Hospital Ljubljana (Slovenia) who were screened for CFRD annually from the age of 10 years were analysed. Weight, height, BMI, spirometry values and results of OGTT were recorded yearly. A diagnosis of CFRD was made according to the published recommendations based on OGTT and continuous glucose monitoring. Change in BMI SDS and FEV1% obtained a year before, at baseline and 1 year after the initiation of insulin treatment in 7 CFRD patients (aged from 10 to 15 years) were compared.

Results: Ten (2 males, 8 females) of 40 CF patients met the diagnostic criteria of CFRD. The median age at diagnosis of CFRD was 13.3 years. BMI SDS and FEV1% were lower in CFRD patients compared to the patients without CFRD, but the difference was not significant. Out of 10 subjects, data from 7 subjects treated with short acting insulin before meals was obtained. In the year before therapy a decline in BMI SDS (-0.28 ± 0.47) and FEV1% (-7.33 ± 8.89) was observed. After 1 year of treatment BMI SDS increased for 0.13 ± 0.7 SDS and FEV1% for 2.67 ± 9.03 (%).
Conclusions: Although the differences were not statistically significant insulin therapy reversed decline in BMI SDS and FEV1% in patients with CFRD. Insulin may prove to be successful in improving nutritional status and pulmonary function in children and adolescents with CFRD. Therefore treatment after the confirmed diagnosis of CFRD should not be delayed.

P15
Characteristics of thyroid autoimmunity and dysfunction in children and adolescents with type 1 diabetes mellitus

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Objectives: The aim of this study was to evaluate the prevalence and characteristics of Autoimmune Thyroid Disease (AITD) in children and adolescents in a university Hospital from an urban area.
Methods: This is a cross-sectional study, analyzing clinical data from medical records of T1D patients from 1 to 20 years. All patients were evaluated for thyroid function (TSH and free T4) and autoimmunity (anti-TPO and anti-TG antibodies). Other recorded data: age at diagnosis of diabetes, duration of diabetes, time of follow-up, age at onset of thyroiditis, auxologic data and metabolic control assessed with glycated hemoglobin (HbA1c).
Results: We included 233 T1D patients, 131 female (56%), mean ($\pm$SD) age at T1D diagnosis: 7.7 ($\pm$4.0) years; mean duration of T1D: 12.4 ($\pm$5.8) years. AITD was found in 49/233 (21%), 35/49 (71.4%) female, with a mean age at diagnosis of 11.9 ($\pm$3.3) years, and mean time between T1D diagnosis and AITD was 3.7 ($\pm$3.1) years. In the AITD group, 18/49 (37%) had hypothyroidism, 1/49 (2%) hyperthyroidism and 30/49 (61%) had normal thyroid function. Compared to patients without thyroiditis,those with AITD were more female, had longer duration of diabetes and higher TSH levels. Patients with <5 years of age at the time of T1D diagnosis took a longer time to present AITD.
Conclusions: Our data showed high frequency of AITD in young T1D patients coming from urban area, mainly adolescents and females, similar to what is described in other populations in Brazil. These data may suggest different approaches for AITD screening in patients with T1D according to their individualities.

P16
Celiac disease in children and adolescents with type 1 diabetes mellitus

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Objective: To evaluate the prevalence and the characteristics of celiac disease (CD) in patients with type 1 diabetes mellitus (T1D).
Subjects and methods: We conducted a cross-sectional prospective study with young T1D patients who were regularly followed-up in the Diabetes Clinic at Santa Casa of São Paulo School of Medicine (ISCMSP), São Paulo, Brazil, from January 2014 to January 2015. Clinical data assessed were current chronological age (CCA), chronological age at diagnosis (CAD), duration of T1D since diagnosis (DTD), and presence of typical and atypical symptoms of celiac disease. The complementary tests performed included glycated hemoglobin (HbA1c), total IgA and anti-endomysial antibody (EMA-IgA). All patients reactive to EMA (EMA+) underwent a duodenal biopsy. CD was diagnosed if EMA+ and histological alterations in the small intestine mucosa consistent with CD (Marsh criteria) were present.
Results: A total of 134 patients were screened and 3 were excluded due to undetectable total IgA levels, so we included 131 patients (67 female [51.1%]; CCA = 12.2 + 4.1 years; DTD = 5.7 + 4.5 years; CAD = 6.5 + 3.8 years). Among these, five patients showed reactive EMA, and underwent digestive endoscopy and duodenal biopsy. In all 5 patients we found histological characteristics compatible with CD. So the prevalence of CD in the assessed group was 3.8% (5/131). From de 5 CD patients, 4 had been diagnosed with T1D below 4 years of age. There were no difference between CD+ and CD- patients regarding BMI, Height, HbA1c and insulin dose. Importantly, four out of the five CD patients were asymptomatic.
Conclusions: Celiac disease was associated with T1D in 3.8% of the patients, most of whom (4/5) did not have GI symptoms. There was a high correlation between EMA and duodenal biopsy. This study reinforces the importance of performing CD early screening (during the childhood and adolescent stages) in T1D patients.

P17
Aniti-parietal cell (ATP4A) autoimmunity in children with type 1 diabetes (T1DM)

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ATP4A autoantibodies (AuAbs) against parietal cells are typically present in the sera of individuals with atrophic body gastritis (ABG), an autoimmune disease associated with T1DM. A former project, concerning the relationship of ATP4A AuAb incidence and Helicobacter pylori infection, revealed ATP4A AuAb in 30% of the general pediatric T1DM population (no associated autoimmune diseases excluded).
Objective: The present study aimed to assess ATP4A AuAb prevalence in T1DM children with no other autoimmune diseases and estimate if ATP4A AuAb positivity is related to complete blood count (CBC) values, fetal hemoglobin (HbF) or glycemic control (HbA1c).
Methods: Sera, CBC and HbF samples from 94 (55♀) T1DM children (aged 12.5 ± 4.1 years, T1DM duration 0–15.7 years, mean HbA1c at study time 7.34 ± 1.53%) and exclusion of other autoimmune diseases were collected at the regional diabetes clinic in Katowice, Poland. ATP4A AuAbs were measured using a radioimmunoprecipitation assay (RIA) developed at the Barbara Davis Center for Childhood Diabetes, University of Colorado Denver, USA. HPLC was used to measure HbF and HbA1c.

Results: ATP4A AuAbs were identified in 16 (17%) children. Univariate analysis did not reveal significant ($p > 0.05$) relation between ATP4A.

AuAb presence and: gender, age, age at T1DM diagnosis as well as T1DM duration. Also no significant differences in CBC values (red blood cell count, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, red blood cell distribution width), HbA1c or HbF were found ($p > 0.05$).

Conclusions: ATP4A AuAbs are detectable in a significant percentage of T1DM children. Presence of these AuAb does not appear to impact the CBC values or to be related to glycemic control.

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P18
Eating disorders in type 1 adolescent females

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Objective: To study the prevalence of eating disorders in type 1 diabetic adolescents in comparison to the non diabetic control group of adolescents.

To compare the Glycaemic variability in diabetic subjects with eating disorder to those without the eating disorder.

Methodology: Inclusion criteria:

1). 12–18 years age
2). Type 1 diabetes more than 3 years

Exclusion criteria: Patients with co morbid conditions.

Study design: Cross sectional Case-Control study: No of subjects: 56 females aged 12-18 years with type 1 diabetes and 50 females age matched non diabetic controls.

Both the study and control groups were given a questionnaire based on the answers of which it was decided whether or not the subject suffered from any eating disorder. Also the HbA1c levels of all the diabetic subjects were measured.

Results: It was observed that eating disorders that met DSM-IV criteria were more prevalent amongst the diabetic subject (15%) than their non diabetic counterparts (5%). Subthreshold eating disorders were also more prevalent amongst the diabetic subjects (20%) than in the controls (7%). HbA1c levels were comparatively higher in the diabetic subjects with an eating disorder (HbA1c-9.8%) than those without any eating disorder (HbA1c-8.2%).

Conclusion: Eating disorders are more prevalent in the diabetic patients as compared to their non diabetic peers. Also those with diabetes with an eating disorder tend to omit their regular insulin dosages and thus have a higher Glycaemic variability in the form of higher HbA1c levels than those diabetic subjects without an eating disorder.

Patients were concluded to have Mauriac syndrome. It was observed to be as a result of uncontrolled blood glucose levels and/or decreased IGF-1 levels.

P19
Pancreatectomy and auto islet transplantation in a child with severe chronic hereditary pancreatitis

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Severe chronic hereditary pancreatitis frequently leads to pancreatic cancer and insulin dependence in adulthood. Pancreatectomy with auto islet transplantation has a higher success of ending opiate dependence and preventing insulin requirement if performed preadolescent[1].

A 7 year old indigenous Australian boy presented with a 3 year history of severe chronic hereditary pancreatitis (PRSS1 7q34) requiring opiates daily for pain relief and frequent admission to hospital. Medical treatment, with antioxidants and Creon, pain relief (oxycodone, tramadol, and amitriptyline), and endoscopic treatment, had failed. He could not attend school regularly. His father had pancreatectomy for severe chronic hereditary pancreatitis in early adulthood and has well controlled insulin dependent diabetes with HbA1c = 7.0% and no detectable vascular complications. A younger brother also has hereditary pancreatitis, but is less symptomatic.

The family presented with the request for pancreatectomy and auto islet transplant after their extensive internet research. Assessment with the Minnesota criteria[1] confirmed that he was eligible. His oral GTT was normal. Ultrasound of the pancreas showed a hugely dilated pancreatic duct, loss of pancreatic volume, and intra ductal calcification. Human Ethics Committee approval for the procedures was received after extensive family discussion over 12 months. The procedure and subsequent course after pancreatectomy and islet transplantation will be presented.

The case provides reflection on the ethics and optimal timing of pancreatectomy and auto islet transplant to ensure the best long term outcome in this debilitating condition.

1. Bellin MD, Carlson AM, Kobayashi T, Gruessner AC, Hering BJ, Moran A, Sutherland DE. Outcome after pancreatectomy and islet autotransplantation in a pediatric population. J Pediatr Gastroenterol Nutr. 2008; 47(1): 37–44.

P20
Bone metabolism and glucose control in children and adolescents with T1DM

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Objectives: Experimental studies suggested that undercarboxylated osteocalcin (GluOC) is directly related to insulin sensitivity and secretion. Aim of the present study was to evaluate whether in type 1diabetic children and adolescents the glycemic control is influenced by the bone metabolism.

Methods: We studied 79 DMT1 patients (45 male), age 14(7) years, disease duration 59(49) months, HbA1c 7.8(1.2)%, insulin requirement 0.8(0.3) U/kg/day; 12 patients were treated with CSII and 57 with MDI. In all patients we measured: height (H), weight, waist circumference (WC), L2-L4 spine and total body BMD (evaluated by DXA), serum levels of calcium, phosphate, magnesium, alkaline phosphatase, PTH, 25-OH-D, undercarboxylated (GluOC) and

carboxylated osteocalcin (GlaOC). Data are reported as median (IQR). Mann–Whitney, simple and multiple regressions were used for statistical analysis.

Results: We divided our patients according to the metabolic control in two groups: Group A (good control – HbA1c ≤7.5%) and Group B (poor control – HbA1c >7.5%). Group B showed significantly lower levels of 25-hydroxy vitamin D (23.6 ng/ml (12.6) vs. 18.6 ng/ml (13.2); $p < 0.01$). Alkaline phosphatase resulted inversely correlated to GluOC adjusted for age ($p < 0.05$) and to GluOC/GlaOC ratio ($p < 0.01$). L2-L4 ($p < 0.0001$) and total body ($p < 0.0002$) BMD Z-Score were both highly directly correlated to SDS-BMI. WC/H ratio resulted directly correlated to GluOC/GlaOC ratio ($p < 0.01$) and inversely correlated to GlaOC adjusted for age ($p < 0.01$).

Conclusion: Our results support the hypothesis of a favorable effect of vitamin D on insulin/glucose balance in children and adolescents with T1DM, with no evidence of significant effect of exogenous insulin and metabolic control on osteocalcin levels and bone density. Furthermore our study confirms inverse correlation between osteocalcin and visceral fat, previously reported both in mice and humans.

P21
25(OH)D levels in patients of type 1 diabetes mellitus

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Objectives: Vitamin D supplementation is associated with increased insulin secretion and decreased incidence of type 1 diabetes mellitus (T1D). The study was conducted to evaluate vitamin D levels and its association with insulin and glycemic control in T1D patients.

Methods: 73 consecutive type 1 diabetes (T1D) patients were included. Anthropometry, 25(OH)D and fasting insulin levels were measured.

Results: Mean HbA1c of the study population was 11.8 ± 3.2. Mean 25(OH)D levels were 16.8 + 12.3 ng/ml. 41(56.2%) patients had an episode of Diabetic ketoacidosis. 7(9.6%) patients had primary hypothyroidism.

Vitamin D levels <30 ng/ml were present in 43 of 47(91.5%) patients and 75% of age and sex matched controls. 32(68.1%) patients had levels <20 ng/ml. Patients with low 25(OH)D levels were significantly younger (18.8 ± 6.6 years vs. 21.5 ± 9.1 years, $p = 0.024$). Phosphorus levels were lower in 25(OH)D deficient group. There was no difference with regards to glycemic parameters or insulin requirement in vitamin D deficient and sufficient groups.

Females had an earlier age of presentation than males (15.9 ± 6.9 years vs. 19.5 ± 7.7 years, $p = 0.048$ respectively). Diabetic ketoacidosis was more frequent in females (70.5%) compared to males (43.5%), $p = 0.031$. Patients with diabetic ketoacidosis were younger (15.8 ± 7.15 years vs. 20.16 ± 7.18 years, $p = 0.008$) with an earlier age of onset of diabetes (13.3 ± 6.8 years vs. 17.2 ± 6.6 years, $p = 0.021$). Those with ketones positive had significantly lower body weight (32.3 ± 12.3 kg vs. 45.4 ± 16.3 kg, $p < 0.001$) and BMI (15.4 ± 3.3 kg/m^2 vs. 18.7 ± 5.1 kg/m^2, $p = 0.002$).

Conclusion: Vitamin D deficiency was highly prevalent, although seen more commonly in younger age group in T1D patients. Vitamin D insufficiency was not a significant predictor of poor glycemic control or more insulin requirement. Diabetic ketoacidosis was more frequent in females and could be due to less treatment and care given to girl child in our country.

P22
Simultaneaous onset of diabetes and juvenile dermatomyositis in a boy

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Introduction: Juvenile dermatomyositis (JDM) is a chronic systemic autoimmune disease characterized by proximal weakness and characteristic skin rashes. Even if the disease may resolve over several years with a few sequelae, some patients have residual weakness, muscle atrophy, joint contractures, and/or calcinosis. A less frequently recognized complication is lipodystrophy (LD). LD could be generalized, partial or focal. Usually, LD follows JDM several years after the diagnosis of JDM. In patients with partial or generalized LD, insulin resistance (IR), diabetes and hypertriglyceridemia are metabolic features that must be searched for[1,2].

Clinical case: We report on a 15 years old boy without any personal history.

Actual complaints and physical examination: muscle weakness and pain for 3 months, loss weight: 4 kg, weight: 43 kg (−1.7DS), height: 170 cm (−0.2DS), erythematous papules overlying the metacarpal and interphalangeal joints (Gottron's papules)

Biological data:

CPK: 4015 UI/l, GOT: 212 UI/l, GPT: 91 UI/l

Glycaemia: 77 mg/dl, insulinemia: 44.2 pmol/l, HbA1c: 37 mmol/mol

FAN, DOT, Mi2, ENA, JO1, PL-7,PL12, ribosomes, M2, SRP: /-/

Triglycerides: 379 mg/dl.

Oral glucose tolerance test: at diagnosis before any treatment and at 3 months (before/3 months) 0, 30, 60, 90, 120 min: glycaemia: 80/70, 158/133, 192/112, 194/97, 208/92 mg/dl and insulinemia: 15/59, 480/433, 462/410, 534/496, 849/519 pmol/l. No treatment for the diabetes or IR was started.

Muscle biopsy: inflammatory myopathy, muscle fibers atrophy

Treatment: intravenous Medrol 1 g for 5 days, followed by oral prednisolone 1.5 mg/kg/j. Dosis could be decreased to reach, 3 months later, 0.2 mg/kg on alternate day.

Conclusion: This is the first case of JDM with partial LD at onset, associated with diabetes documented before treatment. Corticosteroid treatment for JDM seems to improve also the IR and diabetes resolved. We hypothesized that IR is probably immune mediated.

Poster Tour 3: Diabetes Acute Complications

P23
Acute kidney injury as a severe complication of diabetic ketoacidosis

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Background: Diabetic ketoacidosis [DKA] in children and young adults carries significant morbidity and mortality relating to complications such as cerebral oedema. Acute kidney injury (AKI) is a rare but potentially fatal complication of DKA. We present 3 cases of DKA complicated by AKI.

Case 1: A 9 year old girl presented with severe DKA at diagnosis. She was treated with intravenous fluids and insulin as per protocol. She had oliguria and haematuria 36 hours after admission. She was hypertensive with evidence of enlarged kidneys on ultrasound (USS). She was transferred to the renal unit where she needed 2 cycles of hemodialysis before making full recovery.

Case 2: A 14 year old girl presented with severe DKA and altered consciousness at diagnosis.

She developed oliguria 24 hours after starting treatment for DKA. USS of abdomen showed enlarged kidneys. Her renal function improved with haemofiltration and recovered fully by 1 week.

Case 3: 17 year old girl with poorly controlled type 1 diabetes presented with severe DKA. She showed evidence of AKI with very high plasma creatinine, oliguria and low plasma phosphate. She was managed conservatively with individualised fluid plan and phosphate supplementation with recovery in 7 days.

Conclusion: Patients with severe DKA can develop AKI due to a number of possible causes, hypovolaemia being the most likely primary cause. Appropriate management of hypovolemia and electrolyte disturbance in these patients can be very challenging. These cases highlight the importance of early recognition of AKI (rising plasma creatinine, oliguria, haematuria) and discussion with paediatric nephrologist to formulate individualised fluid therapy in order to prevent deterioration in renal function. It is uncertain if recent modification in fluid management of DKA has led to a change in the incidence of AKI.

P24
Diabetic ketoacidosis in an adolescent and young adult population in the UK in 2014: national survey comparison of the management in adult and paediatric settings

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Background: The management of diabetic ketoacidosis (DKA) differs in the UK between adults and children, but the extent of use of national guidelines and outcomes are unknown. In a national survey we examined management and outcomes of teenagers and young adults across adult and paediatric services.

Methods: We sent a standardised questionnaire to adult and paediatric services requesting details of all DKA admissions in teenagers over the age of 14 years ("adolescents"), and in young adults ("adults") up to the age of 22 years during a 6 month period in 2014. Data collected covered clinical, biochemical, outcome, and discharge information.

Results: 64 adult patients were aged 22 or under (7 were teenagers aged between 10 and 16). 56 paediatric services submitted 71 patients (mean age 14.9 years). 85% adolescents and 69% adults were treated according to national guidelines. Causes of DKA were adherence problems and infection in most cases; only 4(3%) were at diagnosis. 89% adults and 99% adolescents were treated with 0.9% saline and fixed-rate insulin infusions, but 16% adults had an insulin bolus. Insulin treatment was delayed in adolescents compared with adults (100 min vs. 39 min after admission). 23% of potassium levels in adults and 8.8% in adolescents were below 3.5 mmol/l ($p < 0.005$). Lowest potassium levels were 3.98 mmol/l in adolescents and 3.60 mmol/l in adults ($p < 0.005$). Hypoglycaemia occurred in 42.3% adolescents and 36% adults. None of 9 adolescents started on insulin 0.05 Units/kg/h became hypoglycaemic, but DKA resolution was slower (21.4 h vs. 15.3 h, $p = 0.015$). Time to DKA resolution was similar in adults (18.2 h) and adolescents (16.0 h), as was length of stay (2.53 vs. 2.35 days).

Conclusions: Young adults and teenagers in the UK are treated mostly according to national guidelines, but hypoglycaemia and hypokalaemia is unacceptably common. Potassium replacement in adult guidelines and insulin and glucose in all DKA guidelines need to be reviewed.

P25
Audit of DKA management in Wellington New Zealand 2005–2013

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Objectives: Diabetic ketoacidosis (DKA) is the commonest cause for diabetes-related death in children & adolescents. The New Zealand DKA protocol was planned to be updated in 2014. In preparation to this, we aimed to audit adherence to the current protocol in patients 17 years & younger presenting to Wellington Hospital with DKA from Jan 05–Dec 13.

Methods: Retrospective case note review of all patients under 17 years with DKA (Hyperglycaemia with pH <7.3 and/or HCO3 < 15). During the study period we identified 74 episodes in 54 patients (28 male), aged 13 months – 17 years (median age 12.4 years).

Results: There was poor adherence to the DKA guideline with only 54.1% treated appropriately. 81.1% received an initial fluid bolus whereas only 9.5% were admitted to ICU. 25.3% had intravenous fluid (IVF) started in <30 min of presentation and 56.9% received IVF for <24 h. One patient had cerebral oedema & multi-organ failure, 3 cases had iatrogenic hypoglycaemia and 21 cases had low K+ following initial treatment. It was unclear if DKA patients received cardiac monitoring.

Errors made were mainly around IVF rate, insufficient K+ supplementation, inappropriate adjustment of dextrose strength, use of the adult DKA or perioperative protocol and giving bolus insulin prior to insulin infusion. In 8 cases, the patient's weight was not recorded (though it is required for fluid prescription). Low K+ occurred in 12 cases that were adherent to the guideline, suggesting higher K+ intake may be required in our population. Imprecise documentation of fluid therapy was also of concern.

Conclusion: Significant improvement in adherence to the local guidelines is required and should be emphasized to all associated ambulance, medical & nursing staff. An online practice module or

inclusion in orientation package may be useful. Changes to the NZ national paediatric DKA protocol should mitigate many of the identified issues and will be the subject of a future re-audit.

P26
Severe hypertriglyceridemia, acute pancreatitis in a new onset of type 2 diabetes adolescent presenting with diabetic ketoacidosis

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Objective: We report, a 14 years 6 months old girl presented with episodic abdominal pain, diabetic ketoacidosis (DKA) and milky serum which found to be hypertriglycedemia (>8,000 mg/dl) and hypercholesterolemia (1.456 mg/dl).
Case report: She was a chubby child and became obese on late childhood period with a strong familial history of type 2 diabetes, comblined hyperlipidemia. She was followed up in obesity clinic, received metformin occasionally, OGT was done every other years since 10 years. She has had irregular menstruation after menarche, then received oral contraceptive pills since 13 years 10 months. At diagnosis, BMI 23 kg/m^2, initial lab were blood glucose 322 mg/dl, Na 111, K 4.2, Cl 81, HCO3 14 mmol/l, lipase 977, amylase 569 mg/dl, urine ketone positive(strong), Hb A1c 8.3%. Her DKA resolved within 36 h after insulin and fluid therapy, pancreatitis resolved gradually, serum was less milky overtime. At day 4th, serum triglyceride decreased to 208, cholesterol 425, lipase 67, amylase 31 mg/dl, and finofibate 160 mg was started together with basal-bolus insulin regimen, insulin glargine 10 units, novorapid 1 unit: CHO 15 g before each meals and Metformin 1000 mg/day.

At one month, serum triglyceride and cholesterol reached normal range at 97 and 166 mg/dl, finofibate was discontinued. AntiGAD, IA2 were negative, diagnosed type 2 diabetes. Metformin was added, insulin was reduced according to normal blood glucose level. Her HbA1c was decreased to 5.6, 5.5, 6% at 3, 6, 9 months respectively by using insulin glargine 6 units once at night and metformin 2,000 mg/day.
Conclusion: A triad of DKA, hypertriglyceridemia, pancreatitis resulting from insulin deficiency in new onset diabetes in the young is rarely reported during last two decade, but it seems to be more as a few report cases, therefore pediatric endocrinologist must be awared of and recognized as it needs more exclusive management than usual normal presentation of DKA.

P27
Acute complications in children with type 1 diabetes from a regional cohort setting. Auckland, New Zealand

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To study the incidence of acute complications (diabetic-ketoacidosis (DKA) and severe hypoglycaemia (SH)), in T1DM children aged <16 years from a single regional tertiary diabetes centre, Auckland, New Zealand. To determine any factors associated with these complications.
Methods: A retrospective review of a prospectively collected cohort who attended the Starship paediatric diabetes clinics: Jan 1, 1999, through Dec 31, 2014.
Results: There were 1,115 children aged <16 years with 5,536 person-years of follow-up data. The average age was 10.9 years, median HbA1c 8.2%, diabetes duration 3.6 years, Females 46%; 66% European, 8.8% Maori, 12% Pacific Island and 12% other.

DKA.

There were 220 DKA episodes in 178 patients, with an overall incidence of 3.9 per 100 patient years. The proportions of mild, moderate and severe DKA were 51%, 26% and 23% respectively. 63% of DKA episodes occurred among 19% of children who had recurrent DKA. There was no significant change in DKA rate after either the introduction of Glargine (2005) or increasing numbers on insulin pumps (especially from 2006). Children reported missing insulin in 40% and infections were in 26%. Among 184 pump users, 16 patients had 19 episodes (8.6%) of DKA after initiation of pump therapy. 9% of pump users had DKA compared to 16% with non-pump users ($p < 0.01$)
SH: There were 799 episodes of SH in 351 patients, with an overall incidence of 14 per 100 patient years. There has been a reduction on SH: SH rate gradually decreased from 23 in 2004 to 9 per 100 patient years in 2014 ($p < 0.05$). 78% of SH episodes occurred among 78% of children who had recurrent SH events. Europeans had few recurrent DKA($p < 0.003$) and SH ($p < 0.047$) compared to other ethnicities.
Conclusions: In this regional cohort, SH rates are improving and DKA rates are stable over this 16 years period. Unlike a small group with recurrent DKA, a large group have recurrent SH. The introduction of both Pumps and Lantus do appear to be associated with stable DKA and improved SH rates.

P28
Clinical features of different ages childhood type 1 diabetes mellitus in Tian Jin of China

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Objective: To describe the clinical features and laboratory characteristics of newly diagnosed diabetic children and discuss its clinical significance.
Method: Retrospective analysis was carried out on the clinical data collected from 185 newly diagnosed Type 1 diabetes patient at Tian Jin children's hospital from May 1997 to March 2012. These data were divided into 3 groups by age and compared in terms of clinical manifestations and laboratory characteristics.
Results: Type 1 diabetes was more common in female children (53%), and the incidence rate of diabetic ketoacidosis was 43.8%. The most common symptoms were polyuria and polydipsia. Weight loss, polyuria and polydipsia happened frequently in older groups. For different age groups, the time from incidence to definite diagnosis of the young age group was the shortest. The percentage of precursor infection was relatively high, and the incidence of breathing abnormaly and consciousness disturbance was frequent. Meanwhile, the blood phosphorus, potassium and lactic acid levels were higher in the young age group, but blood HbA1c, blood sodium, and blood Tcho were lower than those of children of elder age. The level of C peptide was lower in the median age group.
Conclusion: The incidence of diabetic ketoacidosis in type 1 diabetes patients was high. The young infants were more likely to suffer from metabolic disorder, because diabetes developed fast and their state of illness was serious in these children. To strengthen propaganda and education and improve the level of medical diagnosis and treatment

is an important way to reduce diabetic ketoacidosis incidence. The onset of T1DM in small-age children was acute and severe, and more attention should be given to such cases.

Keywords: Type 1 diabetes mellitus children age clinical features

P29
Evaluation of questionnaires to classify awareness of hypoglycemia in children and adolescents with type 1 diabetes

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Objective: To evaluate the use of the "Gold" and "Clarke" questionnaires in detecting impaired awareness of hypoglycemia (IAH) in children and adolescents with type 1 diabetes (T1D).

Methods: 112 patients with T1D (duration ≥6 months) aged 2–19 year. completed two questionnaires (Gold, Clarke) followed by four weeks of blood glucose (BG) and symptoms registration. Questionnaire scores were correlated to previous severe hypoglycemia (SH) with seizures and/or coma, and prospectively registered data. Fisher`s Exact test, Mann–Whitney *U*-test, *t*-test and Spearman`s rank correlation were used for data analysis.

Results: The 4-week diary was completed by 102 subjects (91%) (50 males). Non-completers (9%) had similar clinical characteristics as completers, whose mean (SD) age was 12.5 (3.8) years, T1D duration 64.5 (46.1) months and HbA1c 8.1 (1.2)%. Insulin pump therapy was used by 74.5%, and 25.5% used multiple injections. They performed SMBG 6.0 (1.9) times daily and registered 12.1 (7.8) episodes of symptomatic or asymptomatic hypoglycemia <4.0 mmol/l per month. Mean (SD) scores were 1.51 (1.29) (Clarke) and 2.48 (1.19) (Gold). A cut-off of 3 gave the best prediction of IAH because Clarke score ≥3 predicted higher prevalence of SH (9.1% vs. 0%, p = 0.045) in the next four weeks and was associated with more SH the preceding year (22.8% vs. 3.8%, p = 0.011). The Gold score ≥3 predicted increased risk of asymptomatic hypoglycemia <3.6 mmol/l (24.7% vs. 13.1%, p = 0.004). Using a score of 3 as cut-off, 40.0% (Gold) and 21.6% (Clarke) of participants were classified as having IAH.

Conclusions: In this pediatric T1D population (74.5% insulin pump users) both the Gold and Clarke questionnaires were valuable to classify the state of hypoglycemia awareness; a cut-off score of 3 seemed most appropriate. Clarke predicted episodes of SH whereas Gold predicted occurrence of hypoglycemia without symptoms.

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increased incidence of injuries in children and adolescents with type 1 diabetes

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Background: Hypoglycemia or hyperglycemia may increase the risk of injury in patients with type 1 diabetes (T1D). The goal of this study was to determine whether the risk of injury in youth with T1D differs from that in the general population.

Material and methods: The study population included all Colorado residents aged <20 years followed for 14,332,638 person-years, during 2000–2010. Annual age-specific intercensal population estimates were obtained from the State Demographer and aligned with the 2000 and 2010 US Census data. Cases of injury resulting in death, hospitalization or emergency department visit (N = 34,761) were ascertained using the population-based Colorado Trauma Registry. Injury was classified using the ICD-9 and Clinical Modification injury codes. Youth with T1D among injury cases (N = 84) were identified based on a comorbidity variable. The population of youth with T1D who were at risk for injury in 2000–2010 (15,369 person-years) was estimated based on SEARCH Colorado diabetes prevalence data for 2001 and 2009.

Results: The incidence of injury in youth with T1D was significantly higher – 5.4/1000 p-years than that in the underlying population – 2.4/1000 p-years, RR = 2.25 (95% CI 1.81-2.78). Most injuries (67%) occurred in males, regardless of diabetes status. Age-group 15–19 years accounted for 67% of injuries in patients with T1D and 42% in the general population. Motor vehicle accidents (MVA) were the primary cause of injuries in T1D patients and responsible for half of the injuries among 15–19 years olds. The incidence of MVA injuries in T1D patients – 1.8/1000 p-years was significantly increased, compared to the general population – 0.6/1000 p-years, RR = 3.29 (2.27–4.77). The risk of falls in youth with T1D diabetes was less pronounced – RR 1.62 (1.05–2.48).

Conclusions: Youth with T1D is more likely to suffer injury, particularly in older teenage years. Increased incidence of MVA-related injuries in youth with T1D requires further evaluation.

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Ketoacidosis at diagnosis of type 1 diabetes in children and adolescents: role of the general practitioners

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Objectives: The frequency of ketoacidosis (DKA) is >40% in France at diagnosis of type 1 diabetes (T1D) in children and adolescents. General practitioners make the diagnosis in more than half the cases. The study aimed at evaluating their role in the diagnosis of T1D.

Methods: General practitioners (GP) of three different groups were asked to answer a questionnaire to evaluate their knowledge and practice to diagnose T1D in children and adolescents: age at diagnosis, revealing symptoms, diagnostic criteria and practice, referral to hospitals, frequency and risk of DKA. Answers were collected from 562 GPs, M/F 55/45%, aged 45 ± 15 years.

Results: Answers to the questionnaire showed that: 51% had previously diagnosed T1D in children and adolescents; 27.8% did not know that T1D existed before age 2 years, 4.3% before 5 years; 45.7% evaluated the risk of DKA >25% at diagnosis, but 8.4% did not think it could be lethal. Polyuria polydipsia was a revealing symptom for 97% of them, but enuresis for only 43.8%; loss of weight for 95.1%, asthenia 83.6%, abdominal pain 51.1%, vomiting 54.3%, dehydration 61.6%, dyspnea only 16.9%; for non specific criteria, family history of diabetes 53.7%, recurrent urinary infections 40.9% and visual impairment 19%. Measuring blood glucose was judged

mandatory for 83.3%, in the fasting state for 52.1%, immediately for 51.8%; urine analysis was considered as sufficient for 63.2% and should be made immediately for 74.5%; 89% disposed of urine tests, 88.1% of a glucose meter, in their office. Diagnostic criteria were fasting blood glucose >126 mg/dl on two days for 53.6%, >200 mg/dl at any time for 56%. After diagnosis was suspected, 81.3% would refer the child to pediatric emergency units, 17.4% to a hospital outpatient clinic, 6.8% to a liberal endocrinologist.

Conclusion: General practitioners should be better informed about the specificities of T1D in children and adolescents and the urgency to hospitalize them to prevent DKA at diagnosis.

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Abstract withdrawn

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Symptomatic threshold of hypoglycemia and predictors of severe hypoglycemia in children and adolescent with T1DM

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Objectives: To evaluate the ability of a group of children and adolescent with T1DM to recognize the state of hypoglycemia and to estimate their hypoglycemic symptomatic threshold (HST). To identify risk factors for the development of severe hypoglycemia.

Methods: Forty-five T1DM patients (22 Males) aged 15.1 (5.3) were asked to complete a questionnaire designed to investigate the HST, the type of neuroglycopenic and autonomic symptoms and the frequency of moderate and severe hypoglycemic episodes.The patients were then asked for a three months period to measure and record blood glucose (BG) levels and any hypoglycemic symptom at least four time a day (before and two hours after main meals). HbA1c, Insulin requirement, mean and SD of BG values, low BG (LBGI) and high BG (HBGI) indexes were taken into account.The results are reported as median (IQR). Mann–Whitney, Kruskal–Wallis and simple regression were used for statistical analysis.

Results: Forty-five patients completed the questionnaire and 14 (31%) of them reported the three months glucose and hypoglycemic symptoms monitoring. The reported HST was 69 mg/dl in 28/45 (62%), 50 mg/dl in 14/45(31%) and 40 mg/dl in 3/45(7%).The patients reporting the lowest HST showed significant higher LBGI ($p < 0.05$). The rate of hypoglycemic values in HBGM in the previous six months was 7.7% (7.4). The percentage of hypoglycemic values resulted directly related to disease duration ($p < 0.05$), age ($p < 0.02$), LBGI ($p < 0.002$). Four patients (10%) who reported a HST of 69 mg/dl and who declared to be always able to recognize hypoglycemic symptoms, showed, during the previous year, at least one episode of severe hypoglycemia. The patients who showed severe hypoglycemic events have significantly higher BG SD in the last six months ($p < 0.002$).

Conclusions: In our experience, BG-SD is a predictive parameter of severe hypoglycemic events, while LBGI, HST and prevalence of LBG values do not appear to be reliable risk indicators.

Poster Tour 4: Diabetes Care I

P34

Info-diabetes: an approach of mobile phone massaging to minimize the complexities in diabetic patient care

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Objectives: Info-Diabetes is becoming an important approach in E-health to stipulate the diabetic patient care and management. In this study we have tried to get an overview for application of mobile phone text messaging over adolescent diabetic patients (ADPs). The major objective of this study was to test whether adding mobile application for patient care compared with control cases would reduce Glycated Hemoglobin (HbA1c).
Methods: Eleven ADPs (study cases, $n = 11$) were selected for mobile phone coaching through text messaging, with consultants. ADPs of the control site ($n = 09$) were continued with their standard diabetes health care from consultants. Primarily ADPs were inquired for demographic and social characteristics, frequency of mobile phone use, general health information and diagnosis of type 2 diabetes. Further the level of Hb1Ac, in both the groups, was measured in a regular interval of 45 days. After 225 days, percentage of mean improvement in Hb1Ac level was compared between mobile users and control cases.
Results: More than 3% improvement in Hb1Ac was observed among the patients having mobile phone and they made regular interaction with consultant. The differences were very small but a trend of positive improvement was observed among ADPs using mobile phone's text messaging.
Conclusions: This shows that info-diabetic approach may contribute to minimize complexities in medical care and the cautious use of mobile phone technology in the form of text messaging would be an asset for self care management in ADPs.

P35

The impact of a diabetes management team on the metabolic control and prevalence of complications in paediatric patients with type 1 diabetes mellitus

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Background: In various centres a diabetes management team (DMT) was found to have an impact on glycaemic control.
Hypothesis: A DMT improves HbA1c, DKA rate and decreases hospital stay and prevalence of complications of type 1 diabetic (T1DM) patients.
Study design: Before-after study.
Methods: 190 T1DM patients attending the paediatric diabetic clinic at Tygerberg Children's Hospital between August 2004 and July 2011 were reviewed. The following data were extracted: HbA1c, DKA admissions, length of hospital stay, clinic attendances, insulin regimen and dose, and complications. Four time periods were compared: P1 (paediatric endocrinologist only), P2 (introduction of DMT), P3 [introduction of diabetes nurse educator (DNE)], and P4 (substitution of DNE).
Results: HbA1c increased from 9 (7.85–10.15)% in P1 to 10.9 (9.6–12.2)% in P2, and decreased to 9.25 (8.75–9.75)% in P4 ($p = 0.01818$). DKA rate improved from 32.5 (P1) to 23.5/100 patient years (P4). Recurrent DKA rate improved from 18.8% (P1) to 9.6% (P4). Admissions decreased from 0.79 (0.46–1.12) in P1 to 0.18 (0.02–0.34) in P4 ($p = 0.00127$). Patients staying longer than 30 days decreased from 30% (P2) to 15.1% (P4). Number of insulin injections increased from 2.97 (2.91–3.03) in P1, to 3.06 (2.97–3.14) in P2 ($p = 0.0015$). Few complications were documented in P1. Prevalence of microalbuminuria was similar (26.9–46.2%) in all periods, as was retinopathy (10.3–13.3%). Detection of limited joint mobility increased from 0% (P1) to 42.9% (P4). Levels of triglycerides were similar in all periods, LDLC decreased to 2.6 (2.38–2.81) mmol/l in P3 and HDLC decreased to 1.38 (1.27–1.49) mmol/l in P4.
Conclusions: After introduction of the DMT (including the DNE), DKA rate decreased, hospital stay shortened, HbA1c showed less variation, number of insulin injections/day increased and complications were more readily identified. It is therefore recommended that the services of the full DMT should continue.

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Empowering type 1 diabetes mellitus patients and families to learn pattern management strategies to improve their diabetes care and management

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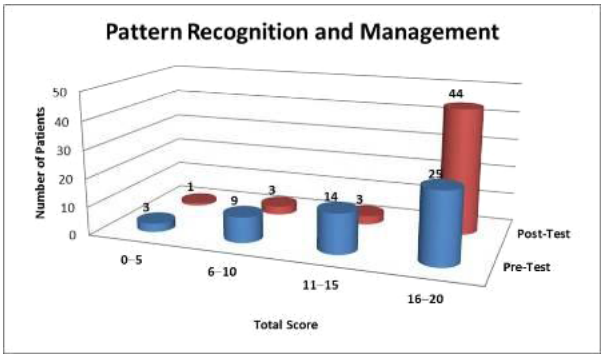
Objective: To develop and utilize a self-monitored blood glucose (SMBG) pattern recognition and management (PRM) guideline tool to empower type 1 diabetes (T1DM) patients/families to improve glycemic control between clinic visits.
Methods: A multi-disciplinary group contributed to the development of a comprehensive SMBG PRM guideline tool for T1DM patients on either multiple daily dose insulin injections or insulin pump therapy.



[Pattern R&M JPEG 031615]

A vignette-based quiz was created to evaluate PRM skills. The quiz was administered to 51 T1DM patients selected at random in diabetes clinic. A clinical diabetes educator met with these patients for a 10 min PRM education session utilizing the SMBG PRM guideline tool. The quiz was then repeated at the conclusion of the session.

Results: Baseline scores indicated suboptimal SMBG PRM knowledge. Post-teaching SMBG PRM knowledge greatly improved with the percent of patients with passing scores improving from 49% to 86% (Figure).

Conclusions: Our SMBG PRM educational tool provides families with a better understanding of SMBG pattern recognition and management. Dedicating even minimal time reviewing SMBG PRM to look for glucose patterns and guiding families to make appropriate insulin regimen changes using a highly refined and simplified guideline tool resulted in improvement of their PRM skills. As next steps, we have incorporated this teaching in routine clinic visit by the health care providers and continue with skills evaluation as well.

P37

Does continuous subcutaneous insulin infusion (CSII) allow sustained improvement in HbA1c?

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Objective: To determine the effectiveness of CSII in maintaining sustained improvement in HbA1c in children with Type 1 Diabetes (T1DM).

Method: A retrospective longitudinal study of patients with T1DM on CSII in a District General Hospital setting. Data was collected from hospital Diabetes Database and coding department. 48 patient, aged 2–22 years were identified. 6 were excluded due to insufficient data. The sample was 50% males and females (n = 21 each). Mean HbA1c from 3 serial readings over a period of 9 months prior to initiation of CSII was compared with mean HbA1c from 3 serial readings after being on CSII for 9 months. In order to assess whether improvement in HbA1c was sustained, latest HbA1c from last clinic appointment in last 3 months was compared with mean HbA1c prior to initiation of CSII. Mean duration of being on CSII was 2.9 years (range 9 months to 5 years). Repeated measures Wilcoxon Signed Ranks Test was carried out for statistical analysis.

Result: Mean HbA1c improved in 69% of patients after being on CSII for 9 months. This improvement on average from 9.2% (77 mol/mol) (SD = 1.06) before initiation of CSII to 8.6% (70.5 mmol/mol) (SD = 1.42) afterwards was statistically significant, ($Z = -2.845$, $p = 0.004$).

Mean HbA1c improved in 78.6% of the patients after being on CSII for a mean duration of 2.9 years. This improvement on average from 9.2% (77 mol/mol) (SD = 1.06) before initiation of CSII to 8.59% (70.4 mmol/mol) afterwards was statistically significant and sustained ($Z = -3.040$, $p = 0.002$).

Patients with mean HbA1c >8.5% prior to CSII showed greater improvement on CSII. Incidence of DKA reduced by 71% after being on CSII for 1 year (7 before and 2 after) and significant hypoglycaemia by 60% (5 before and 3 after).

Conclusion: This study showed that CSII allowed statistically significant sustained improvement in HbA1c in patients with T1DM. There was significant reduction in incidence of DKA and hypoglycaemia as well.

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Reduction of insulin related adverse drug events: a "Zero Hero" journey towards better outcomes in a large pediatric medical center!

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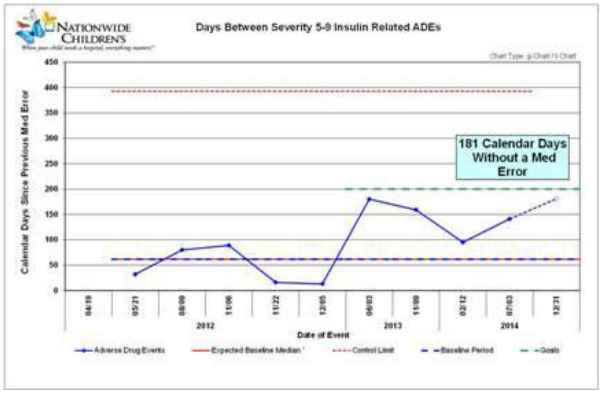
Objectives: Evaluate insulin related adverse drug events (IADEs) and develop comprehensive strategies to reduce the number and severity of IADEs.

Method: Comprehensive, multipronged, system-wide, interdisciplinary approach used to detect, address, and reduce IADEs (classified 1-9 per NCH scale). Hospital-wide strategies used included: medication huddles on each event; standardization of insulin pump use; use of insulin pens; insulin dose calculator and insulin order sets in electronic medical record; policy changes: mandatory endocrinology consultation for patients on insulin, restriction of patient placement of patients on insulin pump and drips to units with expertise. Data for IADEs and days between errors analyzed monthly.

Result: Total IADEs (severity 1–9) remained similar from 2012 to 2014. Severity 4 ADEs increased 60%; severity 5–9 events decreased by 66.6%; severity 5 events decreased by 80%; severity 6 events remained the same during this time. Calendar days between severity 5–9 ADEs increased from 32 to 181 calendars days in the same time period.



[Insulin ADEs- Days between severity 5-9]

Conclusion: This project, a part of the overall hospital wide "Zero Hero", quality improvement initiative towards zero preventable patient harm, demonstrates the success of a comprehensive multipronged, multidisciplinary approach in reduction of IADEs and enhancing a culture of safety. Universal adaptation of similar strategies will definitely improve morbidity and mortality secondary to medication related ADEs.

P39

Mismanagement of child with type 1 diabetes in diabetes ketoacidosis in a teaching hospital in Ghana

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Background: Diabetic ketoacidosis (DKA) is a common acute complication among children and adolescents with type 1 diabetes in Africa. This is due to the fact that awareness about diabetes among children is very poor in low income countries and in many cases there is little or no support for children and adolescents with diabetes. DKA carries a significant risk of death, which can be prevented by early and effective management. It is important that all doctors, irrespective of discipline and level of practice, whether in primary, secondary or tertiary care institutions, should be able to diagnose DKA early and initiate appropriate management to improve upon chances of survival.

Misdiagnosis and mismanagement of DKA is a worrying cause of morbidity and mortality among children with diabetes in Ghana and many other resource constrained countries.

Method: Case description of a type 1 diabetic patient who reported to the Paediatric Emergency Unit of a Teaching Hospital in Ghana in DKA.

Results: As a result of non adherent to protocol guidelines for management of DKA the patient was mismanaged and he died.

Conclusion: Adherent to protocol guidelines is important in the management of DKA in order to reduce mortality among children and adolescents presenting to health facilities in resource limited countries.

P40

Efficacy and safety of once-daily insulin glargine in Chinese T1DM children aged between 6 to 17 years

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Objective: To assess efficacy and safety of once-daily insulin glargine (IG) vs. Neutral Protamine Hagedorn (NPH) insulin in Chinese T1DM children aged between 6 to 17 years.

Method: In this phase III, 24-week, randomized, open-label, parallel group, multicentre trial, subjects were randomized to IG or NPH group in a 2:1 ratio. Both IG and NPH were given as basal insulin in the basal bolus regimen. Primary endpoint was absolute change of HbA1c from baseline to week 24. Secondary endpoints include percentage of patients reaching ISPAD recommended target of HbA1c <0.5% at Week 24, change from baseline in fasting blood glucose (FBG), nocturnal blood glucose (BG), 8-point SMBG, rates of all symptomatic, severe, nocturnal hypoglycaemia and treatment emergent adverse events (TEAEs) during 24 weeks. Due to difficulty in recruitment and insufficient sample size, a descriptive statistical method was used instead of non-inferiority hypothesis test.

Results: 162 patients (mean age 12.3 ± 3.3 years, T1DM duration 3.74 ± 2.71 years) were randomized, of which 161 were included into mITT population. At week 24, both groups showed a reduction in mean HbA1c from baseline (IG: −0.25 ± 1.68, NPH: −0.54 ± 1.67) and reached similar level of glycemic control (IG: 8.63%, NPH: 8.59%). Percentage of patients reaching HbA1c <7.5% at week 24 in IG group was 18.7% (20/107), in NPH group 21.6% (11/51). Mean FBG decreased from baseline (−0.76 ± 3.56 mmol/l) in IG group while increased (1.07 ± 3.64 mmol/l) in NPH group. In IG group, nocturnal BG and 8-point SMBG throughout the day appeared less fluctuations as compared to NPH group. There was a trend of lower event rate in IG group for all category of hypoglycemia. The number of all hypoglycemia events per patient year in IG group was 68.63 and 84.58 in NPH group. TEAE of metabolism and nutrition disorders were 2 (1.9%) in IG group and 4 (5.6%) in NPG group.

Conclusion: Insulin glargine is safe and effective as well as NPH in Chinese T1DM children aged between 6 to 17 years.

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The analysis of body composition change in pediatric type 1 diabetes mellitus

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Childhood is associated with growth accompanied by rapid change of body composition. Excessive fat gain and consequential increase of insulin resistance is an obstacle in controlling blood glucose for type 1 diabetics. On the other hand, adequate body mass which has to be acquired during the growth period cannot be accomplished if the insulin supply is insufficient.

This study was conducted to understand the body composition change along with the growth process in newly diagnosed type 1 diabetic children and adolescents and gender difference in the patterns of body composition change during growth.

Twenty one type 1 diabetic children (9M/12F, 11.9 ± 3.4/12.4 ± 3.3 years at diagnosis) were included in the study. Height, weight, body composition of fat mass and fat free mass were measured in 6–12 month interval in each patient and body mass index (BMI), fat mass index (FMI), fat free mass index (FFMI) and percent body fat (PBF) were calculated. The coordinates of each component (FFMI, FMI, BMI, PBF) were plotted on the body composition chart and traced along entire follow up period. The BMI increased as the children aged in both genders (male 2.0 ± 1.8 and female 2.9 ± 2.9 kg/m^2, respectively) but no significant difference in BMI z-scores was observed. The body composition chart demonstrated that the fraction of FMI increment contributing to BMI increase was higher in girls while that of the FFMI was higher in boys. When the body composition change of the girls is compared with the mean change by age in the chart, FFMI increment was similar and FMI was increased to a lesser extent. The body composition change in boys showed sufficient increase in FFMI during the follow up period.

Body composition change of type 1 diabetic adolescents progressed with distinct pattern by gender. The evaluation of body composition change using the body composition chart may serve as a valuable option in diabetes control to promote adequate growth in pediatric diabetic patients.

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Diabetes nurses have an important role in preparing families for pubertal challenge during transistion through adolescence in type 1 diabetes

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Background: Adolescents have a need for autonomy and independency. Many families are not prepared for this challenge. Self-managing of type 1 diabetes (T1D) in adolescents is challenging and must be understood in relation to the pubertal development changes. There is a potential for conflicts, if the balance between given support and the adolescents need for independency is not well managed. As a provider of education and support, diabetes nurses can observe how the families manage this balance, and to guide the families towards shared responsibility.

Aim: To obtain the diabetes nurses experiences acquired through work with adolescents with T1D and their families, in relation to shared responsibility.

Method: Data were collected by semi-structured interviews of six diabetes nurses, working in three different hospitals in Norway, working experience with adolescents of mean 13 years (range 4–22). The transcript of the audio-recorded interviews were analysed by Qualitative descriptions following the methods by Granheim & Lundman.

Results: The nurses emphasize the importance of being available and supportive for the parents as well as for the adolescents during the transition. The following practical steps were proposed in the communication with the families: Information about pubertal challenges already from diabetes onset. Reveal the parents role in the diabetes treatment the last half year. Identify what expectations the adolescents and the parents have of shared responsibilities. Facilitate transparency around shared responsibilities, and what tasks this includes. Help the families clarify the roles they have – who does what? Identify defined areas of responsibility related to practical action both for the adolescent and the parents.

Conclusions: The diabetes nurses can by helping families to identify responsibilities and tasks related to diabetes treatment, facilitate the fine balance between the parenting role and the adolescents need for autonomy and independency.

P43

Abstract withdrawn.

P44

Consistent documentation for managing type 1 diabetes at school

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Introduction: There are currently 2689 school-aged children with type 1 diabetes in Victoria. These children spend much of their time at school and frequently need the support and assistance of adults (teachers) at school to help manage their diabetes.

Historically, a multiplicity of school diabetes management plans was used in Victoria, constructed by different people, often with little or no reference to any evidence based clinical practice guidelines.

This variety of plans generated considerable confusion for the teachers who rely on them, and also for parents and health professionals.

Objectives: To develop a consistent school management plan format and style to better inform and support teachers about diabetes care expectations at school.

Methods: The Victorian Department of Education and Training (DET) invited a working party to create one style of management plan that could be used across *all* schools in Victoria. A group was established representing key stakeholders, and a suite of evidence-based school management and action plans were developed, using evidence based principles to underpin care threshold and actions.

Rigorous focus testing was used to test the acceptability of the plans by key stakeholders: paediatric diabetes health professionals; teachers working across all education age sectors; parents with children of various ages. Each group was asked to provide feedback on each of the plans representing the three insulin regimen systems – twice daily and multiple daily injections plus insulin pumps.

Results: Following analysis of feedback received from focus test groups, final versions were established in December 2014, and subsequently the new plans are gradually being used by schools and preschools across Victoria. The use of 'home grown' plans is reducing.

Conclusions: Systematic review continues so that all schools in Victoria can use the same style plans as endorsed and directed by the DET, Catholic and Independent schools across Victoria.

Poster Tour 5: Diabetes Care II

P45

Diabetes basics – managing type 1 diabetes at school and preschool: developing a suite of resources for schools and families

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Introduction: In April 2015, there were 117,442 people in Australia with type 1 diabetes (T1D); of these, 24.8% (2,689) were aged between 3 and 18 years old, and living in Victoria.

Providing comprehensive, and accurate information about diabetes at school, has to-date occurred in numerous ways.

Families *and* schools deserve specific information that can provide helpful strategies to ensure the child with T1D is safe and supported during all school day activities.

Children with T1D should be well supported to actively and fully participate in all that the school experience has to offer, to fulfil their potential.

Objectives: Diabetes Victoria will undertake a coordinated approach in conjunction with key clinical experts, to develop and make available quality resource materials for schools and families about T1D.

Methods: Strategic consultation meetings between the Victorian Department of Education and Training, Royal Children′s Hospital Melbourne, Monash Children′s Hospital Melbourne, and parents of Victorian school-age children with T1D, demonstrated a gap in availability of quality diabetes at school resource materials.

Diabetes UK website and information packs were used as a framework (with permission), to develop a similar suite of resource materials for schools and families in Victoria.

Information is structured around website content together with hard copy information packs to be available for anyone.

The Diabetes UK content was reviewed and adjusted to reflect the Australian/Victorian context to ensure that information is both relevant and accurate to the Australian setting.

Focus testing of the revised content has been undertaken by paediatric diabetes health professionals, teachers and parents, representing all ages and stages of children with T1D across a range of education settings.

Results: The website goes live in August 2015 and the information packs will be ready for distribution to schools and families at the same time.

P46

The Westmead Model: seamless transition for young people with type 1 diabetes from pediatric to adult health care

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A structured transition process has existed between The Children's Hospital Westmead (CHW) and the Diabetes Transition Support Program for the Young Adult Clinic (YAC) at Westmead Hospital since 2001 with the goal to prevent loss to follow up and deterioration in diabetes control.

To assess diabetes control at time of transition from 12 months prior to, and 12 months following transition.

Retrospective audit of patients referred to the YAC between Jan and Dec 2013 from CHW. Data: age at transition, gender, diabetes duration, diabetes therapy (insulin pump or MDI) HbA_{1c}, interval from CHW referral to first YAC visit, number of clinic visits 12 months pre and 12 months post transition.

n = 24 (16f/8 m); 11 insulin pump, 13 MDI

CHW		YAC	
HbA1c 12 months pre transition (%)	8.2 ± 2.0	HbA1c 1st YAC visit (%)	9.3 ± 2.5
HbA1c last CHW visit (%)	8.6 ± 2.0	HbA1c at 12 months post (%)	9.7 ± 2.5
Visits 12 months pre (*n*)	3.1 ± 1.1	Visits 12 months post (*n*)	4 ± 2.0

[Results]

Mean age at transition was 17.1 ± 1.3 years (14.3–19.7 years); diabetes duration 7 ± 4 years, and interval to first YAC visit 3.0 ± 1.0 months. HbA_{1c} significantly increased from one year prior to transition to the first YAC visit (1.1 ± 2.3%, p = 0.05) There was no significant change in HbA_{1c} in the 12 months post transition. Insulin pump users had a lower HbA_{1c} than MDI users at first YAC visit (8.9% vs. 9.7%) but small numbers meant the difference was not significant. At 12 months post transition HbA_{1c} increased in both pump users (9.2%) and MDI users (10.1%). Frequency of clinic attendance was maintained 12 months post transition.

Deterioration in control at transition appears unrelated to factors associated with usual care as HbA_{1c} was maintained between clinic visits within a single centre. This suggests external factors have a significant impact on diabetes control while clinic attendance may limit rise in HbA1c over time. Age at transition had no impact on clinical outcomes but insulin pump use may be associated with better glycemic control at the time of transition.

P47

Self-care and optimal glycaemic control in young adolescents with type 1-diabetes: role of a consistent parental support of adolescent's self-care at least in the management of diabetes and if possible also in its psychosocial life

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Parental support plays an essential role in the development of adolescent's self-care (SC). During the adolescence, the challenge to develop autonomy in decision-making, and the need to integrate the identity of being a person with diabetes with other dimensions of one's identity, can explain the difficulty to obtain an optimal diabetes control. The literature tends to focus exclusively on the contribution of different parenting practices on the medical dimension of SC. Moreover, little is known about the role of consistent parenting practices.

Our study aimed to explore the association of adolescents' HbA1c with consistency of parental support in adolescents' management (i) of diabetes alone, (ii) of psychosocial life issues alone and (iii) of both issues.

During French AJD summer camps, we interviewed 31 adolescents with T1D, aged 13 to 15, and used mixed-methods design in order to code the different reported parenting practices, and to explore the associations by applying statistical tests according to HbA1c level was used as continuous or categorical variable.

Our results show that HbA1c ≤7.5% was significantly associated with consistent parental support in the medical dimension of SC (Fischer Exact test $p = 0.004$), as well as across the medical and psychosocial dimensions of SC (Fischer Exact test $p = 0.011$). Moreover, optimal median HbA1c level (7.43%) was significantly associated with parental consistency in both dimensions of SC (Kruskall–Wallis test $p = 0.018$). And only adolescents with HbA1c ≤7.5% reported consistent parental support, as Non-Directive Guidance, across both dimensions of SC.

Our study supports the hypothesis that consistent parental support of SC is associated with better glycaemic control in young adolescents. We recommend that diabetes care include more systematically a dimension of family work in order to strengthen the parents' capacity to effectively and adequately support their adolescents' emerging SC capacity in its both dimensions.

P48

Using blood glucose meter downloads to improve the accuracy of verbal self-reported blood glucose in teenagers with type I diabetes at ski camp

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Background and Objectives: Despite advances in diabetes management, self-monitoring of blood glucose (SMBG) remains fundamental. A number of studies have confirmed that logbook entries of SMBG are prone to common errors. A single recent study reveals similar findings for verbally reported SMBG. As verbal SMBG is crucial for safety at diabetes camps worldwide, we aimed to assess whether adolescent awareness of a planned meter download at diabetes ski camp conclusion, would improve the overall accuracy of camp verbal SMBG.

Methods: 26 adolescents with diabetes attended a 3-day ski camp. Verbally reported SMBG values were reported to, and recorded by, camp supervisors at multiple time points throughout the camp, as per safety protocols. The intervention involved ensuring all participants (at camp commencement) were aware of a planned meter download and SMBG review at camp conclusion. This data was then compared with historical camp data from 2012, collected using identical methodology, in which participants were unaware of the planned meter download. Blood glucose (BGL) data was classified as: matching, absent/phantom, over or under-estimates.

Results: Dual-data from verbal SMBG and download was obtained for 527 instances of BGL testing. This was compared to dual-data for 394 historical tests. Following intervention, error rate was 4.5%, over 34% of participants. There was a statistically significant improvement in accuracy compared to historical non-intervention data, in which the error rate was 13.5% over 70% of participants ($p < 0.001$). There was also a significant decrease in phantom readings at 2%, from 8.6% in 2012 ($p < 0.001$).

Conclusions: This study demonstrates an improvement in accuracy and reliability in verbally reported SMBG, following a simple intervention. Meter download could be easily incorporated into camp safety protocols worldwide, and may provide an easy, low cost way of improving safety on camp.

P49

Can the frequency of paediatric clinic attendance predict what will happen post-transition?

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Objective: The association between pediatric clinic attendance and metabolic outcomes during childhood is established, but the impact that this may have on adult clinic attendance rates, glycaemic control and complications is less well understood.

Methods: Using BioGrid, a data linkage system, 503 individuals who successfully transitioned to adult services 1992–2013 were retrospectively studied from the time of diagnosis with type 1

diabetes mellitus to adulthood. Data were collected from clinical databases at each institution and included clinic attendance rates, documentation of diabetes related complications and serial HbA1c measurements. Individuals were deemed to be high or low attenders based on the annual number of diabetes clinics attended during childhood (≥3 or <3 respectively).

Results: 'High attenders' who comprised 65% of the cohort were more likely to continue this attendance pattern into adulthood (RR 1.2, 95% CI 1.1–1.4, p = 0.005), with a shorter time interval between specialist pediatric and adult review (β −1.0 years, p < 0.01). HbA1c was also lower in this group during childhood (8.1% [65 mmol/mol] vs. 8.5% [69.9 mmol/mol], p < 0.01) and at the time of transition (8.2% [66.1 mmol/mol] vs. 8.8% [72.7 mmol/mol], p < 0.01) when compared to 'low attenders'. The overall incidence of diabetes-related severe complications was low (n = 29, 5.6%). Lower pediatric attendance rates were seen in those with severe eye disease (0.8 vs. 3.2 clinics per annum, p < 0.001) or in whom death occurred (0.8 vs. 3.2 clinics per annum, p = 0.003).

Conclusions: High attenders in childhood demonstrated better glycaemic control during childhood and maintained regular clinic review into adulthood; the opposite was true for low attenders who continued to under-utilise specialist diabetes services.

P50
Childhood diabetes: focus on glycaemic goal than phenotyping

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Objectives: Onset of diabetes in childhood with ketoacidosis and insulin dependency has traditionally been sufficient to diagnose type1 diabetes (T1D), while onset in older, obese patients with primary insulin resistance suggests type2 diabetes (T2D). Unfortunately, features of both types can be present in the same patient, making differentiation difficult. Therefore, this study looked into clinical & biochemical features which can help distinguish the two types of diabetes.

Methods: Data on clinical presentation, anthropometry, demographics and biochemistry was extracted from diabetes registry and analysed using Microsoft excel.

Results: Total number of patients was 502(T1D:T2D=324:178). Gender distribution was almost equal (M: F = 241:261).The mean age of presentation for T1D is younger as compared to T2D (7.8 years ± 3.9 vs. 13.2 years ± 2.2). The mean BMI SDS is greater in T2D as compared to T1D (+2.2 ± 1.3 vs. −1.2 ± 1.8). Family history of diabetes was present in both types T1DvsT2D (63.9% vs. 86%). Diabetic ketoacidosis (DKA) was present in only 53.7% of children with T1D. T2D mainly present with non-DKA.The mean C-peptide (ng/ml) was lower in T1D as compared to T2D (0.6 ± 0.6 vs. 3.5 ± 2.2).In T1D, GAD was positive in 79% & ICA in 40%, and a small number of T2D 5% also had positive antibody. Among the T2D, 60% were started on insulin, 35% on OHA & 5% on diet.

Conclusions: Features which can distinguish between T1D&T2D are age of presentation, BMI, C-peptide and antibodies. However, as more T1D children are presenting with non-DKA and also have family history of diabetes; these mixed features make differentiation difficult. A significant proportion of T2D children are also started and continued on insulin with other add-on therapies to achieve glycaemic control.

In addition, it may not be clinically helpful and cost effective in children to differentiate T1D&T2D. Therefore, clinician should focus on attaining optimal diabetes control goals. Use of exogenous insulin should not be delayed in T2D.

P51
Insulin regimens, diabetes knowledge, quality of life and HbA1c in children and adolescents with type 1 diabetes

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Objectives: To further describe the changes in insulin therapy regimens and HbA1c in children and adolescents with type 1 diabetes, and their associations with diabetes knowledge and quality of life (QOL).

Research design and methods: The study included 4293 children and adolescents (12.9 ± 2.6 years, more than one year of diabetes) attending AJD (Aide aux Jeunes Diabétiques) summer camps between 2009 and 2014. The distribution of insulin regimens and the associations between HbA1c, therapeutic regimens, diabetes knowledge (AJD questionnaire) and Quality of Life (QOL, Ingersoll et Marrero, Hvidoere Study Group short version) were assessed as a function of years.

Results: The percentage of youth treated with the pump increased up to about 45%, basal bolus stabilized around 40%, and other regimens decreased dramatically. HbA1c was higher with regimens using premixed insulins only (9.05 ± 2.43%), but there was no difference between pump (8.12 ± 1.09%), basal bolus (8.32 ± 1.33%) and 2–3 injections (8.18 ± 1.28%). Mean HbA1c decreased by 0.014% per year, and the percentage of HbA1c <7.5% did not change, except with the pump. The percentages of HbA1c >9% or >10% decreased by more than half, and in a greater proportion with the pump. HbA1c was weakly associated with diabetes knowledge, and strongly with general health and diabetes perceptions.

Conclusion: The percentage of T1D youth with the highest risk of complications decreased markedly. The distribution of HbA1cs depicts better glycemic control in a population than the mean and the only percentage of patients reaching the target (7.5%). HbA1c was more strongly associated with general health perception than with therapeutic regimens and diabetes knowledge.

P52
HbA_{1c} assessment every 6 or 12 weeks?

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Objectives: Measurement of hemoglobin A_{1c} (HbA_{1c}) four times a year improves metabolic control in patients with type 1 diabetes (T1D). However, it is unknown whether reducing the interval between HbA_{1c} measurements will improve metabolic control in children even further. The aims of the study were to examine if assessment of HbA_{1c} every 6 weeks improves metabolic control compared to assessment every 12 weeks and to examine if it reduces inter- and intra-individual variations in HbA_{1c}.

Methods: In total 128 children, aged 4.7–16.3 years, with T1D for more than one year, were included. The children were randomized to assessment of HbA_{1c} every 6 weeks (group 1) or every 12 weeks (group 2) for 48 weeks. All children and parents were aware of their

target HbA_{1c} of less than 58 mmol/mol. At every measurement the child and the parents were informed on the results of the HbA_{1c}, and treatment was adjusted according to the result. Patients were excluded from the study if they needed more than two reminders for blood samples in the study period.

Results: In total 111 (51 females) children (56 in group 1) completed the study. At inclusion in the study mean (SD) age was 11.4 (3.4) years, mean T1D duration 4.7 (3.0) years, mean HbA_{1c} 60.2 (10.3) mmol/mol, and the two groups were comparable according to age, sex, diabetes duration and HbA_{1c}. After 48 weeks mean HbA_{1c} had decreased 2.5 mmol/mol in group 1 ($p = 0.028$) and 0.7 mmol/mol in group 2 ($p = 0.64$) (paired sample *t*-test). However, the mean decreases of HbA_{1c} in the two groups were not different (independent sample *t*-test). Group 2 demonstrated the largest inter- individual variation in HbA_{1c} ($p < 0.02$) due to some patients with very high HbA_{1c} values, but the intra-individual variations in HbA_{1c} were not different in the two groups.

Conclusion: Measuring HbA_{1c} every 6 weeks may improve metabolic control and may reduce the number of patients with very high HbA_{1c} for longer periods compared to measuring HbA1c every 12 weeks.

P53
CoYoT1 Clinic: diabetes care from your sofa (Colorado Young Adults with T1D)

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Objective: It is well-known that young adults with type 1 diabetes (T1D) struggle with diabetes management and are not routinely seen by their diabetes providers. CoYoT1 Clinic was designed to meet the needs of this high-risk population in a technology driven, shared medical appointment (SMA) model. The purpose of this pilot study is to investigate the feasibility and acceptability of a home-based telehealth intervention for young adults with T1D using a SMA clinical model.

Methods: CoYoT1 Clinic consists of an appointment with a diabetes provider and a group session facilitated by a certified diabetes educator. Patients complete the clinic visit from home, or other location of their choosing, using HIPPA-approved, web-based, video conferencing. Prior to the scheduled clinic visit, participants upload their diabetes devices and complete hemoglobin A1c measurements at an outside laboratory. The group session consists of a patient-driven, facilitator-mediated discussion on a topic relevant to young adults with T1D. Patients also spend individual time with their diabetes provider to discuss personal diabetes needs and adjustments.

Results: To date, 25 young adults with T1D have been recruited to participate in CoYoT1 Clinic and 11 patients have completed a clinic visit (average age = 19; average A1c = 8.2%).

The majority of patients enjoyed talking to other young adults during their appointment, with only 9% of patients reporting they disliked the group chat. Additionally, 91% of patients felt comfortable using technology for a clinic visit and wanted to have another online appointment.

Conclusions: CoYoT1 Clinic may be an effective way to engage young adults with T1D in routine diabetes care. Patients liked the online experience, and inclusion of a group discussion may allow for more comprehensive care. Home based telehealth within a SMA clinic model may result in increased frequency and improved quality of diabetes clinic visits for young adults with T1D.

P54
The impact of management program for children with diabetes in China on the glucose control of T1DM children and related factors on glucose control

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Objective: To compare the glucose control of different management approach for type 1 diabetes mellitus(T1DM) children, and to evaluate influence of related factors on glucose control.

Methods: Medical records and blood samples of T1DM children lasting more than 1 year management from Jan. 2012 to Dec. 2014 in the affiliated hospital of Qingdao university were collected. Hemoglobin A1c(HbA1c)levels were used to assess glucose control. HbA1c of 23 children who participated in the management program for children with diabetes in China (Group A) were compared with that of 45 T1DM children who had extensive self-management (Group B).Clinical data of which factors optimize glucose control was analyzed.

Results: Enrolled 68 T1DM children, their average HbA1c was $(8.86 \pm 2.00)\%$, of which only 21 patients had optimal HbAlc (HbAlc< 7.5%). The average HbA1c of group A$(7.6 \pm 1.57)\%$ was significantly lower than that of group B$(9.4 \pm 1.91)\%$ ($p = 0.000$). More than 3 years of management program for children with diabetes in China resulted in lower HbA1c and less fluctuation in blood glucose level than extensive self-management ($p < 0.05$). Duration, diabetic education, frequency of self-monitoring blood glucose and diabetes diet were correlated with optimal glucose control.

Conclusion: The glucose control of T1DM children in our hospital was in the medium level, most of that wasn't up to par. The management program for children with diabetes in China could significantly improve the glucose control continuously. Accepting diabetic education, frequent self-monitoring blood glucose and diabetes diet were in favor of optimal glucose control.

P55
The peculiarities of psychological status in children with type 1 diabetes mellitus

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Aim: To determine features of psychological status children with DM1 and it relationships with clinical and metabolic characteristics of the disease.

Methods: We examined 65 children with DM1 (age 14.4 ± 0.8 years) and 50 healthy controls (13.7 ± 1.8 years ($p = 0.3$)) in the endocrinology department of University hospital (Minsk) in 2014–2015. Tanner stage, diabetes duration, daily insulin, HbA1c, quality of life (QoL) questionnaire were assessed in children with DM1. The scale of self-depression (DSRS) were determined in control and diabetic groups. The results were processed using SPSS.18.

Results: DM1 experience was 4.9 ± 3.6 years, HBA1C $9.7 \pm 1.7\%$, daily insulin1.67 ± 0.3 IU/kg.

We didn't find difference DSRS test in DM1 and control groups ($p = 0.8$). QoL revealed11.6% children with diabetes rated their health as excellent, 41.9% good, 32.6% average, 13.9% consider bad. There were no difference between B and G in their assessment of life satisfaction ($p = 0.7$), B were more satisfied with their studies ($p = 0.04$) and time spent on physical activity ($p = 0.02$). Diabetes effects on diet, communication with friends, parents were equal in B

and G (p = 0.2). G were more anxious than B about their diabetes (p = 0.09), especially future marriage (p = 0.016), children (p = 0.017), appearance (p = 0.019), ability to communicate with friends (p = 0.025). Sleep deprivation was dependent on DM1 experience (p = 0.036), glucose level (p = 0.045). Low mood was dependent on glucose (p = 0.05), insulin (p = 0.018) levels; higher irritability with experience of DM1 (p = 0.04); low confidence with insulin (p = 0.045); weight increasing with insulin (p = 0.036). CBCL and QL showed that disorganization (p = 0.02), the loss of time due to DM1 (p = 0.003) and time, on glucose monitoring (p = 0.005) were correlated with the experience of DM1.

Conclusions: G showed more concern about diabetes comparison with B. Psychological problems in children with DM1 (sleep deprivation, low mood, low confidence) were dependent on the compensation of DM1.

Poster Tour 6: Diabetes Care III

P56
Identifying intervention targets for a health promotion program to reduce DKA in children with newly diagnosed T1D

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Objective: A recent audit of our children's T1D services showed 23% of newly diagnosed T1D still present in DKA. The aim of this study was to determine the key target points for an effective health care promotion intervention to reduce DKA presentations in newly diagnosed T1D. To do this, the patient journey from onset of symptoms (Sx) to diagnosis in the WA population based cohort was characterised.
Method: A 7 point questionnaire was given to all parents of newly diagnosed T1D <16 years between August 2011 and January 2013. The items covered signs and Sx, time from Sx to health care visit, who/where advice was sought from, number of visits to medical services. A chart audit was undertaken to determine DKA diagnosis (pH <7.2).
Results: Data was collected from 126 consecutive patients at T1D diagnosis, mean age 8.7 years (50%M). In the DKA group (n = 29, 23%), 59% of the parents were not aware that their child's presenting symptoms were related to diabetes compared to 32% with non-DKA ($p < 0.01$). Fewer children with DKA presented with polyuria (52% vs 73%, $p < 0.01$) but had higher rates of lethargy (72% vs 43%, $p < 0.01$) and vomiting (21% vs 3%, $p < 0.01$). There was no difference between the 2 groups in the time from symptoms to 1st heath care presentation, however 4 times as many patients with DKA had multiple visits to a medical services before diagnosis ($p < 0.01$).
Conclusion: This study shows that although there is a knowledge gap in the DKA parent group about what the presenting Sx could mean, there was no delay in initial presentation to health services between groups. The delay in diagnosis in the DKA group is associated with multiple health service visits and failure of diagnosis on first visit. Increased awareness in the community about Sx related to T1D may help patients advocate for diabetes screening at onset of symptoms. However, this data suggests that a health care promotion program to reduce DKA at T1D diagnosis should primarily target health care services.

P57
Immigrant children with type1 diabetes have impaired metabolic control after three years of treatment: a nationwide cohort study in Sweden

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Objective: To compare clinical status after three years of treatment and socio-demographic conditions at onset in children with diabetes born to immigrant parents to children with Swedish born parents.
Design: Observational nationwide population based cohort-study on prospectively recorded registry data.
Setting: All children with diabetes in Sweden and their parents between the years 2000 and 2010.
Patients: 879 children with diabetes born to immigrant parents out of a total of 13,415 children, Immigrant cohort. To these we added 2627 children with diabetes of Swedish born parents, matched for gender, age and year of diabetes onset, Swedish cohort.
Main outcome: The immigrant children had a higher median $HbA_{1c,}$ 69 mmol/mol (8.5%), compared to their Swedish peers 62 (7.8%), $p = 0.002$, and the 75th percentile of 72 (8.8%) vs. 70 (8.5%). There was however no difference in frequency of severe events of hypoglycaemia or keto-acidosis between the two cohorts ($p = 0.258$). A linear regression model with HbA_{1c} as dependent variable pointed out insulin units per kg BW as the main reason for inferior metabolic control, B coefficient of 13.597, CI 95% (10.019–17.174), $p < 0.001$.
Conclusions: Children with diabetes born to immigrant parents have inferior metabolic control three years after disease onset compared to children with Swedish born parents.

Social family support and educational coping programs are thus warranted for improving treatment outcome in ethnic minorities with childhood type1 diabetes.

P58
Good metabolic control without excessive weight gain during the first five years of treatment of children with type 1 diabetes

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Objective: Excess weight gain is a problem in type 1 diabetes and may be related to glycaemic control. We have investigated the BMI trajectory and HbA1c in children during the first five years following diagnosis of type 1 diabetes.
Methods: During the period 2005–2009, 124 children <18 years of age were diagnosed with type 1 diabetes at Uppsala University Hospital. Follow-up data including weight, height and HbA1c for the first five years of treatment was available for 81 children (48 boys). Growth curves including measurements of weight and height preceding the onset of diabetes were taken from the school health services. Weight and height prior to diagnosis and during treatment were recalculated into BMI standard deviation scores (BMISDS). All patients were started on multiple injection treatment with insulin aspart and detemir. At five years 21 children (26%) had switched to insulin pump treatment.
Results: Prior to the onset of diabetes the BMISDS was 0.43 ± 1.41 (mean $\pm$ SD), had decreased at presentation and was fully recovered without overshoot one year after presentation when it was 0.54 ± 1.09. BMISDS did not increase further and was at five years of diabetes duration 0.57 ± 1.06. HbA1c at one year was 52 ± 9 mmol/mol and increased to 61 ± 14 mmol/mol at five years. Girls had HbA1c 66 ± 17 mmol/mol compared to 57 ± 14 mmol/mol for boys. In a repeated measures ANOVA there was a main effect of diabetes duration on HbA1c ($p < 0.001$). There was also an interaction between duration and gender ($p < 0.05$). At five years there was not a correlation between BMISDS and HbA1c.
Conclusion: During treatment of type 1 diabetes in children it is possible to achieve good metabolic control without excess weight gain. The BMI during treatment does not exceed the trajectory prior to onset of diabetes. Girls are at greater risk of deteriorating metabolic control.

P59

Quality of life and satisfaction with treatment for children with type 1 diabetes and their parents

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Care and treatment provided at hospital clinics has important implications for patients' satisfaction, and often their social, psychological and physical quality of life. The satisfaction of patients with Type 1 diabetes (T1D) and their parents with the care they receive from their diabetes clinic can have an impact on quality of life (QoL) and further, treatment adherence. There is a particular risk for adolescents with T1D, who often disengage from family and treatment during the transition period between childhood and adulthood, and are prone to lower QoL. With this knowledge, this 2-part study aimed to assess satisfaction with service delivery at the Mater Hospital and the Lady Cilento Children's Hospital in Brisbane, Australia, for young children and adolescents with T1D and their parents. We initially conducted interviews with adolescents, parents and clinicians to gather information regarding service delivery including what was important and satisfying as well as perceptions of T1D consequences for QoL. A number of themes developed during these interviews – patients were dissatisfied with mostly administrative issues such as wait times and seeing different doctors each time they went to the clinic, while clinicians stressed that booking flexibility, seeing the same team each time and losing patients were concerns. Clinicians, parents and adolescents agreed that T1D often negatively affected quality of life. The findings from the interviews, along with further validated instruments, have been used to develop a questionnaire package to further explore satisfaction of various services and aspects of clinical care, confidence in diabetes, and social, physical and psychological QoL. Data collection is currently underway and it is hoped that the findings will inform future clinic practices.

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A rare complication of T1DM in a female teenager: Mauriac syndrome?

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Objective: To report a case of Mauriac syndrome.
Methods: A 14-year old F patient was referred to our Clinic for poor glycemic control and progressive insulin resistance. She was diagnosed with T1DM at 8 years old. After the first 2 years of MDI she underwent CSII due to progressive increase in insulin requirement (0.66->1.46 units/kg). However compliance was very poor and led the patient to be frequently hospitalized (2 DKA) and soon after to replace the therapy back. In spite of frequent manipulations in insulin dosing,our patient showed progressive worsening of metabolic control (HbA1c 8.72->10.9%) and follow-up drop-out.

In March 2015 she was referred to our clinic for a further worsening of glycemic control.
Results: Height,weight and BMI resulted below than 3rdcentile for age (respectively 146.2 cm/34.1 kg/16 kg/m^2). She had delayed puberty (B2,PH1).

Laboratory investigations described increased liver enzymes (ASAT/ALAT/GGT:590/435/328 U/L),elevated lactate level (72 mg/dl) and IGF-1 < 3rd centile. Abdominal ultrasound revealed hepatomegaly with steatohepatosis. Pelvic features confirmed prepubertal status.

Microalbuminuria and retina examination were normal.

During hospitalization our patient started psychological interviews, which revealed her disease refusal (frequently skipped insulin injections, uncontrolled snacks and glycemic controls performed to friends in order to simulate adequate compliance). Investigations about hepatomegaly excluded infectious diseases, autoimmune, metabolic, obstructive and oncologic causes. Coeliac disease screening was negative. DXA demonstrated Zscore -3,2. Brain MRI was normal.

After 2 weeks we observed a significant reduction of HbA1c (7.9%), ASAT and ALAT (140/219 U/L).
Conclusions: According to the presented data we confirmed the presence of Mauriac syndrome. This is a rare complication related to under-insulinisation. It includes short stature, glycogen laden enlarged liver, limited joint mobility, tight waxy skin and delayed puberty.

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A controlled trial of family approach to diabetes management in poorly controlled adolescents with type 1 diabetes

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Objectives: To evaluate the impact of the Family Approach to Diabetes Management (FADM) on glycaemic control of poorly controlled adolescents with Type 1 Diabetes.
Methods: Seven adolescents (mean age 14.9 years) with poorly controlled diabetes were selected for FADM and compared with seven aged matched adolescents (mean age 14.1 years) who continued standard diabetes management and support with the same diabetes team. The initial FADM consultation comprised the FADM coach and the diabetes team (paediatrician and diabetes nurse educator) and was conducted by videoconference to the family. Follow up comprised face to face consultations and some videoconference consultations done entirely by that local diabetes team who had been up-skilled in FADM. The average HbA1c for the twelve months prior to therapy was compared with the current Hba1c 9 months after the intervention and to current HbA1c of the control group.
Results: Glycaemic control in the intervention group improved from mean Hba1c over previous year of 10.04% ± 1.12 to 8.39% ± 0.76% at 9 months ($p = 0.014$) post intervention. Age matched control glycaemic control changed from HbA1c 9.97% ± 1.14 to 10.17% ± 1.94 (NS) over the same period. Compared with controls, the improvement was significant ($p = 0.02$).
Conclusions: FADM is an effective intervention for poorly controlled adolescents with T1DM with improved glycaemic control at 9 months post intervention compared with controls. The FADM intervention can be supported by up-skilled local diabetes teams after commencement in combination with a FADM coach.

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Does the size of a pediatric treatment centre predict the quality of care and outcome? Results from the Austrian/German DPV registry

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Hypothesis: To provide good quality of care in children with type 1 diabetes a structured diabetes centre is necessary. We hypothesise that the number of patients with T1D treated per centre may influence medical outcome indicators.
Methods: The diabetes management program (DPV) used in Austria/Germany allowed classification depending on the number of patients treated per centre. Less than 40 patients were defined as small, 40–<80 patients as median and with >80 patients as large centres. Outcome parameters were HbA1c, severe hypoglycaemic events and frequency of complication screening as recommended by ISPAD guidelines.
Results: In the year 2013 a number of 232 centres taking care of a total of 17,729 patients were included in the analysis. 78(33.6%) were classified as small, 66(28.5%) as median and 88(37.9%) as large centres. Gender, age and diabetes duration did not differ between the centres. In linear regression models after adjustment for age, gender, diabetes duration, migration background and BMI SDS, the metabolic control (HbA1c) in small centres was 8.0(±1.6), 7.8 (±1.6) in median and 7.9(±1.5) in large centres ($p = 0.004$ small vs. large). Severe hypoglycaemia rate (events per 100 patient years) was 28.8 in small, 16.0 in median and 13.7 in large centres ($p < 0.0001$ small vs. large). Retinopathy screening was performed in 70% of patients in small and in 75% in median and large centres ($p = 0.09$ small vs. large) and nephropathy screening was performed in 64% of patients in small centres, 69% in median and 75% in large centres ($p = 0.003$ median vs. large and $p = 0.0001$ small vs. large).
Conclusion: Differences in metabolic control and rate of hypoglycaemic events were more pronounced between small and large centers. Large centres showed significantly complication screening rates than small centres. Before drawing conclusions on the structure of care, the clinical relevance of the differences, as well as patient-related aspects have to be taken into account.

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Growth, puberty and final height in children with type 1 diabetes (T1D)

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Objective: The aims of this study were to assess growth in a group of diabetic children and to evaluate final height and age at menarche.
Research design: Growth was assessed by longitudinal study, compared with Sempé, Pedron subjects and semi longitudinal case-control study. Controls (diabetic brothers and sisters). Age at menarche was assessed by case-control study. Controls (diabetic sisters).
Results: Growth was significantly more delayed in T1D patients (92 girls, 103 boys) than in Sempe, Pedron subjects. However, evident catch-up growth was noted between the 18 and 21 years age (251 T1D girls and 248 T1D boys).

The growth speed was less important during puberty compared to Sempé, Pédron subjects. After 18 age, our T1D patients was contuned their growth in time where Sempe, Pedron subjects finished their growth.

Semi-longitudinal study: The mean adult height was: 162.17 ± 4.031 cm (251 women T1D) vs 163.91 ± 3.15 cm (162 controls: $p > 0.05$). The mean adult height was 172.34 ± 4.87 cm (248 men T1D) and 172.98 ± 4.67 cm (190 controls: $p < 0.001$).

The mean age of menarche in 123 girls with T1D was: 14.44 ± 2.18 years vs 13.55 ± 1.46 ans years in 176 controls ($p < 0.0001$).
Conclusion: Growth, puberty and adult Height are delayed especially in the T1D girls.

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Abstract withdrawn

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Varied bolus dosing for identical meals and blood glucose values, calculated by different insulin pumps

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Objective: Smart insulin pumps are increasingly used for patients with diabetes. While most pump models carry out the same essential functions, they vary in several features, including the algorithms used in calculating bolus doses. Our objective was to examine whether different pump models differ significantly in bolus recommendations in identical clinical scenarios (blood glucose (BG) level and meal to be ingested).
Methods: We devised a hypothetical but realistic insulin pump regimen (basal rates, insulin:carb ratio 1unit:15 grams, high BG correction ratio 1:50 mg/dl above target 100:, insulin duration time 3 h, etc.). This regimen was entered to program several late models of pumps by different manufacturers (Animas, Medtronics, Accu-Check, Tandem, and Insulet). Each pump was made to deliver 4 units for 60 g carbohydrates, and assume a baseline BG 100 mg/dl. Then, at 1 and 2 h after the initial bolus, each pump was presented by identical scenarios of BG level and carbs in a meal, and the recommended bolus doses were recorded on a separate sheet for comparison. The same scenarios were given to representatives from each pump company to duplicate our entries to confirm our findings.
Results: Our findings were confirmed by pump company representatives. At all scenarios except when BG was less than or greater than 100 mg/dL, there were marked differences in bolus recommendations by each pump. As expected, AccuCheck "Aggressive" program consistently recommended higher doses than the rest. The most pronounced differences were when BG was high at 1 and 2 h after the initial baseline bolus, and there was zero carbs to be ingested.
Conclusions: Different pump models calculate insulin boluses differently and the doses can vary significantly between different pumps. Providers and patients must be aware of these differences for when patients switch a pump model, and for when providers are interpreting data downloaded from different pumps.

P66

To study the relationship between C-peptide levels and duration of type 1 diabetes in urban and rural area of South India – observational study

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Objective: To test the relationship between C-peptide levels and disease duration in subjects with Type 1 diabetes. Stratified by 3 intervals of disease duration in years.

Methods: Serum C -peptide levels, a marker of insulin production were measured in 31 subjects with Type 1 diabetes by Chemiluminescent Immuno Assay(CLIA) at the onset of the disease and present levels attending Type 1 clinic at KLES hospital, Belgavi. Disease duration, age at onset, sex were analyzed to determine their relation to C peptide levels.

Results: In this study 17 were males and 14 were females and male to female ratio being 1.2:1. The mean present age is 16.8 years. The mean age of onset of disease is 9.2 years. The mean duration of disease is 6.93 years. The mean C-peptide level at the diagnosis of disease is 0.9 ng/ml which declined to 0.61 ng/dl over the period of 5 years, 0.41 ng/ml in 6–10 years, 0.31 in 11–15 years. The normal levels of C peptide were seen in 14 out of 31 subjects at the enrolment. Mean being 1.58 ng/ml which declined to 0.7 ng/ml over the period of 5–15 years. The C peptide levels with onset at 11–15 years (mean 1.12 ng/ml) of age were significantly higher than those with onset at 0–5 years (0.57 ng/ml) of age. Correlation of C peptide levels with duration of diabetes is significant in our study.($r = 0.150$).

Conclusion: Our study showed that as disease duration increased, C peptide levels tend to gradually decline over 5–15 years. But not a decline over months as is commonly viewed as course of pancreas. The mean C peptide levels at onset of disease were 0.6 ng/ml in 0–5 years groups, 0.64 ng/ml in 6–10 years, 1.12 ng/ml in 11–15 years. This is consistent with believed slower disease onset in older patient. Therefore our data show that C peptide can be normal at the onset of disease.

Poster Tour 7: Diabetes Chronic Complication

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Study the level of some novel urinary biomarkers for predicting nephropathy in type 1 diabetes

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Diabetic nephropathy is the leading cause of end stage renal disease and is a serious complication in type 1 diabetes. The purpose of this study was to define a panel of proteins that can serve as novel biomarkers of nephropathy in type 1 diabetes and to evaluate whether there is an association between microalbuminuria and the urinary proteins. The study included 4 groups of subjects,

Group 1 (control subjects),
Group 2 (diabetic patients with normoalbuminuria),
Group 3 (diabetic patients with microalbuminuria) and
Group 4 (diabetic patients with macroalbuminuria).

FBG, HbA1c, Creatinine, Urea, Microalbumin, creatinine in urine, lipid profile, THP, Progranulin, Clusterin, AGPand Prost D level were determined ACR and GFR were estimated.

There is a significant decrease in THP in the macroalbuminuria group, the microalbuminuria group and the normoalbuminuria group in compared to control subjects, also there is a significant increase in progranulin in the macroalbuminuria group, the microalbuminuria group and the normoalbuminuria group in compared to control subjects, also there is a significant increase in Clusterin in the macroalbuminuria group and the microalbuminuria group in compared to control subjects and the normoalbuminuria group also there is an increase in AGPand Prost D the macroalbuminuria group, the microalbuminuria group and the normoalbuminuria group in compared to control subjects. In conclusion THP, Progranulin, Clusterin, AGPand Prost D level in urine may serve as early predictors for nephropathy in type 2 DM.

So, early diagnosis and good glycemic control are effective in reducing the diabetic nephropathy.

Keywords: Diabetes mellitus, type 1 diabetes, nephropathy, urinary biomarkers

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Abstract withdrawn.

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Oral vitamin C and E do not improve endothelial function in adolescent type 1 diabetes

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Short-term studies with intravenous infusions have indicated that ascorbic acid might have beneficial effects on endothelial function in some patients with type 1 diabetes. We have previously demonstrated that adolescents with type 1 diabetes and poor glycemic control have impaired endothelial function (EF). We decided to test the effects of 6 weeks of combined antioxidant therapy with vitamins C and E in 8 adolescents with type 1 diabetes (age, 12.9 ± 0.9 years; duration, 5.5 ± 2.5 years; BMI, 22.1 ± 3.8 kg/m^2; mean ± sd) and hemoglobin A1c>8.2% (9.3 ± 1.1%). Doses were weight-based, vitamin C 250–750 mg, vitamin E 100–300 units per day. EF was assessed using venous occlusion plethysmography to assess forearm blood flow (FBF) and vascular resistance (FVR, mean arterial pressure/FBF) before and after 5 min of upper arm arterial occlusion. Studies were coded so that the scorer was blind to treatment status. High sensitivity C-reactive protein (CRP), total anti-oxidant capacity (TAC), adiponectin (ADC) levels and endothelial progenitor cell percent (EPC) were also measured. No changes were seen in any of the variables after treatment.

Results are mean ± SD.

These results indicate that 6 weeks of combined antioxidant do not improve non-traditional cardiovascular risk factors in adolescents with type 1 diabetes.

	Post-occlusion FBF	Post-occlusion FVR	CRP	TAC	ADP	EPC
Baseline	21 ± 3	4.1 ± 0.8	0.63 ± 0.85	95 ± 6	3970 ± 1150	0.024 ± 0.015
Vitamin C and E	20 ± 5	5.3 ± 2.9	0.74 ± 0.88	102 ± 12	4330 ± 1280	0.032 ± 0.037

[Pre and post vitamin C and E]

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Frequency of microalbuminuria and diabetic nephropathy in children and adolescents – single center experience

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Objectives: Early recognition of microalbuminuria as the most significant predictor of nephropathy is a goal in prevention of diabetic nephropathy. Prevalence of diabetic nephropathy in childhood is 10–20%. Our aim was to assess the frequency of microalbuminuria and relationship with other risk factors (metabolic control, duration of diabetes, puberty, BMI, blood pressure) for the development of diabetic nephropathy.
Methods: In a cross-section study involving a group of 203 children and adolescents of both sexes, mean age 15.61 ± 2.62 years and with mean duration of type 1 diabetes 6.88 ± 3.44 years, we assessed the presence of microalbuminuria. Microalbuminuria was determined as an albumin excretion rate between (AER) 20 and 200 μg/min in timed overnight urine collection, using nefelometric method.
Results: In the whole group, transitory microalbuminuria was developed in 61 (30%) patients and permanent microalbuminuria and/or diabetic nephropathy was developed in 23 (11.3%) patients, mostly adolescents with completed sexual development, statistically significantly poorer metabolic control (HbA1c 9.59% vs. 8.03%) and later start of intensive insulin therapy than in the patients with normoalbuminuria. The duration of diabetes was statistically significantly related to urine albumin excretion (UAE), with a high statistical significance of the correlation between HbA1c and UAE. We have not found statistically significant relation between puberty (age at the onset of puberty, duration of puberty before the diagnosis of T1 diabetes or duration of puberty until the last examination) and UAE.
Conclusions: Using binary logistic regression, in our patients statistically significant risk factors for the development of microalbuminuria and nephropathy were: poor metabolic control and duration of diabetes.

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Corneal confocal microscopy detects corneal nerve fiber loss in type 1 diabetes children without clinical neuropathy

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Objectives: To compare corneal confocal microscopy (CCM) parameters between children who have had Type 1 diabetes (T1D) for 5 years or more and healthy control subjects and to compare these findings with neuropathy assessment.
Methods: In a tertiary care paediatric diabetes clinic, 83 children with T1D (age 14.7 years (SD 2.3), duration of diabetes 8.9 years (SD 2.7)) and 85 healthy controls (age 13.4 years (SD 3.0) underwent CCM and detailed assessment of diabetic neuropathy (DN) including symptoms, signs, nerve conduction, quantitative sensory, and autonomic function testing. CCM images were analyzed with an automated program for mean corneal nerve fiber length (CNFL), nerve fiber density (CNFD), nerve branch density (CNBD), and total branch density (CTBD) on an average of 7–16 images per subject. CNFL values <2 SD from healthy control mean were considered abnormal. Groups were compared using independent samples *t*-tests and Fisher's Exact tests with a Bonferroni correction for multiple comparisons of CCM parameters.
Results: Mean CNFL, CNFD, and CNBD were significantly lower in T1D subjects compared to healthy control subjects ($p < 0.0125$; Bonferroni correction). One control and 4 T1D subjects had subclinical neuropathy on detailed neuropathy testing. No participants had clinical neuropathy. No significant association was found between abnormal CNFL and subclinical neuropathy ($p = 0.24$).

Mean (SD)	CNFL mm/mm^2	CNFD no/mm^2	CNBD no/mm^2	CTBD
Control	16.7 (3.4)	27.9 (7.0)	38.1 (17.3)	58.9 (25.6)
T1D	15.2 (2.9)	24.6 (5.8)	30.8 (13.6)	50.0 (21.1)
	p = 0.002	p = 0.001	p = 0.003	p = 0.013

[CCM Parameters]

Conclusions: In children with T1D, there is no evidence of clinical DN and low prevalence of subclinical DN. A significant lower values in corneal nerve parameters compared to control subjects suggests early subclinical small fiber neuropathy. Longitudinal studies are warranted to explore the clinical relevance of this abnormality. CCM could be a novel tool for the early detection of DN.

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Serum levels of bone turnover markers: osteocalcin and CTx in adolescents with type 1 diabetes mellitus

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Background: There is still little clinical data regarding the influence of IDDM on bone structure, bone density and biochemical markers of bone turnover especially in children.
Objective: To evaluate the potential role of osteocalcin (OC) and CTx in adolescents with IDDM and the influence of age, sex, metabolic control, diabetes duration, age of diagnosis and anthropometrics parameters on OC and CTx levels.
Methods: Serum concentrations of OC and CTX were measured in 60 children (25 boys, 33 girls) with IDDM duration of 5.1 years ± 3.9 (min. 1.0, max. 11.8), aged 15.0 ± 1.9 (11.4–17.8), age of IDDM diagnosis 9.9 ± 3.9 (2.5–17.0), HbA1c in the last year-7.8 ± 1.7% (5.1–13.6). Control group consisted of 17 healthy, age- and sex-matched children. OC and CTX levels were measured by ECLIA commercial kits.
Results: Both OPG and CTx serum levels were lower in diabetic children – but not in a statistically significant way and correlate positively. There were no influence of gender on both OC and CTx levels. Negative correlation was observed between both OC and CTx concentration and age, diabetes duration, metabolic control, pubertal stadium, weight, BMI and fat mass. Both OC and CTx correlate negatively with lean body mass. Age of diagnosis have no influence on OC and CTx levels. Height correlate positively with OC and negatively with CTx.

Conclusions: Bone turnover markers both formation (OC) and resorption (CTx) were reduce in adolescents with IDDM. Only lean body mass and partial height increase bone turnover whereas age, puberty status, weight, BMI, fat mass, diabetes duration and poor metabolic control decrease it. Especially the influence of fat mass and metabolic control are important as modifiable parameters

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Impact of glycemic variability on complications risk in adolescents with type 1 diabetes

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Objective: To investigate the association between glycosylated hemoglobin (HbA_{1c}) variability and the risk of microvascular complications in adolescents with type 1 diabetes.

Methods: Adolescents (aged 12–20; minimum diabetes duration 5 years) were assessed for complications from 1990–2014. Glycemic variability was computed as the standard deviation of all HbA_{1c} measurements (SD-HbA_{1c}) after the date of diagnosis. Retinopathy was detected using seven-field fundal photography, early nephropathy determined using albumin excretion rate (AER) and albumin-to-creatinine ratio (ACR), peripheral neuropathy assessed using thermal and vibration threshold testing, and cardiac autonomic neuropathy assessed using time- and frequency-domain analyses of electrocardiogram recordings. Generalized estimating equations were used to examine the relationship between complications outcomes and glycemic variability, after adjusting for known risk factors including HbA_{1c}, diabetes duration, blood pressure and lipid levels.

Results: At last assessment, 1706 (47% male) patients had a median age of 15.9 years [interquartile range 14.3–17.5] and diabetes duration of 8.1 years [6.3–10.8] with 22 [14–29] HbA_{1c} measurements per patient. In multivariable analysis, SD-HbA_{1c} was associated with early retinopathy (odds ratio [OR] 1.32; 95% CI, 1.00–1.73), early elevation of AER/ACR (OR 1.61; 1.23–2.12), microalbuminuria (OR 1.81; 1.04–3.14) and cardiac autonomic neuropathy (OR 2.28; 1.23–4.21), but not peripheral neuropathy (OR 1.00; 0.63–1.60).

Conclusions: Greater HbA_{1c} variability predicts retinopathy, early nephropathy and cardiac autonomic neuropathy, in addition to established risk factors, in adolescents with type 1 diabetes. Minimizing long term fluctuations in glycemia may provide additional protection against the development of microvascular complications.

P74
Is my diabetes really for life?

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Introduction: Reversibility of Tacrolimus associated post-transplant diabetes mellitus (PTDM) is minimally reported in children. Tacrolimus is an immunomodulatory therapy used in transplant that can inhibit insulin secretion and sensitivity.

Case report: MZJ was diagnosed to have β-thalassemia major since 4 months old. At 8, he had a matched sibling bone marrow transplant. His ferritin levels were 1467 ng/L on chelation therapy. Tacrolimus was used (maximum dose 6 mg BD, total duration 3 months, peak trough level 21.6 ng/ml) but the first graft was rejected 3 months after transplant. His blood glucose (BG) were occasionally abnormal(fasting BG 6.9–10.4 mmol/l) without symptoms, hence was not treated at that stage. He received a second transplant 4 years later. Just prior to that, his BG's went high. He developed ketosis with ketonuria and blood ketones 1.6 mmol/l. He was started on insulin and the doses were tapered up to a total daily dose(TDD) of 0.65 units/kg/day. His antibodies were negative; c-peptide 1.5 ng/ml, HbA1c 6.6%. Post-transplant, he received Tacrolimus again for 2 months (maximum dose 2.5 mg BD, peak trough level 14.3 ng/ml).Two years later his HbA1c was 6.6%, well controlled with the same TDD of insulin. Eventually, he became less compliant and his HbA1c rose to 9.0% (his ferritin was well below 700 nmol/l). He was angry at diabetes and did not check his BG. At the age of 16, he skipped insulin but despite that, his HbA1c improved to 5.9%. He had a trial off insulin and three months later, his fasting BG's and 2hpps' were between 6–8 mmol/l. His latest HbA1c was 6.2% and his c-peptide level was 1.6 ng/ml.

Conclusion: We suggest monitoring BG levels during and after Tacrolimus therapy. This case has demonstrated the worsening HbA1c despite improvement of ferritin level suggesting the effect of Tacrolimus rather than hemosiderosis. These children should be referred early to the endocrine team and one should be aware that they might not need lifetime insulin therapy.

P75
Can YKL-40 predict microvascular complications in type 1 diabetic children and adolescents?

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Objectives: YKL-40, a glycoprotein produced by immunologically active cells, participates in inflammatory states and induces endothelial dysfunction. These mechanisms play a crucial role in the progression of diabetic microvascular complications. However, little information has been obtained about serum YKL-40 levels in type 1 diabetic patients. Hence, the present study aimed to assess serum YKL-40 in type 1 diabetic children and adolescents and its relation to the presence of microvascular complications.

Methods: The study included 50 children and adolescents with type 1 diabetes mellitus (T1DM), with disease duration of 5 years or more, who are regularly attending the Pediatric Diabetes Clinic of Ain Shams University. Patients were divided into two groups. Group 1 included 20 diabetics with microvascular complications, and group 2 included 30 diabetics without microvascular complications. Thirty healthy age- and sex- matched subjects served as controls. Subjects were clinically assessed and had their total-cholesterol, HDL-

cholesterol, LDL-cholesterol, triglycerides, HbA1c, microalbuminuria, and serumYKL-40 levels tested.
Results: Mean serum YKL-40, among diabetics, was significantly higher than controls ($p < 0.001$). Furthermore, its serum level was higher in diabetics with microvascular complications, than other diabetics ($p < 0.001$). Serum YKL-40 had a significant correlation to age, duration of diabetes, HbA1c, total cholesterol, triglycerides and HDL-cholesterol ($p < 0.05$). A strong positive correlation was found between YKL-40 and the level of microalbuminuria among studied groups ($p < 0.05$).
Conclusions: The significant correlation between serum YKL-40 levels and the microvascular complications in T1DM patients might suggest the possibility of utilization of YKL-40 as a tool to assess the risk of diabetic microangiopathy in the early stages of T1DM.

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Neurospecific proteins and brain in patients with diabetes mellitus type 1

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The aim: To study neurospecific proteins and association with brain in patients with diabetes mellitus type 1 (T1DM).
Materials and methods: Were examined 58 patients with T1DM at the age 22.4 ± 0.2 years, the control group consisted of 29 healthy young adults, matched by sex and age. Complex examination included clinical and metabolic tests, screening of brain function – MoCa test. We studied neurospecific protein – protein S100, glial fibrillary acidic protein (GFAP), myelin basic protein (MBP). Statistical data processing was carried out by methods of variation statistics using software packages «R-system».
Results: An average level of HbA1c in patients with T1DM was 8.84 ± 1.8%, fasting glucose corresponded 11.52 ± 4.9 mmol/l. The study revealed elevated levels of protein neurospecific – S100 (121.65 ± 66.39 ng/l), myelin basic protein (0.13 ± 0.043 ng/ml) and glial fibrillary acidic protein (0.11 ± 0.041 ng/ml) in patients with T1DM compared with the control group ($p < 0.001$). Patients with T1DM had cognitive impairment (total score of 25 points) to 72.2% while the control group cognitive functions were normal in 100% (total score of 30 points). When assessing tasks MoCa test recorded a statistically significant reduction of parameters that assess short-term memory and attention in patients T1DM compared with the control group. Cognitive decline was correlated with all neurospecific proteins.
Conclusions: The data suggest that in patients with T1DM are characterized by significantly higher levels of all surveyed neurospecific proteins, that associated with brain cognition.

P77
Effect of glycaemic control on longitudinal growth in childhood onset type 1 diabetes mellitus

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Objective: To determine the effect of glycaemic control and age of diagnosis on growth in children with type 1 diabetes mellitus (T1DM).
Study design: Routinely collected data from a Western Australian population based cohort of 2897 patients, diagnosed and treated for T1DM between 1993–2014, were analysed. Patients additionally diagnosed with hyperthyroidism, hypothyroidism or coeliac diseases and those with no recorded height measurements were excluded from the analysis, leaving 2119 eligible patients (1153 males, 966 females). For each patient, glycaemic control was based on the concentration of glycated haemoglobin (HbA_{1c}) and categorised as <7.5% or ≥7.5% for the following age ranges (years): 6 to <8, 8 to <10, 10 to <12, 12 to <14. Height observations were converted to sex and age-adjusted z-scores prior to sex-specific analyses using linear mixed effects models. Analyses of untransformed heights were based on a shape invariant model (SITAR) stratified by age-specific glycaemic control or age at diagnosis.
Results: Median age of diagnosis of T1DM was 7.24 years in both males and females. Median number of height observations was 19 for males and 20 for females. Male height z-score trajectories were associated with age at diagnosis of T1DM and glycaemic control between 10 to < 12 years (time dependent interactions $p = 0.006$ and $p = 0.002$, respectively). The stratified SITAR models estimated that the average difference in height at 18 years between: (i) patients diagnosis at 4 years and 12 years is -2.9 cm, corresponding to a lower peak height velocity in the younger children; and (ii) patients with HbA_{1c} <7.5% and ≥7.5% is +2.7 cm, which appears to be attributable to a later and lower peak height velocity in patients with suboptimal glycaemic control. No associations were detected for female heights.
Conclusion: Young age at diagnosis and poorer glycaemic control are significantly associated with reduced peak growth velocity in males but not females.

P78
Smoking and physical activity during adolescence and in young adults is strongly related to HbA1c level during adolescence and to retinopathy in young adults

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Objectives: To study how smoking and physical activity during adolescence relates to HbA1c and microvascular complications in young adults.
Methods: Data regarding smoking habits, physical activity (PA) and HbA1c reported in the Swedish pediatric quality registry together with data on HbA1c and microvascular complications in the National Diabetes Registry for adults (NDR) on 1759 subjects with type 1 diabetes.
Results: Fifteen percent of the teenagers (13–17.99 years of age) were smokers, of those 54.6% still smoked as young adults (18–40 years of age). Only 10.5% of those who did not smoke as teenagers, smoked as adults. In teenagers with HbA1c >78 mmol/mol 31.3% were smokers whereas in teenagers with HbA1c <57 mmol/mol 7.4% were smokers. In those with HbA1c between 57 and 78 mmol/mol 12.4% were smokers ($p < 0.001$). When comparing HbA1c in NDR (as young adults) with smoking habits,

22.7% of the patients with HbA1c >78 mmol/mol were smokers as teenagers compared to 11% in the group with HbA1c <57 mmol/mol and 10.9% in the group with HbA1c value 57–78 mmol/mol. In teenagers with HbA1c >78 mmol/mol 27.4 had no or very low PA whereas 9.5% reported daily PA ($p < 0.01$). Among those who smoked 56% had retinopathy as young adult, 8.7% had microalbuminuria compared to 49.4% and 6.7% in non-smokers. No difference in macroalbuminuria was seen. Among teenagers with daily PA 24.2% had retinopathy, 3.2% micro- and 1.9% macroalbuminuria. Corresponding figures for those with no or very low PA were 30.5%, 14.3% and 2.9%.

Only 15.4% of the teenagers with daily PA smoked as young adults compared to 29.5% of those with no PA as teenagers ($p < 0.01$).

Conclusion: There is a strong relation between smoking habits, PA and HbA1c level during adolescence and to microvascular complications in young adults. This study highlights the importance for pediatric diabetes team members to motivate the teenagers to a healthy lifestyle.

Poster Tour 8: Diabetes Education I

P79

Awareness and knowledge of diabetic ocular diseases among diabetic patients. Aden Diabetic Center, 2013

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Background: Diabetes mellitus, particularly type II is a major public health concern worldwide.
Objectives: This wok was conducted with the principle objective of assessing the level of awareness and knowledge regarding diabetic ocular diseases among diabetic patients attending Aden Diabetes Center in Al-Gamhoria Teaching Hospital.
Methods and patients: A cross sectional study was applied in this study. A sample size was 182 diabetic patients attending this center during the period January–March 2013. For achieving the objectives of the study, a closed type questionnaire was constructed including different variables related to diabetic patients awareness which was filled by the researcher during direct interview with patients.
Results: The results showed that among the studied sample 109 patients were females ant 73 were males. The mean age group was 53 years and half of the patients were illiterates with an age group 45–60. Fifty eight percent of patients were diagnosed less than 10 years. Awareness regarding the importance of controlling issues in Diabetes mellitus to prevent different eye complications as well as other body organs was satisfactory. Sixty seven percent of patients never visited eye specialists. The health team was the main source of information about eye diseases.
Conclusions: The study concluded that the majority of patients were aware regarding eye complications of Diabetes Mellitus and it was mentioned Cataract, Glaucoma and Retinopathy as the most known complications.

P80

Dasman diabetes motivational interview program (DDMI)

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Background: Kuwait is among the top 10 countries with the highest prevalence of DM worldwide.DM is associated with high morbidity and mortality rates. SDM management programs recommend constant life-style changes. Promoting lifestyle changes necessitates a shift in patient management from straight forward recommendation to counselling-based approach.
Aim: Study aims to address the impact of applying MI during the educational sessions on people with diabetes to change their behaviours in order to enhance their DM self management, achieve better glycaemic control, prevent diabetes complication and improve their quality of life.
Objectives:

(i)To determine whether adding MI to diabetes self-management education (DSME) program improves positive behaviour changes, improve glycemic control, increase diabetes self-care and increase self efficacy for people with diabetes.
(ii)To develop additional skills for helping patients to explore and resolve their ambivalence about health behaviour change.

Methods: Ten female patients with poorly controlled type 2 diabetes selected to participate into three sessions of MI and telecare-support in between the MI sessions, the intervention used different interviewing strategies and techniques, based on each person′s readiness stage to change.
Results: A statistically significant improvement in glycemic control was demonstrated ($p = 0.002$) as assessed from glucose-meters downloads. Behavioural changes outcomes were also statistically significant ($p = 0.0003$) as assessed by questionnaire.
Conclusion: Based on our initials findings, the effect of MI on improving the positive behavior changes and glycemic control of females with T2DM seem to be promising.

P81

Exploring adolescents' and their caregivers' experiences of an intensive structured education program (SEP) for type 1 diabetes (T1D) "Kids In Control OF Food (KICk-OFF)" in Kuwait: a qualitative study

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Objectives: To explore the perceptions and experiences of adolescents and their caregivers towards KICk-OFF, a diabetes structured education program (SEP) that is provided over five full days for adolescents (11–16 years old) with T1D. KICK-OFF is designed to empower participants with diabetes self-management (DSM), knowledge and skills for better glycemic control.
Methods: This is a qualitative exploratory case study. Semi-structured interviews were used to explore experiences of five adolescents and five caregivers. Participants were interviewed individually. Interviews were recorded and then transcribed verbatim. Data was analysed using an inductive thematic approach.
Results: Five main themes emerged from the thematic analysis.

1-Value of the Program: interviewees reported that they acquired enough knowledge for better understanding of diabetes, their autonomy was enhanced, they are more efficacious and competent at DSM, and they can lead more flexible lives.

2-Confidence: adolescents and their caregivers gain more self-confidence, and hence they provide more support. KICK-OFF enhanced the sensation of control over the disease.

3-Psychological effect: KICK-OFF helped participants to better cope with diabetes. It helped reducing diabetes-related family stress and gave them more social freedom. It also supported behavioral change for better lifestyle.

4-Course setting & layout: all participants enjoyed the KICK-OFF guiding style. They all had positive overall impression about the course and suggested reinforcement courses.

5-Clinical Parameters: attending KICK-OFF led to better glycemic control and helped reduced the rate of hospital admissions.

Conclusions: Experiences of participants with T1D and their caregivers of KICk-OFF as a SEP was positive. It was perceived as a valuable program that enhanced their confidence and psychosocial status, and resulted in a better clinical outcome. Possible follow-up courses would be of benefit.

P82

Effects of mobile phone radiation on health of diabetic patients

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This paper presents an insight on the effects of mobile phone radiations on human health; specifically the health of elderly aged diabetic patients. The paper aims to expose the extremely negative effect of using mobile phone& its radiation on two types of diabetic patients, one, who report high level of blood glucose, and others who report low level of blood glucose. The experimental study has been conducted on a group of diabetic patients owning age groups ranging from 51 to 85 years. Also, all patients are assumed as having established diabetes which means that they are progressive from the early diabetic phase. To guarantee a healthy practice, previous health record of all the patients was collected and ensured that previous history is taken into account during experiment and conclusions. Health conditions were monitored over 90 days maintaining similar dietary conditions. Blood samples of the patients were taken against different parameters i.e. random, fasting and normal blood sugar level etc. Blood glucose was calculated with usage of mobile phone for a specific amount of time. Conclusions were made on the basis of statistics gathered.

P83

Assessment of diabetes knowledge and readiness for independent care among adolescents preparing for transition

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Background and aim: Transition of care to adult services for adolescents with diabetes begins by identifying the individual who shows readiness for adult-based care. This study aims to identify the predictors of better knowledge and readiness for independent care among adolescents with diabetes.

Method: Two self-administered questionnaires were prospectively completed by adolescents on their first visit to a diabetes transition clinic. The Michigan Diabetes Knowledge Test (MDKT) assessed diabetes knowledge by summing up the number of correct answers. Readiness for independent care was assessed based on statements on

(a) independent behavior & understanding of diabetes,
(b) sexual health & future plans, and
(c) health & lifestyle, and scored on a 5-point Likert-scale where lower scores indicated greater readiness.

Data was analyzed using multivariate linear regression.

Result: We assessed responses from 154 adolescents (age at first transition visit 17 ± 2.5 years, age at diagnosis 11 ± 3.7 years, 54% female, 72% Chinese, 86% insulin treated). An older age predicted a higher score in the MDKT ($\beta = 0.233$, 95% CI 0.001–0.465, $p = 0.049$). Longer duration of diabetes ($\beta = -0.025$, 95% CI −0.049 to 0.001, $p = 0.038$) and the male gender ($\beta = -0.235$, 95% CI −0.067 to −0.404, $p = 0.007$) predicted lower Likert-scores, indicating greater readiness towards independent behaviors and understanding of diabetes. No predictors were identified from sections on sexual health/future plans or health/lifestyle.

Conclusion: While the older adolescent has better knowledge in diabetes, males with longer duration of diabetes appear to be more ready for transition to adult-based care.

P84

Type 1 diabetes therapeutic education in a non-profit association, T1Diams. An overview

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Background: Type 1 diabetes is a chronic endocrine disease requiring a lifelong insulin treatment. T1Diams, a Mauritian non-profit organisation specialised in the care and self-management of Type 1 Diabetes in Mauritius has been working on the development and implementation of therapeutic and educational activities, during the last 10 years. The aim of the study is to give an insight of their therapeutic educational program.

Methods: This retrospective study was carried out from March–April 2015. The author was given a contract of consultancy where he evaluated all the therapeutic educations carried out by T1Diams.

Results: Therapeutic education is carried out by two diabetes educators and a general practitioner. The first stage consist of doing a diagnostic questionnaire to evaluate the present knowledge (pertaining to Type 1 diabetes) for each member. 6 themes (What is type 1 diabetes, Hypoglycaemia, Hyperglycaemia, Insulin/Adaptation, Nutrition and Personal experience) have been identified. Educational games and presentation have been devised on these themes. The whole program is based on empowering the Type 1 diabetic patient with these knowledge, which is of utmost importance, for the management of their medical condition. Ongoing home and centre visits (at least 90 visits per month), 12 therapeutic educational group sessions as recreational diabetic day (Enjoy Life and T1Diams en balade) and a one week-long annual diabetic camp are carried out for the whole year. Every 3 months T1Diams releases a news bulletin on diabetes education for the public. Furthermore the association organises once a year a national congress on Type 1 diabetes for health professionals.

Conclusion: Over the last decade, T1Diams has successfully been able to empower its patients, through its therapeutic education program, to become autonomous in the management of type 1 diabetes.T1Diams plays an important role in the management of Type 1 diabetes in Mauritius.

P85

'Type 1 diabetic camp: an experience in Mauritius'

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The aim of the Non-Profit Organisation T1Diams (Type 1 Diabetes Mellitus Support) is to empower children, adolescents and young adults with Type 1 diabetes to optimally manage their medical condition. In the Republic of Mauritius (an island in the south-west of the Indian Ocean), since 2007, T1Diams have been organising a yearly diabetic camp of seven days duration during the winter season for its members and their families. Two age groups are present (0–11 years and 12–25 years). For the first group the children are accompanied by their parents while the second group come on their own. During the camp, therapeutic education is carried out. The acquisition of knowledge and self-care skills are ensured through pedagogical diabetes related games and presentations. Physical activities as well as workshop on carbohydrate counting are also organised. Those activities help the participants acquire and maintain the skills that are sine qua non to live optimally with their disease. During the camp, there are also interventions from professionals (nutritionist, psychologist, social worker, endocrinologist, ophthalmologist, podiatrist and dentist) so that they get a complete medico-social follow-up. Self-monitoring of blood glucose (SMBG)

and education on insulin injections are done on a regular basis (at least four times per day). Tests for Glycated haemoglobin (HbA1c) and microalbuminuria are performed with all the patients.

P86
'An experience recreational diabetic day in a non-profit organisation, T1Diams, in Mauritius'

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Background: T1Diams, a Mauritian non-profit organisation is specialised in the care and self-management of Type 1 Diabetes in the island of Mauritius. During the last decade, they have been working on the implementation of therapeutic and educational activities for its members.

They regularly organise a recreational diabetic day ('Enjoy life' or 'T1Diams en balade').

The aim of the study is to give an overview of a typical diabetic recreational day in T1Diams.

Methods: The author participated in several of these activities organised by the organisation in 2014 and 2015. He placed himself in the shoes of a type 1 diabetic patient and did all the activities organised for him. Clearance was granted by the managing committee of the organisation.

Results: 22 patients came for that event. The morning session was dedicated to diabetic therapeutic education and was carried out by two diabetes nurses. In the afternoon session there was physical activities (for those >12 years) and low intense activities for the other group. An optometrist did a presentation on diabetes and eyes problems. The menu for the lunch was elaborated by a nutritionist. Blood glucose levels were monitored on arrival, before lunch and on departure (15 h00). The patients did their insulin injections at noon and any hyperglycaemia noted during the day was corrected with rapid acting insulin. Hypoglycaemia was treated using an established protocol. Animators were present to ensure the proper functioning of the day.

Conclusion: This recreational diabetic day continue to give an opportunity for parents to be reassured that their diabetic children can be autonomous. The day was carried out in a professional way so as to empower the patients. These activities should be organised regularly during a year.

Poster Tour 9: Diabetes Education II

P87

Improving diabetes care through structured educational programs for multidisciplinary healthcare providers in Kuwait

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Objectives: To develop and improve the knowledge of multidisciplinary healthcare providers who work with diabetes patients in diabetes clinics, through structured Diabetes Mellitus (DM) education programs, in order to provide a better understanding of diabetes to professionals that are novel to diabetes practice. It also aims to provide them with the knowledge and skills required for safe and effective treatment, provided to people with diabetes in outpatient clinics, and improve the overall quality of care.

Methods: A "Diabetes Knowledge and Skills Workshop", was planned and delivered by Diabetes Nurse Educators at a diabetes institute. The course was adapted from the International Diabetes Federation (IDF) curriculum for healthcare professionals. The intended learning outcomes of the workshop were structured also around the IDF course. The 5 day, 6 h workshop employed different teaching methods for delivering the contents such as interactive lectures, practical sessions and small group activities. Pre and post course assessments were conducted to assess their level of DM knowledge.

Results: Pre- course assessments of 42 healthcare providers indicated that they were from multidisciplinary fields and that their DM knowledge was at a novice level. Results demonstrated significant improvement in the participants' knowledge ($p < 0.00001$). 98% of the participants indicated that the sessions met the objectives "remarkably well" and expressed overall satisfaction with the course content, objectives and their knowledge of diabetes.

Conclusion: This workshop confirmed the need to establish a framework to promote an ongoing structured education, thus providing knowledge and skills training to healthcare professionals who are novice to diabetes, regardless of their previous experience for safe and effective treatment of diabetics and to improve the overall quality of care.

P88

Home-based versus inpatient management of children newly diagnosed with type 1 diabetes (T1D)

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Objectives: There are different models for the management of newly diagnosed T1D but few have been assessed using a randomised-controlled trial. This study measured the medical and psychosocial impact of home-based vs inpatient management of children newly diagnosed with T1D.

Methods: A RCT was conducted from 2013–2014. Eligible patients were randomised to inpatient care and education (control) or to discharge after 2 days for home-based management (intervention). Patients in the intervention arm were visited by a Hospital in the Home nurse to supervise injections for the 1st 2 days. A multidisciplinary team then conducted 3 home visits over 2 weeks to complete initial education. All families attended routine outpatient clinics following initial education, completing surveys on patient satisfaction at 1 m and on family impact and diabetes knowledge at 3 and 9 m post-diagnosis. Primary outcomes included HbA1c and number of hypoglycaemic events. Secondary outcomes included survey measures, length of stay (LOS) and cost.

Results: 50 children (mean age = 9.5 years) were randomised (25 to each arm). Although 24% of parents in the intervention arm reported being less than ready to be discharged vs. 0% in the control arm, there was no difference between the arms at 1 m post-diagnosis in their confidence to manage diabetes ($p = 0.31$). More than 2/3 of all families indicated that given the choice they would prefer home management. Mean LOS was 2.7 and 4.6 days for the intervention and control arms respectively. To date 14 patients from each arm have completed the 9 m follow-up. Both arms had a median HbA1c of 6.7% at 9 m, 2 moderate hypoglycaemic events and no hospital readmissions. There was no difference in diabetes knowledge and family impact measures at 3 or 9 m. An economic analysis is still to be completed.

Conclusion: Results to date indicate that children newly diagnosed with T1D can be safely managed at home, resulting in higher patient satisfaction and reduced hospital bed days.

P89

A collection of case studies: investigating the efficacy of an intervention that reframes poor diabetes self-management as a form of self harm

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We present a cohort of adolescent diabetic patients with a history of poor or unstable control to explore the efficacy of an intervention which reframes poor adherence to self-management of diabetes as a form of self-harm. The patients took part in six sessions of intervention based around self-harm and maladaptive coping. The strengths and difficulties questionnaire (SDQ) which includes measures of stress and distress was used to measure functioning pre and post intervention and data was collected relating to blood glucose levels (HbA1c). The results demonstrate a downward trend in HbA1c, secondly the data highlights a significant improvement in the psychometric constructs measured for each patient ($t(9) = 2.4149$, $p = 0.0389$, $t(5) = 1.5165$ $p = 0.0949$, $t(4) = 1.8402$, $p = 0.0698$). This study provides embryonic evidence that reframing poor diabetic self-care as a form of self-harm can improve the efficacy of interventions targeting poor self-management and ameliorating psychological distress in adolescent populations.

P90

A one-day educational course improved HbA1c in children with type 1 diabetes with poor metabolic control

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Objective: To evaluate the effect of a one-day structured educational course given by a diabetes team (doctor, nurse, dietician and psychologist) on metabolic control in children with type 1 diabetes (T1D).

Methods: A historical prospective cohort study was conducted on 140 children and adolescents with T1D (duration ≥12 months, age 2–18 years) at our clinic. The effects of one-day educational courses held in 2008–2013 were studied. Children attending courses (n = 81) were compared to a control group (n = 59) who did not attended courses. There were no differences in gender, age or the duration of T1D between the groups. Mean HbA1c was registered prior to and 3, 6 and 12 months after the one-day educational course.

Results: There was no difference (p = 0.15) in mean HbA1c in the intervention group before (8.8 ± 1.2%) and one year after the course (9.0 ± 1.3%). The yearly acute complication rate (severe hypoglycemia, diabetic ketoacidosis) was 0.04 ± 0.09 in the intervention group and 0.10 ± 0.32 in the control group (p = 0.048). However, a reduction in mean HbA1c was observed after the course for children with inadequate metabolic control. Compared to prior value, the number of children with a HbA1c value <10% at 3 months (84.7% vs. 76.7%, p = 0.021) and 12 months (84.6% vs. 76.7%, p = 0.049) was higher in the intervention group, and this was not observed in the control group. Similar results were found with an HbA1c cut-off at 9%. A univariate general linear regression model indicated that boys had a better effect of the educational program than girls (decline in HbA1c 0.59% ±0.44 at 6 months, p = 0.01).

Conclusions: A structured one-day diabetes educational course improved metabolic control for children with poor metabolic control (HbA1c >9%) prior to the course, whereas there were no significant differences found in children with HbA1c <9%. Thus, such courses may be particularly beneficial to children and adolescents with poor metabolic control.

P91

Educating teachers about type 1 diabetes – a program that works

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Introduction: Optimal management of type 1 diabetes (T1D) can assist to maximise cognitive ability and learning of children with diabetes.

Therefore, how well children with T1D are supported to manage their diabetes in the school setting can potentially influence future learning capacity. To maximise learning outcomes for children with T1D, and increase teacher confidence to support these children, the resulting Diabetes at School and Preschool Program (DSPP) has been developed.

Objectives: The DSPP aims to provide teachers across all education sectors, to expand their knowledge about T1D and its management, while also improving their confidence to safely support the day-to-day school experience of children with T1D in their care.

Methods: In 2009, a collaborative partnership was established between Diabetes Victoria, Royal Children′s Hospital, Melbourne (RCH) and Monash Children′s Hospital, Melbourne (MCH). A working group was established to oversee the development of the DSPP for teachers and school staff, with content based on the components of the diabetes school management and action plans.

More recently, the Victorian Department of Education and Training (DET) have endorsed the program as being favoured.

Results: Between February 2012 and April 2015, 32 DSPPs have been conducted at which 1084 teachers and school staff has attended. Every participant provides feedback following attendance at the DSPP with consistently positive feedback received about the positive impact the program has had on their confidence and ability to support students with T1D in the educational setting. Participant feedback also contributes to the ongoing and continuous evaluation and annual program content and structure review process.

Conclusions: For the 2,689 children aged 3 to 18 years in Victoria and their families, this program provides essential information for teachers to facilitate a safe and fulfilling school experience for children with T1D to maximise learning potential.

P92

Abstract withdrawn.

P93

The cost-effectiveness of the Kids in Control OF Food (KICk-OFF) structured education programme in a paediatric population with type 1 diabetes mellitus in the UK

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Objectives: Kids in Control OF Food (KICk-OFF) is a 5-day structured education programme for 11-16 year olds who use multiple daily insulin injections. This study evaluates whether KICk-OFF would be considered a cost-effective use of NHS resources by decision makers in the UK.

Methods: A cost-effectiveness analysis comparing KICk-OFF to usual care was conducted. Data from the KICk-OFF trial were extrapolated to simulate lifetime outcomes using the Sheffield Type 1 Diabetes Policy Model. Baseline patient characteristics and effectiveness on HbA1c, severe hypoglycaemia and diabetic ketoacidosis came from trial data. In the model HbA1c is the key predictor of future events (retinopathy, neuropathy, nephropathy, myocardial infarction, stroke, revascularization and angina). KICk-OFF implementation costs were calculated using data from participating trial centres. Analyses was conducted in the full cohort and a high baseline HbA1c (>9.5%) subgroup. Treatment effect durations of 2 years, 4 years and lifetime were tested. Uncertainty was examined using probabilistic sensitivity analysis.

Results: Using the full cohort and a 4 year treatment effect duration, KICk-OFF provided more quality adjusted life years (+0.0394 QALYs) at a higher cost (£1,135) per person than usual care. The incremental cost per QALY gained was £28,813 per QALY gained, just within the range of £20,000 to £30,000 which NICE would consider cost-effective (42.6% chance of being below £20,000). This value changed considerably with the treatment effect duration. For the high HbA1c sub-group, KICk-OFF was dominant i.e. provided more QALYs (+0.2012) at a lower cost (-£4,423) per person

(96.4% chance of being below £20,000). This result was robust to different treatment effect durations.

Conclusions: For the whole study population, whether KICk-OFF is cost-effective depends on the long-term treatment effect duration. For the high baseline HbA1c sub-group, KICk-OFF was found to be cost-effective

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Lesson-learn from type 1 diabetes integrating camp for patients, families and health professional careteam in less resource country

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Objective: DM camp setting is an ideal situation for medical staffs to teach diabetes education, skills and allow campers to share experiences. In Thailand, we have organized T1D camp since 1990, recently developed to be an educational school camp for T1D, parents and careteam to learn and gain experience together 5 days, 4 nights.

Method: At 14th camp, April, 2015 there were 63 T1D patients (camp1), 53 families(camp2), 17 young endocrinologists/pediatric, medicine endocrine fellows, 9 nurses, 2 dietitians (camp3A), 22 careteam (camp3B) attended. The 39 experienced camp staffs gave supervision and support. Each camp had their own schedule, own teachers.

All main activities included lectures, workshops, outdoor activities aimed for T1D. We divided them into 6 groups, each group consisted of 8-10 patients, 1 nurse, 1 dietitian, 1 T1D former camper, and 1 pediatric, 1 adult endocrinologist as teachers. In each small group, there were 3–5 in-training endocrine fellows/nurse/dietitian from camp3A attended as assistant of team, meanwhile they be able to learn and make close relationship with T1D daily's life.

In camp2, campers were encouraged to learn diabetes daily's life by doing SMBG, food records 24 h, attended diabetes, psychosocial classes.

In camp3, assistant in camp1(3A) and observer(3B) also have their own teachers for Q and A each day. Recreation activities aimed for fun, cultural and understand each other.

Results: By questionnaires, all groups gained their expectation at the end of camp. Campers from 3A(17),3B (20), the confidence in taking care T1D, CHO counting, insulin adjustment, correct hypo-hyperglycemia increased from 53% to 82%. The majority(86.5%) understand nature of T1D and family, psychosocial issues, their daily's life.

Conclusions: Lesson-learn from organized "3 in 1 Siriraj diabetes school camp" are more experiences gained by each group of participants in the same environment and a short period of time. It probably is a suitable model in less resource countries.

Poster Tour 10: Diabetes Education III

P95

Medtronic Minimed 640G system; lessons learned during continuous glucose monitoring training

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Objectives: Insulin pump and continuous glucose monitoring (CGM) functionality is becoming progressively multifaceted. Increasing use of such devices requires assessment of potential increased burden for patient and clinicians alike. In this report we assess the frequency and nature of issues requiring contact with the diabetes educator in the 3 weeks after initiation of therapy.
Methods: Patients with type 1 diabetes in our centre commenced using the Medtronic Minimed 640G with Enlite 2 and Guardian 3B transmitter as part of a clinical trial. In the following 3 week period, patient questions and subsequent responses from the diabetes educator were recorded.
Results: Twenty five patients (age 14.10 ± 2.5 years, duration of diabetes 7.74 ± 4.1 years, A1C 7.6 ± 0.9%, mean ± sd) received an individual 4 h teaching session with the diabetes educator to commence using the Minimed 640G system. Upon entry four patients had used CGM regularly and 21 were either sensor naïve or had previously participated in trials utilising CGM. Fifty percent of patients subsequently actively sought further assistance from the diabetes educator to troubleshoot CGM within the first 1–3 weeks. Contact was via phone, email and/or face to face communications. Common troubleshooting included transmitter signal, calibration and interstitial glucose time lag. Education included calibration timing, sensor placement and customising glucose alerts to improve ongoing acceptability.
Conclusion: Diabetes educators require knowledge and skills to guide individuals to navigate troubleshoot and individualise pump and sensor settings and alerts across the day and night to optimise value from these technologies. Efficient processes including sufficient diabetes educator time must be designed to disseminate expert advice on the use of such technologies as they become available.

P96

Dive: a serious game for diabetes therapeutic education in children

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Objectives: Implementation of type 1 diabetes (T1D) in children is constant from 20 years. In combination with insulin treatment, therapeutic patient education (TPE) is essential to improve care and prognostic. The use of video games as educational support appears suitable for learning in children, innovative, and interesting to respond to the increase in TPE needs in T1D and current economic constraints. Our objective is to validate in a proof of concept (POC) the children' interest for a serious game dedicated to TPE in T1D.
Methods: We designed the serious game Dive (DIabetes Virtual Education). In a virtual environment reproducing patients life places (home, school, hospital) it provide patients theoretical (videos, animations and quizz in the game) and practical knowledge (role playing with an avatar to confront virtually to particular life situation). Each successful steps allows children to earn learning points and trophies and to access to the next level. Forums and tchat also allow children to interact with each other. In this POC, patients were given free access to the game and had to give their feedback through an auto questionnaire.
Results: POC was conducted in 9 patients during 10 days. Number of connections confirmed patient's interest for this educative support and functionality of game interface. Majority of children have crossed 80% of stages and 31280 points and 12 trophies were collected in 4 days. All report having learned about diabetes. Educational sequences were found interesting by children (100%) and tchat seems to be an asset of the game (83%), even if few children have used it.
Conclusions: The POC confirm the interest of this serious game development for therapeutic child education in diabetes and allow to consider improvement in contents of educational sequences and game interface. To confirm these results, pilot study and multicentric controlled randomized study are planned.

P97

Junior KICk-OFF – developing formal structured diabetes education within an informal learning environment for children aged 4-11 years

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Objective: Our objective was to develop a diabetes education course for children of primary school age. Learning in school takes place within a clearly structured curriculum that has been nationally set, tested and delivered in the classroom (formal education). This structure can be advantageous in terms of planning, continuity and consistency. However, informal settings outside school can be more relaxing and less pressured environments for learners. In developing the Junior KICk-OFF course for children with diabetes we aimed to draw on the organisation and structural advantages of education curricula whilst planning delivery in a less formal setting.
Method: The presentation and content of the curricula was influenced by children and their families/carers who attended focus groups, together with input from primary school teachers, educationalists, psychologists and experiences from KICk-OFF (Knowles, 2006).
Results: 3 age banded curricula were developed together with parents′ curricula to support their childrens' learning and a home school book to inform schools.

There is a formal educational structure within a relaxed learning environment. Various diabetes related activities using art, puppets, stories, floor games, food preparation were all developed from familiar games children play.

The educator facilitates the learning opportunities with assessment and evaluation tools embedded within the curricula.
Conclusion: Definitions of formal and informal learning abound in the literature (Malcolm, Hodkinson, and Colley, 2003; Boyer and Roth, 2006; Folkestad, 2006) but researchers agree that formal – informal should be thought of as a continuum and not as separate and unlinked entities.

The Junior KICk-OFF project accepted this continuity and based sessions on a well-defined and trialled curriculum but created a non-school context within which to address health and scientific concepts related to supporting children and their families in managing their own diabetes.

P98

An audit of the sharp waste disposal by families with type-1 diabetes mellitus attending a multi speciality childhood diabetic clinic of a children's hospital in a developing country

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Background: Sharp waste generated in the care of a child with Type-1 Diabetes mellitus (T1DM) needs to be disposed safely.
Aim of the study: To study the pattern of needle and lancet disposal by families of children with T1DM under follow-up.
Methods: Interview of families attending follow-up clinic and telephonic interview of families under the care of our unit and data pertaining to disposal of sharp wastes ascertained and entered into a structured proforma.
Results: Data collected from 23(43%) families under follow-up (chronological age 9.0 $\pm$ 5y, 13 males, 2.2 $\pm$ 2.0 diabetic age). Sharp wastes discarded into the street dustbin, container, cover and others in 52.1%, 21.7%, 17.3% and 8.6% respectively. In families who did not discard directly into the dustbin, sharps from containers, covers and others entered into street dustbin in 80% cases and landfill in 20%. Needles were bent, covered and clipped by 39.1%, 60.8% and 0% respectively. 50% of the mothers accepted to have accidentally injured with needles, 23% more than once. 39.1% accepted their practice as adverse for the community. 91% and 33% of the families use the needle beyond three days, and glucometer lancet beyond 3 days, respectively. All families were receptive to the unit providing a sharp disposal bin.
Conclusion: As it has been observed that needle disposal adopted by the families are not in an ideal way, it should be modified and all families will be provided with a BD puncture proof container, henceforth.

P99

Support group effectiveness and perspective evaluation of children with type 1 diabetes: an observational study

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Objectives: Support groups bring together people facing similar issues. Members of support group share experiences & advise. Support group can help to cope better & feel less isolated with others facing similar challenges. This study was aimed to quantify support group effectiveness among children with Type 1 diabetes by estimating HbA1c knowledge attitude & perceptions (KAP) was evaluated.
Methods: In order to quantify support group effectiveness a 4 months observational study was conducted by Penpals United USA & KLES Diabetes Centre. 17 children between 10-17 years of age with Type1 Diabetes were enrolled & consent was taken. HbA1c was measured prior & post study by HPLC method. KAP regarding diabetes was evaluated at the end of the study. Children interacted with support group on last Sunday of every month, in telemedicine studio via oovo which was mentored by specialists.
Results: In this study 11(64.71) were male & 6(35.29) were female ratio was 1.8:1. The mean age was 13.5 years. These children were enrolled recently in our new Type 1 Diabetes clinic. The mean duration of diabetes was 3.3 years. The mean HbAlc levels at the start of the study was 12.55% which reduced to 10.61% after 4 months post support group interaction, which is statistically significant $p = 0.036$. 3 children had 2 episodes of hypoglycemia per week requiring unscheduled snacks. Diabetes education, response to hypoglycemia, scholastics performance & openness to discuss was positive in 100% of children. Parents changed their perception regarding the scholastic performance, working ability as adult & marriage. The $p = 1.00$ statistically not significant.
Conclusion: Support group programs have long term benefit on knowledge psycho-social functioning & Glycaemic control in these children as observed in the study. Educating patients about self-care skills, providing social support, by being available to listen & talk through problems that patients are experiencing will give positive attitude in life.

P100

Educating the younger child with type 1 diabetes: a review of the literature

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Background: Structured self-management education is regarded as an essential component of diabetes care. Much of the published work has focused on older children and adolescents. During the initial phase of developing an education intervention for children aged 4-11 years, we undertook a systematic review of education interventions specifically for this age group. The objectives were to examine the content, duration, and effectiveness of these educational related interventions.
Method: Searches were conducted for publications up to April 2015, via online databases and relevant bibliographies were reviewed. Data was extracted from each article regarding method and results.
Results: 45 studies were selected. 21 identified themselves as randomised controlled trials. Participant sample size ranged from 23 to 362. 9 studies recruited children below the ages of 8 years and only 1 recruited an age sample explicitly within the range of 4–11 years. 35 studies used glycemic control as a primary/secondary outcome measure, with the remainder measuring alternative outcomes.

Education interventions were found to be effective for children below the ages of 11, with some improvements in knowledge found. Studies which were family focused showed improvements in quality of life, family responsibility and parental knowledge; these studies were particularly effective when the study involved teamwork, communication and goal management. Children with poorly controlled diabetes were more likely to experience a reduction in HbA1c levels, than those with adequate glycemic control.
Conclusion: The literature contains few robust studies of interventions developed specifically for the child with type 1 diabetes below the age of 11 years. Engaging the whole family in diabetes education is more likely to be beneficial but it is important that studies provide developmentally appropriate interventions for young children, rather than extending to those developed for older age groups.

P101

Effect of paramedical treatment codified on balance, quality of life and knowledge of teenagers suffering from T1DM persisting imbalance

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Objectives: Adolescence is a period of T1DM risk of imbalance. Our goal is to demonstrate the importance of codified intensive monitoring with high paramedical involvement.

Subjects and methods: Teenagers aged 12–18 years old suffering from T1D for over a year and with HbA1c above 9% two times were involved. After randomization, group A was managed by means of phone calls and alternating auxiliary consultations over a period of 15 days during 4 months while group B was managed by only monthly consultations. Witness group C that could not, or would not, be incorporated had a usual monitoring. For a relative decrease of 20% HbA1c, the required number of subjects is set to 25 per group. Secondary criteria are the acceptance of the disease ("I live well/badly with my illness"). Self-rated from 1 to 10, the quality of life (PedsQL) is noted on 100 and knowledge of T1DM (local quiz) on 20.

Results: 1. At inclusion the subjects of the three groups of numbers 30, 30 and 25 for A, B and C respectively, are no different with respect to age, start and duration of T1DM. Their HbA1c was respectively 11.92 ± 1.38, 11.29 ± 1.52 and 10.94 ± 1.40 ($p = 0.1$).

2. At month-4, HbA1c is 7.99 ± 1.62, 8.53 ± 1.82 for A and B respectively and 10.57 ± 2.26 for Group C ($p < 0.00001$). After 13 months, it becomes 9.08 ± 2.03, 9.50 ± 2.09 versus 10.44 ± 2.08 for group A, B and C respectively ($p < 0.05$).

3. Ketoacidosis and severe hypoglycaemia are fewer in group A versus B and C ($p < 0.02$).

4. Acceptance of the illness has improved at month-4 in group A versus B and C ($p < 0.02$).

5. There are no differences in quality of life between the 3 groups.

6. The knowledge of T1DM has improved in groups A and B versus C after 4 ($p < 0.00001$) and 13 months ($p < 0.001$).

Conclusion: Teenager in escheat should be entitled to a multiform accompaniment in support to a specialized medical action and to iterative recovery at each proven drift.

P102

'I am sick only when I have the flu'. How some people living with diabetes become 'healthy' again?

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Objectives: The most important outcome of T1D treatment from the medical perspective is to provide the patient with skills to avoid severe and long-term complications. However, for newly diagnosed patients the most important concern is whether they are still able to live in a similar way as prior to diagnosis of T1D despite having the condition. This study explored how patients' perceptions of their own health status changes over time, as well as the mechanisms for getting back to everyday life after the diagnosis.

Methods: In this qualitative study, biographical and narrative approaches were used to interview 22 people who had been diagnosed with T1D in late adolescence or in adulthood (over 15 years old) and who had been living with this chronic illness for more than a year. In-depth interviews were analyzed using nVivo 10 qualitative analysis software.

Results: The study revealed a pattern of rebuilding patients' everyday reality to incorporate activities related to T1D management. Based on the analysis, a novel theoretical model was established, reflecting identified stages of first months of living with T1D. At the final stage of integrating diabetes management-related activities, some of the participants considered themselves fully healthy despite being diagnosed with T1D.

Conclusion: Some patients consider themselves as not being ill, despite burdens associated with the illness. If adequately educated, patients can integrate the illness into their everyday reality to the extent that it becomes a routinely undertaken activity that is not perceived a burden. Being able to perform all daily activities despite having T1D constitutes in some cases a lay definition of ones 'good health'. Diabetes education should concentrate on adapting the therapy into the way of living one had before the diagnosis. This refocus should allow patients to consider themselves healthy, which is key to restoring good quality of life after diagnosis.

P103

'Pump restored my freedom'. Exploring patients' individual perspectives on different types of insulin therapy

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Objectives: Adapting to Type 1 Diabetes (T1D) therapy regime after the diagnosis is a great challenge for patients of all age. The quicker a newly diagnosed person learns how to incorporate diabetes-related duties to his daily routine, the sooner he comes back to pre-diagnosis day-to-day reality and performs back all of his social roles. This study explored how adaptation to therapy regimes differs between patients on different types of insulin treatment.

Methods: Biographical and narrative approaches were used to interview 22 people (Continuous Subcutaneous Insulin Infusion-CSII $n = 8$, injections = 14) who had been diagnosed with T1D in late adolescence or in adulthood (>15 years old) and who were diagnosed for >1 year.

Results: The change of treatment from injections to CSII was described as a 'breakthrough' in the process of adaptation to diabetes. Participants on CSII reported less restrictions resulting from managing T1D with pump and stressed that the comfort of the therapy, defined by them as being able to live the similar life as before the diagnosis, is of a greater importance than medical outcomes (e.g. HbA1C). Patients remaining on injections reported major difficulties in adhering to regular times of injections and meals especially when working on shifts or living on a non-regular basis (college students, corporate workers). Keywords used by participants: Injections - restrictions, limitations, regularity, systematic, lack of spontaneity; CSII - freedom of decisions and actions, independence, autonomy.

Conclusions: When using qualitative research methods to explore patients' experiences with different types of insulin therapies there is a clear difference between insulin pen and CSII users. An adequate diabetes education is required, focused on patients' needs to keep the spontaneity and freedom in daily life. CSII proves to be more effective in enabling patients to get back to the same social roles and come back to previous day-to-day reality.

P104

Clinical examination of lipohypertrophy: best practice recommendations

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Objectives: Forum for Injection Technique (FIT) recommendations for lipohypertrophy (LH) detection influenced clinical examination technique with the aim of improving practice and health outcomes for children and young people (CYP).

Methods: Interactive LH workshops were developed to influence a change in care provision and facilitate swift integration into clinical practice. The event was delivered to the Leeds children's diabetes team and to a representative from each of the 21 diabetes centres in the Yorkshire and Humber (Y&H) CYP Diabetes Network.

A structured clinical examination was role modelled facilitated by four young male volunteers with diabetes. Two YP managed their diabetes on multiple daily injections (MDI) regime and two were on continuous subcutaneous insulin infusions (CSII).

Opportunity to visualise and palpate injections sites for LH out with the pressured clinic environment was universally appreciated by all attendee's. The use of head torches, safe skin marker pens and use of gel in more liberal amounts was widely agreed to be important in detection.

Results: Encouragement to examine more firmly using two fingers at a 30 degree angle facilitated attendee's identification LH. Distinguishing a change in skin texture from softer smoother areas to a harder more rubbery skin textures and identifying these transition zones also formed part of the examination method. Both medical and nursing colleagues reported increased expectation to find LH as well as confidence using an agreed method of best practice.

Although the number of volunteers was small a difference in the shape formation of LH in patients on CSII (more diffuse and uneven) compared to those on MDI (more localised and discrete) was also observed and may have implications for practice.

Conclusion: Health care professional's reflection on practice and agreeing tangible changes in detection of LH has the potential to reduce glycaemic variation and hypoglycaemia.

Poster Tour 11: Diabetes Epidemiology

P105

Association of *PTPN22* gene functional variant C1858T, HLA-DQ alleles and autoantibodies with type-1 diabetes mellitus in Kuwaiti children

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An interplay between susceptibility genes, immune mediators and environmental factors predispose susceptible individuals to T1DM. We have determined the prevalence of *PTPN22* gene C1858T functional variant, HLA-DQ alleles and three autoantibodies in Kuwaiti children with T1DM. This study included 191 Kuwaiti children with TIDM and 101 controls (healthy, ethnically matched). The diagnosis of T1DM was based on the ISPAD criteria. The genotypes for *PTPN22* gene variant C1858T (R620W) were identified by PCR-RFLP. HLA-DQ alleles were determined by sequence-specific PCR in 178 patients. The presence of autoantibodies (ICA, INS and GAD) were determined by radioimmunoassay. The variant genotype of the *PTPN22* gene was detected in homozygous/heterozygous combination in 39% patients compared to 27% in controls. The homozygous TT-genotype was detected in 8% patients compared to 0.99% in controls ($p < 0.001$). Nine different combinations of HLA-DQ alleles were detected in patients. In 55% patients, the genotype was either homozygous for DQ2 or in combination with a DQ8 allele. In 36% patients, the genotype was homozygous DQ8 or with other alleles. Collectively, 91% of the patients had either DQ2 or DQ8 alleles. In patients with TT-genotype of *PTPN22* gene, 93% had at least one DQ2 allele and 60% carried either a DQ2 or a DQ8 allele. In T1DM patients with TT-genotype, GAD autoantibody was detected in 83%, INS-Ab in 67% and ICA-Ab in 54% cases respectively. Our data demonstrate that the variant T-allele of *PTPN22* gene and HLA-DQ2/DQ8 alleles constitute significant determinants of genetic predisposition to T1DM in Kuwaiti Arabs.

P106

Causes of death in a cohort of childhood-onset type 1 diabetes diagnosed during 1973–2012. A nationwide, population-based study in Norway

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Objectives: The aim of this study was to determine cause-specific mortality rates in a nationwide, population-based cohort of childhood-onset type 1 diabetes (T1D) in Norway.

Method: The study is based on data from the Norwegian Childhood Diabetes Registry (NCDR), a nationwide, population-based registry including all new-onset cases with T1D age 0–14 years, in 1973–1982 and 1989–2012. The follow-up period for each individual was from date of diagnosis to date of death, emigration or September 30, 2013. The individual underlying causes of death by ICD-10 code were obtained by linking the NCDR database to the nationwide Cause of Death Registry. In cases coded as 'diabetes' as underlying cause of death we examined the complete death certificate to identify acute or long term complications, or more specific conditions.

Results: Among the 7,884 individuals, representing 132,420 person-years, 249 (3.2%) died, during a mean follow-up of 16.8 years (range 0.0–40.7), 167 males and 71 females. Mean age at death was 29.9 years (range 0.8–51.8). Autopsy was performed in 51% of the diseased. Forty-five % of the individuals died at home, 28% died in hospital, 15% died outside hospital or home and in 12% information was missing. Diabetes was mentioned on the death certificate in 74% of the cases. Death from acute metabolic complications was registered in 59 (24%) cases, 35 of these were coded as diabetes ketoacidosis, two occurred at diabetes onset. Fifty-six (22%) individuals died following an accident or suicide and 39 (16%) died from cardiovascular disease (CVD). The cause of death remained unknown in 35 (14%) of the individuals. Fatal events of CVD were the leading cause of death after the age of 30 years.

Conclusion: The leading cause of death before 30 years of age was acute metabolic complications, while after 30 years of age CVD was the most frequent cause of death. It is important to continue to work to identify individuals at risk of both acute and long term complications.

P107

Differences and similarities in type 1 diabetes in Austria, Germany and Sweden

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Objectives: By using pediatric diabetes quality registries clinical outcomes in Austria (A), Germany (G) and Sweden (S) were compared for benchmarking and sharing of knowledge aiming to increase quality of care.

Methods: Data from year 2013 registered on HbA1c, duration, insulin regimen, BMI-SDS, blood pressure, hypoglycemia, ketoacidosis and smoking habits were collected from three national pediatric quality registries, including 14,383 patients aged 11–16 years; 741 (A), 10,386(G) and 3,256(S).

Results: The patients in S had significantly fewer visits yearly to the clinics than patients in A and G ($p < 0.05$), lower insulin dose/kg ($p < 0.001$) and lower proportion of fast acting insulin ($p < 0.001$). Pump treatment was most common in S ($p < 0.001$). The patients in S had a lower mean HbA1c (A: 64, G: 63 and S: 61 mmol/mol, $p < 0.001$). The proportion of severe hypoglycemia and ketoacidosis were lower in S (3.3% and 1.1%) than in A (6.7% and 5.3%) and G (5.8% and 4.4%; $p < 0.001$). Smoking was most common in A ($p < 0.001$). Males and females had the same pattern regarding age at onset, mean age, insulin dose, blood pressure in the three countries. Girls in all three countries had higher HbA1c and BMI-SDS than boys. In G 47% of the females used pump versus 38% of the males, $p < 0.001$, in S 55% versus 59%, $p < 0.01$ and in A 46%

versus 40% n.s. Children with poor metabolic control (>72 mmol/mol) used pump more often in A (42%) and G (41%) than children with good metabolic control (<57 mmol/mol); A (39%) and G (39%). S had the opposite pattern (58% vs 63%).
Conclusions: Treatment differences between the countries were found e.g. regarding insulin regimen. Sweden had the lowest HbA1c and the lowest frequency of severe hypoglycemia and ketoacidosis. Comparing data from quality registries make it possible to share knowledge and indicates possibilities to improve quality of care.

P108
High HbA1c at onset is a predictor for high HbA1c as well as smoking, low physical activity and higher frequency of retinopathy during clinical follow-up

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Objectives: To study how metabolic control at onset correlates to metabolic control and to clinical parameters during childhood until referral to adult care.
Methods: Data at onset, 3 months, 1, 3, and 5 years after diagnosis and at referral, on HbA1c, physical activity, smoking, severe hypoglycemia, gender and insulin treatment, on 8,084 subjects in the Swedish pediatric quality registry, SWEDIABKIDS, were used. Of these, 26% had in 2014 been referred to adult diabetes care.
Results: Children with HbA1c <8.7% (20% of subjects, low group) at diagnosis continued to have good metabolic control during childhood, in contrast to children with HbA1c >12.6% (20% of subjects, high group) at diagnosis, who continued to have high HbA1c. The high group had lower BMI-SDS at onset (−0.84) compared to the low group (−0.03, $p < 0.001$), but had higher BMI-SDS during follow up at 5 years (0.85 compared to 0.68, $p < 0.01$). There was a higher proportion of girls in the high group ($p < 0.001$). During follow up children in the high group were more often smokers, less physical active and had higher frequency of retinopathy ($p < 0.001$). Those with mean HbA1c <7.4% during the whole follow up period (39% girls) had no retinopathy and only 1, 5% were smokers after 5 years follow-up. Among those with 3 of 5 HbA1c values >8.8% (54% girls), 15.4% were smokers and 14.3% had retinopathy after 5 years follow up. No differences regarding frequency of severe hypoglycemia were seen. The pH-value at diagnosis did not correlate to HbA1c or other clinical parameters during follow up.
Conclusion: It is important to improve early metabolic control as children with high HbA1c at onset continued to have impaired metabolic control and children with low HbA1c at onset continued to have good metabolic control until referral to adult care. Female gender, low physical activity, smoking and retinopathy were associated to impaired metabolic control both at onset and during follow up.

P109
The prevalence of different type diabetes mellitus in children

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The aim of this study was to investigate prevalence of different type diabetes mellitus in children.
Methods: in the study were include 270 children from 0.3 to 17 years old with new-onset diabetes mellitus between 2012 and 2014 years. We used diagnostic criteria recommended by the ADA expert. We measured: BMI, auto-antibodies to islet cells (ICA, IAA, IA-2, GAD), oral glucose tolerance test, insulin basal and stimulating, HLA - phenotypes, genetic testing for maturity-onset diabetes of the young (MODY) to make differential diagnosis of different type of diabetes mellitus.
Results: The type 1 of diabetes mellitus took place in 256 (94.8%) cases (children mean age 8.0 ± 4.29 years). The type 2 of diabetes mellitus was diagnosed in 4 (1.5%) from 270 children (mean age 15 ± 0.8 years); and 3 patients (1.1%) from 270 (4.5 month, 10 years, 11 years) has MODY (1 person with MODY 3; 2 persons with MODY 2). We could not investigate the type of diabetes mellitus in 7 (2.6%) children (mean age 11 ± 2.63 years) despite of excluded autoimmune type of diabetes mellitus.
Conclusion: The type 1 of diabetes mellitus is more often type in children. Others types of diabetes mellitus meet in about 5% of all cases of diabetes mellitus in child in our investigation.

P110
Retrospective baseline services audit regarding the nature of emergency department attendances by diabetic children registered under the care of a paediatric diabetic unit across three years

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Objectives: Many paediatric diabetes units in the UK have introduced 24 h telephone support to encourage self-management to reduce Emergency Department (ED) attendances and admissions. The UK national audit collects information on acute paediatric diabetic admissions; but there is no data available on ED attendances in this group. We undertook a retrospective audit of ED attendances as part of a baseline service evaluation of our newly introduced 24 h support service.
Methods: The details and outcomes of local ED attendances of children with Type 1 diabetes ($n = 177$) registered under the care of a large inner-city Paediatric Diabetes Unit between September 2011 and August 2014, were retrospectively reviewed with an electronic database.
Results: A mean of 39 children with T1DM (23% of those registered in clinic) attended the ED each year. The total number of episodes over the 3 years was 167. 72% were due to a 'diabetic' complaint. 30.3% of these accounted for their first diagnosis of T1DM. In those with an established diagnosis, 63/84 (73.8%) of attendances were due to hyperglycaemia, including DKA. 14.2% had hypoglycaemia and 12.2% had 'troubleshooting' queries. Importantly, 43/84 (51%) of cases had a concurrent illness, such as gastroenteritis, with their diabetic issue. 49/84 (56.3%) of cases were admitted, with a mean duration of 3.4 days. No trends were seen over the 3 years in any of the variables. Only 11.5% of these diabetes-related episodes were documented to have used the helpline beforehand.
Conclusion: Up to 23% of the paediatric diabetes clinic cohort attended an ED. The vast majority of cases were related to glycaemic control. Only half of them had a concurrent illness. Half of the attendances were discharged back to the community. These could possibly have been avoided by early clinical advice and tight

glycaemic control. A targeted 24 h helpline could prevent them from presenting to ED, encouraging better self-management and control.

P111

Equitable health care service delivery and outcomes for children and adolescents with type 1 diabetes resident in urban and regional areas of Western Australia

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Objective: Western Australia (WA) has a landmass of ~2.5 million km^2, roughly equivalent to continental Europe. Paediatric diabetes services are provided via one centralised tertiary Type 1 Diabetes (T1D) centre using an outreach service model; a multidisciplinary team visits 10 rural outreach sites, quarterly, requiring 90 min plane flights for the team and patients travelling up to 4 h to visit. This study describes the contemporary, population-based paediatric cohort with T1D in WA, focussing on place of residence and model of care in relation to diabetes outcomes.

Methods: A cross-sectional study was undertaken to describe clinical outcomes of all patients with T1D managed by the diabetes team at Princess Margaret Hospital, from January to December 2014. Data were obtained from the Western Australian Children's Diabetes Database (WACDD), a prospective, population-based diabetes register, and analysed using standard statistical methods.

Results: During the study period, 1,065 (515 M: 550 F) children and adolescents with T1D attended the diabetes service, with 861 (81%) attending urban and 204 (19%) regional clinics. No statistical difference was observed in mean study age (13.1 (±4.1) years), diabetes duration (5.6 (±4.1) years) or treatment regimen (37% CSII, 42% MDI, 21% BD injections). No differences were found between urban and regional patients in median HbA1c% (7.7 (±1.6)), mean BMI z-score (0.49 (±0.89)), severe hypoglycaemia rate (4.3/100 patient years) or admission rate (4.1/100 patient years).

Conclusions: This study shows that, despite vast differences in physical access to diabetes services, the current model of diabetes care in WA with a centralised tertiary service providing quarterly visits to regional areas is achieving comparable glycaemic outcomes and providing equitable care to children and adolescents with T1D residing throughout the State.

P112

Equivalent metabolic control by insulin regimen and age group in a large, population based contemporary cohort of children and adolescents with typr 1 diabetes in Western Australia

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Objective: Western Australia is the largest state in Australia with a population of 2.6 million. Paediatric patients with type 1 diabetes (T1D) in WA are treated by a centralised multidisciplinary team at the Princess Margaret Hospital (PMH) based in Perth. All newly diagnosed patients are admitted to PMH. Preschool aged children and children above the age of 10 years are commenced on multiple daily injections (MDI). Primary school children are generally commenced on twice daily insulin (BD), as they do not have the necessary support in school for their injections. Intensive education is provided to families in the first few weeks after diagnosis. The patients have 24-h daily phone access to the team for advice. The aim of this study was to describe the glycaemic outcomes in a contemporary population-based T1D paediatric cohort, one of the largest T1D cohorts worldwide, managed by a tertiary service.

Methods: The data for 1,065 patients, aged between 0 and 18 years, who attended the diabetes clinics in 2014, were accessed from the Western Australian Children's Diabetes Database at PMH and analysed by standard statistical methods.

Results: In 2014, a total of 1,065 patients (515 F: 550 M) attended the diabetes clinics. 432 (41%) were on MDI, 218 (21%) on BD and 384 (36%) were on insulin pump (CSII). 6% were <6 years old, 30% between 6 and 12 years and 64% were >12 years old. No statistical difference was found in the median HbA1c of the cohort (7.7%) by insulin regimens (7.6% for BD, 7.6% for CSII and 7.9% for MDI) or by various age groups (7.6% for <6 years, 7.5% for 6–12 years and 7.9% for >12 years). The rate of severe hypoglycaemia was 4.6 per 100 patient years for the cohort, with a significant difference ($p < 0.05$) between the MDI (5.5) and CSII (3.0) regimen.

Conclusion: We report similar glycaemic outcomes for the different insulin regimens and age groups. Other outcomes such as hypoglycaemia rate and quality of life should be included in assessing therapies.

P113

Partial remission by standard and IDAA1c definitions in children with new onset type 1 diabetes in Auckland, New Zealand (2000–2013)

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Objectives: We aimed to examine the occurrence and potential determinants of partial remission phase in the first 18 months after type 1 diabetes diagnosis in children, while comparing the standard (STD) and insulin-dose-adjusted-HbA1c (IDAA1c) definitions.

Methods: This study was a retrospective review of all patients aged <15 years diagnosed with type 1 diabetes in Auckland (New Zealand) from a single regional tertiary diabetes centre over a 14-year period (2000–2013). Data were collected at each clinic visit after diagnosis, including age, ethnicity, BMI, HbA1c, and total daily insulin dose. Partial remission was defined by STD (insulin requirement ≤0.5 units/kg/day and HbA1c ≤7.5%) and IDAA1c [≤9, calculated as HbA1C (%) + (4× insulin dose (units/kg/day))] definitions.

Results: There were 821 new cases of type 1 diabetes recorded over the study period, with a total of 4,909 clinical assessments. Average age at diagnosis was 8.0 years, and 47% of children were female. There were more episodes of partial remission by IDAA1c than by STD definition (880 vs 629 episodes; $p < 0.001$), with partial remission occurring in 44 versus 33% of patients at 3 months ($p = 0.01$), 32 versus 24% at 6 months ($p = 0.03$), 12 versus 10% at 12 months ($p = 0.5$), and 7 versus 5% at 18 months ($p = 0.2$). The likelihood of partial remission was greater in older children ($p = 0.001$), those of lower BMI ($p = 0.003$), and NZ Europeans

($p < 0.0001$), but progressively decreased with diabetes duration ($p < 0.0001$).

Conclusions: Rates of partial remission were higher by applying the IDAA1c in comparison to the STD definition. The reasons for lower rates of PR in younger children and among Non NZ Europeans need to be examined to improve health outcomes in these patients.

P114

Updated incidence rate (1989–2012) of diabetes mellitus type 1 (T1DM) among Polish children aged 0–14 years

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Objective: The aim of this study was to estimate the dynamics of the incidence rate of diabetes mellitus type 1 among children aged 0–14 in 1989–2012 in Poland.

Methods: Children under 15 years with newly diagnosed type 1 diabetes mellitus and drawn from 5 regional registries in Poland were ascertained prospectively using the Epidemiology and Prevention of Diabetes study (EURODIAB) criteria. The type 1 diabetes incidence rate (IRs) were analysed in dependency of age, sex, geographical region and population density.

Results The average incidence, standardised by age and sex, for 1989 to 2012 was 13.8 per 100,000 persons per year and increased from 5.4 to 22.7. IRs in age groups are presented on Figure 1. No difference was found between boys and girls, or between urban and rural regions. The IRs was significantly higher $p < 0.05$ in the population of northern Poland - 13.7 (95% CI: 12.2; 15.2) per 100,000 persons per year - than in that of the country's southern part - 11.6 (95% CI 10.3; 13.1) per 100,000 persons per year.

Conclusions: The T1DM incidence in Polish children maintains an increasing trend, especially in children aged 5–9 years.

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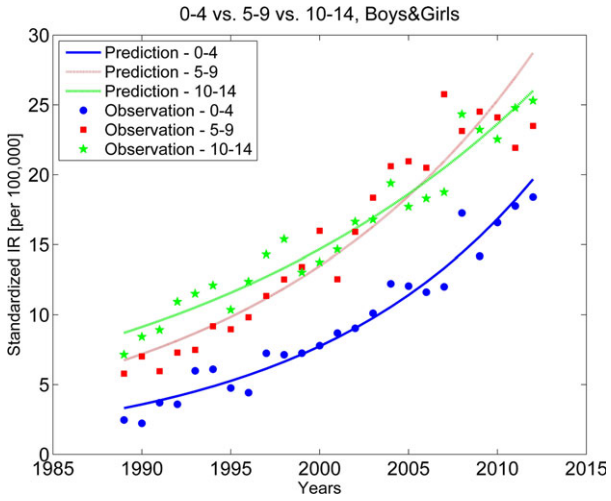

Figure 1 Type 1 diabetes incidence in the years 1989–2012 in Poland in age groups 0–4, 5–9 and 10–14 years.

P115

Epidemiology of the type 1 diabetes of the child in the department of Oran (Algeria) from 1975 till 2014

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Objectives: The aim of this study was to determine the incidence and prevalence of type 1 diabetes (T1D) in children aged less than 15 years varies with age at onset in Oran (Algeria) over a 40 year period.

Methods: To determine incidence, all new cases of TD1 with onset under 15 years of age from 1975 to 2014 were obtained from the diabetes register of Oran department, validated since 1978. Incidence was expressed as the crude value and as standardized incidence. To determine prevalence, all cases of TD1 in children aged 0–14 years at 31 December 2014 were obtained.

Results: The exhaustive recording of 1,877 DT1 least than 15 years listed in the type 1 diabetes register of Oran, shows a continuous increase of the incidence which peaks in 24.46 ± 3.82 for 100,000 these last 5 years. The progress concerns mainly age groups 0–4 and 5–9 years, their incidences of which during the same period reach or exceed that of 10–14 years. Prevalence of 0–14 years becomes established in 125 for 100,000 on 31/12/2014. The risk of developing a DT1 in 15 years which follow was 2.89 for 1,000 births in the year 2000.

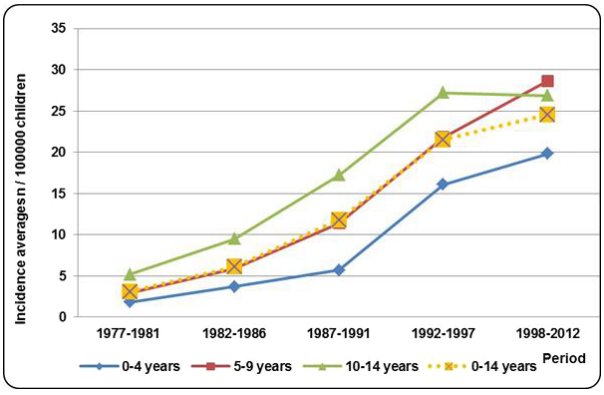

Figure 1 Incidence of DT1 according to age groups.

Poster Tour 12: Diabetes Genetics

P116

Circulating IGF-I and IGFBP-3 in relation to the development of β-cell autoimmunity in young children

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Objective: The aim of this study was to investigate the role of circulating IGF-I and IGF binding protein (IGFBP-3) in the development of β-cell autoimmunity in early childhood.
Methods: 563 subjects with HLA-conferred susceptibility to type 1 diabetes (T1D) from Estonia and Finland were monitored for signs of seroconversion to positivity for insulin and/or GAD, IA-2, and ZnT8 autoantibodies by the age of 3 years. In 40 subjects who developed at least one autoantibody (AAB+), IGF-I and IGFBP-3 plasma concentrations were measured and compared with 80 control subjects who remained negative for autoantibodies (AAB-), and were matched for age, sex, country of origin, and HLA genotype. Plasma concentration of IGF-I, IGFBP-3, and IGF-I/IGFBP-3 molar ratio were compared between the groups with different HLA-related risk for T1D with ANOVA or Kruskal-Wallis test. The increment of IGF-I, IGFBP-3 and IGF-I/IGFBP-3 molar ratio before and after seroconverison was compared with corresponding time intervals in controls using unpaired two-tailed Student's *t*-test or the Mann–Whitney *U*-test.
Results: The IGF-I concentrations at the age of 12 months, and the IGF-I/IGFBP-3 molar ratio at the age of 24 months were lower in AAB+ children ($p < 0.05$). The increase in circulating IGFBP-3 was significantly higher in AAB+ children before seroconversion than in the corresponding time-intervals in controls (0.43 mg/l; 95% CI 0.29–0.56 versus 0.22 mg/l; 95% CI 0.10–0.34 mg/l; $p < 0.01$). Children carrying the high-risk HLA genotype had lower plasma IGF-I and IGFBP-3 concentrations at the age of 24 months than those with low-risk genotypes ($p < 0.05$ and < 0.01, respectively).
Conclusions: Circulating IGF-I and IGFBP-3 appear to have a role in early development of β-cell autoimmunity. Our results suggest that the decreased IGF-I concentrations in young children with the high-risk HLA genotype may contribute to the reduced growth rate and weight gain previously observed in such children.

P117

Intestinal permeability in at risk children who progress to islet autoimmunity and type 1 diabetes

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Objectives: Abnormal immunoregulation in the gut and its effect on small intestinal permeability may modulate the autoimmune pathogenesis of type 1 diabetes (T1D), but our understanding is limited. We aimed to measure small intestinal permeability in children at risk of type 1 diabetes and to compare progressors to islet autoimmunity and T1D, with non progressors.
Methods: 53 children at risk on account of a first degree relative with T1D were studied. Exclusion criteria were gastrointestinal symptoms, probiotic ingestion, coeliac disease or intercurrent infection or fever. Blood lactose-rhamnose (L/R) ratio was measured 90 min after drinking a solution containing 1 g lactulose and 5 g rhamnose, by HPLC. Antibodies to insulin, GAD, IA2 and ZnT8 were measured using ELISA and competitive binding assay. Islet cell antibodies were measured by indirect immunofluorescence. Statistical analysis was by linear mixed models.
Results: Children were aged 4.7 (3.5–6.7; median, IQR) years at baseline and investigated at 6 monthly intervals for 6–24 months. Of 53 children, 4 progressed to T1D over 12 years follow up and 7 were double islet antibody positive at the time of investigation (all categorised as progressors). There was no difference in L/R ratio in progressors ($n = 11$) versus non progressors ($n = 43$) [3.384 (0.496), 3.138 (0.224)] mean (SE) respectively] 55% (23/42) of non-progressors and 45% (5/11) of progressors had L/R ratio above the normal range (>3.6) as determined in paediatric controls. HLA types of progressors to T1D were 2HLA DR3/4, 1 DR3/3, 1 DR4/4. There was a time effect in that L/R ratio was higher at the first investigation and fell over time ($\chi^2 = 7.33$; $p = 0.02$) but there was no difference between progressors and non progressors.
Conclusions: Small intestinal permeability is not different over time in progressors and non progressors after the onset of islet autoimmunity.

P118

IL-22 restores glucose tolerance and alters feeding behavior in obese mice - possible effects beyond the pancreatic islet

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Introduction: IL-22 is a major regulator of glucose homeostasis. Its receptor, IL-22RA1, is most highly expressed in the beta- and alpha-cells of the pancreatic islets, as well as the liver and gut epithelium. We have previously shown that islet-endogenous and exogenous IL-

22 suppresses oxidative and ER stress caused by cytokines and glucolipotoxicity in murine and human beta cells.

In obese mice on high fat diets (HFD), IL-22 administration promoted appropriately controlled insulin secretion and improved insulin quality, suppressing fasting hyperinsulinaemia and hyperprolinsulinaemia, to first restore glucose tolerance and then improve insulin sensitivity. These metabolic improvements were accompanied by a small reduction in weight.

Objectives: A preliminary study to investigate the mechanisms of IL-22-related improvements in glucose tolerance and weight loss.

Methods: C57/B6 mice on a normal chow diet (NCD) or HFD were treated with i.p IgG or IL-22 every 4 days for 12 days. Nuclear magnetic resonance (NMR) was used for body composition analysis at baseline and day 12. The Phenomaster system for comprehensive serial assessment of weight gain, activity, and feeding characteristics. Beta cell function was assessed via IPGTT on day 12.

Results: In this preliminary study, IL-22 administration did not significantly alter weight gain, cumulative activity, or oxygen consumption between groups. IL-22 improved glucose tolerance [AUC (glucose), mean ± SEM] in both NCD (1,263 ± 56 vs 1,168 ± 73, $p < 0.05$) and HFD (1,540 ± 65 vs 1,155 ± 92, $p < 0.01$) mice. Cumulative food intake (grams, mean ± SEM) was reduced in IL-22-treated HFD mice (45.2 ± 2.2 vs 37.6 ± 0.9, $p < 0.05$).

Conclusions: These results suggest a possible beneficial effect of IL-22 on the regulation of satiety, either secondary to, or in addition to, effects in the pancreatic islet. Further studies are planned to further delineate the relationship between IL-22, the beta cell, and gut / hypothalamic satiety signaling.

P119

HLA and phenotype of children diagnosed as type-1 diabetes with and without autoantibodies at diagnosis

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Objectives: Most children, but not all, diagnosed as Type 1 Diabetes (T1D) have autoantibodies present at diagnosis. The purpose of this study was to investigate if any difference could be found in HLA-complex, and phenotype and gender, age at diagnosis, HbA1, P-glucose, pH, BE, or ISO-BMI, dependent on presence or absence of autoantibodies.

Methods: Data from May 2005–Dec 2010, $n = 4{,}088$ were used from the Better Diabetes Diagnosis (BDD) study, a Swedish nationwide prospective cohort study including children <18 year with new onset diabetes. They were tested for autoantibodies; IA2A, GADA, IAA, ZNT8RA, ZnT8WA and ZnT8QA. High risk genotype markers and lower risk genotypes markers were determined. When MODY, T2D, Secondary Diabetes and not classified diabetes were excluded, 3,823 (93.5%, 55% boys) were defined as T1D. Among these, 267 (7%) patients had no autoantibodies and 3,556 were positive for at least one autoantibody. Age at diagnosis and sex ratio were compared between these groups. The autoantibody negative group also was compared with a randomly chosen antibody positive control group, $n = 177$ (90 boys/87 girls) regarding pH, HbA1c, BE, P-Glucose and ISO-BMI.

Results: Patients negative for autoantibodies at diagnosis were more likely classified as HLA low risk ($p < 0.001$) or moderate risk ($p = 0.009$) than of high risk genotype. The proportion of boys was higher in the group with no autoantibodies (175; 65.5% vs 55%, $p = 0.001$). Patients in the autoantibody negative group were at diagnosis older (9.2 vs 10.5 years, $p = 0.004$), had higher HbA1c (96 mmol/l vs 91 mmol/l, $p = 0.036$) and less often low pH (*mode* pH 7.40 vs 7.36, $p = 0.011$) than autoantibody patients. P-glucose, BE and ISO-BMI did not differ between the groups.

Conclusions: The overwhelming majority of children diagnosed as T1D have autoantibodies. The small minority of autoantibody negative patients more often are males, have low risk HLA and are older at diagnosis, suggesting a different disease process before diagnosis.

P120

Perinatal zinc status does not affect the risk of developing type 1 diabetes in childhood and adolescence

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Aim: Zinc status is suspected to influence the risk of developing type 1 diabetes. The purpose was to investigate the association between perinatal zinc status and the risk of developing type 1 diabetes in childhood and adolescence. Furthermore, the study aimed to investigate whether low perinatal zinc status was associated with an earlier age at onset of type 1 diabetes.

Methods: A population-based case-control study including data from National Diabetes Register for children and adolescents (DanDiabKids) and the Danish Newborn Screening Biobank. Cases who developed type 1 diabetes before the age of 16 years, and controls were frequency matched by birth year and month. The dried blood spot samples were collected 5–7 days after birth in the years 1991–1998. Zinc status was analysed by Laser Ablation Inductively Coupled Plasma Mass Spectrometry. The influence of *HLA-DQB1* alleles, birth data, and mother's age at birth were tested using logistic regression. The association between zinc status and age at onset of type 1 diabetes were analysed via a linear regression model. Zinc status was divided into quartiles with lowest quartile set as reference group in both analyses.

Results: The mean perinatal zinc level in cases and controls did not differ. When adjusting for possible confounders (i.e. *HLA-DQB1*

alleles, birth data, and mother's age) there was still no difference in mean zinc level among cases and controls.

Both *HLA-DQB1* alleles and gestational age in weeks were found to affect the risk of developing type 1 diabetes significantly. In addition low perinatal zinc status was associated with earlier age at onset of type 1 diabetes, also after adjusting for possible confounders ($p = 0.02$).

Conclusion: The risk of developing type 1 diabetes in Danish children was not associated to perinatal zinc status. Though, cases with low perinatal zinc status had significantly earlier age at onset of type 1 diabetes.

P121
Serum biomarker correlates of insulin secretion in individuals at risk of type 1 diabetes

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Type 1 diabetes mellitus (T1D) is characterised by β-cell dysfunction in the prediabetes phase. These abnormalities, along with islet antibody (AB) positivity determine risk of progression to diabetes, however there is considerable variation in the rate of β-cell decline. Progression to diabetes is associated with reduction in total insulin secretion (ISR AUC) derived from the oral glucose tolerance test. This reduction is associated with an increase in beta-cell death Additional biomarkers are needed to more accurately predict disease progression, elucidate heterogeneous mechanisms of disease and identify potential response to immunotherapy. In a Brisbane cohort of first-degree relatives (FDR) at risk of T1D, we profiled serum for potential discriminatory biomarkers. We identified three typical signatures, comprising a group of inflammatory cytokines/chemokines demethylated insulin DNA, and metabolic factors. To determine the relationship of these serum markers to diabetes progression, we profiled serum from at-risk FDR from the Trialnet Natural History Study comprising 30 AB−, 30 AB1+, 30 AB2+ and 30 children who progressed to T1D. ISR AUC was significantly lower in progressors than the non-progressor groups (ANOVA, $p = 0.0008$), however there was considerable variation amongst those who progressed to T1D. We found significant correlations between AUC insulin and twenty serum markers. Using a multiple linear regression model, we identified three inflammatory cytokines/chemokines and three clinical parameters which explained AUC insulin ($R = 0.85$, $p = 2 \times 10^{-16}$). Our findings demonstrate that a combination of inflammatory and metabolic factors contribute to reduced insulin secretion in the pre-diabetic phase, however there is significant variation in the rate of beta cell functional decline.

P122
Prevalence of celiac specific HLA genotypes in young patients with type 1 diabetes from Innsbruck and Graz, Austria

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Hypothesis: Due to a high linkage disequilibrium of diabetes and celiac specific HLA genotypes type 1 diabetes (T1D) is highly associated with celiac disease (CD). The European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) has very recently revised the screening guidelines for CD, therefore the aim of our study was to investigate the distribution of celiac specific HLA genotypes in young patients with T1D.

Methods: Paediatric patients with T1D seen at the Medical University of Innsbruck and Graz have been genotyped for celiac specific HLA genotypes HLA DQ2 and DQ8. All patients gave written informed consent to genetic testing. Biometric data, age at diagnosis, diabetes duration were collected.

Results: 121 patients with T1D, 52.1% male, mean age 13.3 (SD 3.9) years, mean age at diabetes onset 7.4 (SD 3.8) years and a mean diabetes duration of 5.9 (SD 3.3) years were included in our analysis and genotyped for HLA DQ2 and DQ8 alleles. 92% of the individuals were tested positive for HLA DQ2 and/or HLA DQ8. 34% showed the HLA risk type DQ2; HLA DQ2 cis 27%, HLA DQ2 trans 6% and HLA DQ2 homozygote 1%. 36% were HLA DQ2+ DQ8 positive; 33% HLA DQ2 cis + DQ8 and 2.5% HLA DQ2 trans + DQ8). 22% of patients were tested DQ8 positive. Only 8% were tested negative, in total 4 patients were diagnosed with celiac disease proven by biopsy.

Conclusions: The vast majority of patients with T1D were tested positive for celiac specific HLA risk genotypes DQ2 and/or DQ8. HLA-Screening as a first-line test, as recommended by the Guidelines from ESPGHAN does not seem to be appropriate in the T1D population. HLA genotyping cannot replace celiac specific antibody testing in the majority of T1D patients. We therefore conclude, that only a very small proportion of patients will benefit from HLA genotyping, while the majority of patients will not.

P123
Serum Interleukin 13 level in children and adolescents with type-1 diabetes mellitus and/or atopy

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Objectives: Interleukin 13 (IL-13) is a T helper 2 (Th2) cytokine that is a mediator of allergic inflammation and disease. Interleukin-13 release was reduced in type-1 diabetes mellitus (T1DM) while numerous reports showed exaggerated IL-13 production in asthma, atopic rhinitis and allergic dermatitis. We aimed to study serum IL-13 level in children and adolescents with type-1 DM with or without

atopy and compare it with non diabetic atopic patients and normal subjects.

Methods: This study comprised 76 children and adolescents from Children's Hospital, Ain Shams University who were subdivided into 4 groups; Group I; 20 patients with T1DM, Group II; 16 patients with T1DM with atopy, Group III; 20 non diabetic patients with atopy and 20 age and sex matched healthy children and adolescents as controls. All patients were subjected to clinical evaluation and laboratory investigations including mean random blood glucose and mean HbA1c over the last year, urinary micro-albumin and serum interleukin-13 level in by ELISA.

Results: Atopic diabetics showed no significant difference as regards glycemic control and glycated hemoglobin compared to diabetic patients ($p < 0.05$). Highly significant increased level of IL-13 in atopic patients -who are not on steroid treatment ($p < 0.01$) compared to other groups with no significant difference in IL13 level between diabetics and atopic diabetics ($p = 0.06$) whose IL-13 production was higher than healthy controls ($p < 0.01$). The level of serum IL-13 in diabetics showed no significant correlation with the duration of diabetes or atopy, insulin dosage and the glycemic control.

Conclusions: Elevation of IL-13 level as a central mediator of Th2 cells in atopic patients compared to type 1 diabetic patients may support the Th1/Th2 polarization hypothesis. IL-13 pathway alterations could play an important role in the pathogenesis of atopy in patients with T1DM.

P124
Glycemic control and insulin requirements during the first 3 years after onset in a pediatric cohort of 149 subjects with type 1 diabetes

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Several studies have highlighted the importance of glycemic control during the first years after diabetes onset to reduce the risk of developing diabetes-related complications in the future.

Aim: To describe the glycemic control and the duration of the remission phase in a cohort of pediatric subjects with type 1 diabetes (T1D) in the first 3 years after onset.

Methods: Retrospective study in which data (demographics, HbA1c and insulin requirements) of a cohort of 149 children with T1D were collected at onset and at regular quarterly visits during the first 3 years after diagnosis. Inclusion criteria: clinical diagnosis of T1D, positivity of one or more pancreatic antibodies, measurement of fasting C-peptide (FCP). The remission phase was defined with the insulin dose-adjusted HbA1c (IDAA1C) described by Mortensen et al. HbA1c was correlated with insulin requirements and with the duration of remission phase.

Results: 61/149 subjects showed features of partial remission phase at least at one point of the observing period. Duration of remission phase was 1.0 ± 0.8 years according to the last presented value of IDAA1c ≤9%. HbA1c values showed a poor correlation with the duration of remission phase (with the strongest correlation after 18 months; $r = -0.59$) and with insulin requirements (with the strongest correlation after 27 months; $r = -0.62$). A stepwise regression model with duration of remission phase as dependent variable showed significant negative correlation with HbA1c 24 m ($p = 0.001$) and insulin requirements 36 months ($p = 0.016$) and positive correlation with FCP ($p = 0.016$). The subgroup of subjects with HbA1c <7.5% at 36 months ($n = 33$) showed significant lower values of HbA1c from the 9 month until the end of the observing period with no differences in insulin requirements respect to those subjects with HbA1c ≥7.5% ($n = 102$).

Conclusions: In our cohort we did not observe association between the glycemic control and the duration of the remission phase during a period of 36 months after onset.

P125
Human soluble receptor for advanced glycation end products therapy reduces autoimmune diabetes in the non-obese diabetic mouse

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Type 1 diabetes (T1D) is rising in incidence attributable to environmental changes that increase the levels of circulating advanced glycation end products (AGEs). AGEs bind to their receptor, receptor for AGEs (RAGE). Both circulating AGE levels and RAGE expression are altered in children prior to T1D diagnosis. This study aimed to deliver recombinant human soluble RAGE (sRAGE), a decoy RAGE isoform, to reduce RAGE signalling prediabetes in the non-obese diabetic (NOD) mouse.

Female NOD mice were ip injected twice daily with recombinant human sRAGE (25 μg) or vehicle (PBS) from days 50–64 of life. Mice were followed until 0 ($n = 6$), 2 ($n = 14$) or 22 weeks ($n = 15$) post-treatment.

Human sRAGE therapy protected mice from diabetes up to day 225 of life compared to mice given the vehicle (13% vs 53%; $p = 0.01$). While the non-fasted blood glucose concentrations of vehicle mice progressively increased from day 50–225, sRAGE mice did not experience an increase (slope non-zero vs zero; $p < 0.0001$). Furthermore, sRAGE treatment reduced fasted blood glucose levels at day 225 (6.5 vs 7.8 mmol/l; $p = 0.0007$). At day 80, oral glucose tolerance tests revealed unchanged area under the glucose curves (899 vs 835 mmol/l 120 min; $p = 0.19$) but the area under the insulin curves demonstrated increased insulin secretion (37.1 vs 29.8 ng/ml 120 min; $p = 0.02$). Flow cytometry confirmed alterations in splenic leukocyte numbers at day 64 including an increase in $CD11b^+CD11c^+CD8^-RAGE^+$ dendritic cells (2.7-fold; $p = 0.008$) as well as classical ($F4/80^+CD11c^-Ly6C^+$; twofold; $p = 0.04$) and non-classical macrophages ($F4/80^+CD11c^-Ly6C^-$; 1.9-fold; $p = 0.02$). Splenic T cell numbers were unchanged at this time point but at day 225, sRAGE mice had reduced total $CD8^+$ T cells (1.4-fold; $p = 0.04$) and naïve $CD8^+$ T cells ($CD62L^+CD44^-$; 1.6-fold; $p = 0.01$).

These results demonstrate that human sRAGE therapy protects against autoimmune diabetes, improves glycaemic control and alters systemic antigen presenting cell and T cell numbers.

P126

Reduced immuno response to hepatitis B vaccine in children and adolescents with type 1 diabetes

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Objective: A defective production of protective levels of antibodies to Hepatitis B (HB) vaccine is reported to occur in 4–10% of healthy subjects and a correlation with the presence of specific human leukocyte antigen (HLA) molecules, including DQ2, which also confers genetic predisposition to type 1 diabetes (T1D), has been suggested. The aim of this study was to analyze the serological response to HB vaccine in 105 T1D patients and 320 healthy control subjects (CT).

Methods: The persistence of anti-HB protective levels were evaluated 3–20 years after HB vaccination in both T1D patients (median time after vaccination 10 years) and CT (median time 8 years). A titer of HB antibodies >10 IU/ml was considered protective. T1D patients from Naples who were non-responders received a HB vaccine booster dose. Serological conversion has been evaluated in patients who received the booster dose.

Results: Among patients with T1D, 40/105 were non responders (38.1%), while among CT only 50/320 were non responders (15.6%; $p = 0.001$ by chi-square between groups. A different prevalence of non-responders has been observed in the T1D patients between the two participating Centers (Naples 24/78, 30.8%; Milano 16/27, 59%, $p = 0.01$). A multivariate analysis did not found any correlation between HB response and age, diabetes duration, BMI, glycated hemoglobin, insulin requirement and HLA status. Among the 24 patients who had a insufficient HB coverage and received a booster dose, after 2 month 18 became responders and 6 were still non-responders, with a higher percentage among patients who developed T1D after age 3 years (4/10) than in T1D patients with disease onset before age 3 years (14/14; $p = 0.005$).

Conclusions: These data demonstrate a lower persistence of anti HB antibodies in children and adolescents with type 1 diabetes after recombinant hepatitis B vaccine. A booster dose seems effective to be protected, especially in children who developed T1D before age 3 years.

Poster Tour 13: Diabetes in Developing Countries I

P127

Health literacy of caregivers of children with type 1 diabetes: a pilot study on impact on glycemic control in an Arabic-speaking population

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Introduction: Health literacy has been linked to poorer diabetes control and outcomes. Caregivers with poor health literacy may fail to comprehend various elements of diabetes education leading to poor glycemic control of their children. No studies to date had investigated the link between caregivers' health literacy and their children's glycemic control in an Arabic-speaking population.
Methods: This is a cross-sectional study of a pilot of caregivers of children with type 1 diabetes in a Diabetes center in Kuwait. Health literacy was assessed through administering the Arabic version of the Newest Vital Sign (NVS) tool. The child's glycemic control was measured through the level of HbA1C within 3 months of the test administration.
Results: Twenty caregivers were recruited with a median age of 37.0 years (IQR 35.5–41.5). The median age of their children was 8.9 years (IQR 6.2–11.1) with a BMI SDS of 0.6 (IQR −0.5 to 1.7). Median HbA1C was 8.6 (IQR 7.8–9.2) with children of caregivers with high likelihood of limited health literacy having poorer glycemic control compared to those without (HbA1C 9.3, and 8.3 respectively, $p = 0.02$).
Conclusion: This study highlights the possible link between caregivers' health literacy and their children's glycemic control in Arabic-speaking populations. This should be confirmed in future studies with larger samples.

P128

Effects of voice inter-relating process and OM mantra enchanting in adolescents diabetic patients in south 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. Objective of present study to present new methods of controlling diabetes complications by "OM Enchanting" and "Brahma Muhurat Awakening" in adolescents diabetic patients in south Delhi metro population.
Method: 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 for 45 obese children (subject) between 9 and 20 years old at Shri Mahamaya vaishnav devi mandir research institute, New Delhi. All children were treated for 1 h in "Brahma Muhurat Awakening" (time duration of 04:00–05:00 AM) early morning with my frequency tuning by voice inter-relating process and children discuss their problem due to diabetes and life style and try to find their problem and provide them with diabetes knowledge for 1 month.
Results: Present study by "Brahma Muhurat Awakening" and Om enchanting one's physical and inner elements balance and a person is filled with the positive energy which makes him/her active enough to burn the required calories ultimately helping one to be fit without having any physical consumption of chemical salt. This process leads to a balanced energy level which in turn leads to a healthy life. After 1 month treatment there were significant changes in glucose, insulin and glycosylated haemoglobin levels compare to normal levels with changes in life style and increase concentration for study.
Conclusion: In conclusion, adolescents diabetes can be controlled and regulate by treating patients with "OM Enchanting" and "Brahma Muhurat Awakening" in diabetic patients without using any harmful drugs.

P129

Abstract withdrawn.

P130

Association of socioeconomic status with overall glycemic control in type 1 dibetes in developing country India

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Objective: To evaluate clinical and laboratory features of children with type 1 diabetes at first presentation at tertiary care centre in Pune, India.

Methods: The records of 78 (boys/girls: 41/37) children with newly diagnosed T1DM hospitalized and their follow ups during 2009–2014 were studied retrospectively. The data were assessed by gender and age subgroups (≤5, 6–10 and ≥11 years).

Results: Mean age at diagnosis was 7.6 ± 3.4 years. At onset of T1DM, number of children ≤5 were 19 (26.7%), between 6 and 10 were 34 (47.8%) and ≥10 years were 18 (25.3%). The patients were mostly diagnosed between 5 and 10 years with equal numbers at both ends. Polyuria and polydipsia were the most common symptoms (94.8%, 92.3% respectively) Ketonuria was seen in 87.1% children with ketoacidosis in 71.1%. As compared to boys, the girls experienced higher rates of ketoacidosis and ketonuria (84.4% vs 54.3%, and 90.9% and 82.9% respectively $p < 0.05$ for both); HbA1C was significantly higher in children diagnosed at >10 years of age as compared to those diagnosed at <5 years of age (13.4 ± 2.6 vs 11.1 ± 2.4). No such differences were seen for TSH. Girls were lighter compared to boys based on weight for age Z scores (−1.4 ± 1.1 vs −0.7 ± 1.1), however height for age Z score were comparable.

Conclusion: The findings possibly indicate a decreasing age of T1DM onset. The high frequency of ketoacidosis at presentation is noteworthy. Girls were lighter and had higher rates of ketoacidosis and ketonuria at presentation.

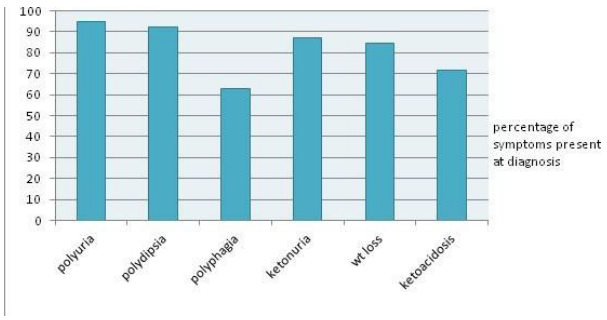

Figure Percentage of symptoms present at diagnosis.

P131

Making strides in the management of diabetes: breaking cultural barriers through technology

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Objective: To Correlate International Diabetes Federation (IDF) Atlas for Diabetes Incidence and Prevalence <15 years with audience reached in developing countries/regions by *Pediatric Diabetes and Nutrition Advocate page posts.*

Background: The use of Diabetes technology by people is becoming increasingly popular. These technologies include glucose monitoring and insulin devices, text messages, smartphone apps and internet enabled education and support programs [1].

Method: An advocacy page was created in February 2014 and DM related information shared with readers. Periodical posts were made mean 4 days including; (a) New DM research findings in Nutritional Management and Complications. (b) Technology such as (i) Pump Therapy (ii) Inhalation of Glucagon and Oral Insulin (iii) New Monitoring Devices and prominent people affected. After collating the data a correlative analysis was done using scattered plots and regression model to determine whether the age group and location of the audience reached by posts were comparable with IDF Atlas of regions with high incidence and prevalence of TIDM.

Results: *N* = 1,325 (12 months) 13–17 years 18–24 years ≥25 Males 689 (52%) 8% 22% 20.81% Females 636 (48%) 10% 17% 21.75%.

Statistical analysis revealed demographic data at 12 months: India with the highest viewership *n* = 339, Philippines 265 (20%), Nepal 152 (11.47%), Bangladesh 119 (8.98%), Jamaica 84 (6.34%), Afghanistan 49 (3.70%), U.S.A. 48 (3.62%), Algeria 44 (3.32%), Myanmar 40 (3.02%), Jordon 38 (2.87%), Mali 24 (1.81%) others 462 (34.9%); These countries were identified on the IDF Atlas within regions with high prevalence of Diabetes Mellitus. A total 5,016 views recorded within 6 months for the first 54, Mean Views 93.074/day (SD 1.41; CI: 92.82–92.98).

Conclusion: DM advocacy via websites provide permanent access to adequate information and has transcend through many developing regions. There is a positive correlation between audience reached and IDF Atlas of regions with increased prevalence.

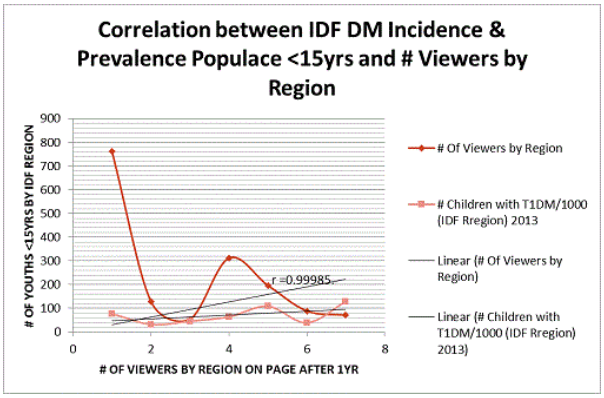

Figure Correlation between IDF DM Incidence & Prevalence.

P132

Economic costs for families of children with type 1 diabetes in less-resourced countries

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Objective: Assess the direct costs of supplies needed for minimal care for a child with type 1 diabetes in countries where the public health system does not regularly provide such care.

Methods: Data on cost of supplies was collected January 2013–February 2015 from standardised questionnaires submitted by

centres requesting support from the International Diabetes Federation Life for a Child Program.

19 centres in 14 countries gave permission for use of their responses: Benin, Burkina Faso, Cambodia, Central African Republic, Ecuador, India (6 centres), Ivory Coast, Malawi, Mauritania, Mongolia, Nepal, Pakistan, St Lucia, and Somalia.

Annual costs for minimal care were estimated as: 18 × 10 ml 100 IU/ml insulin, 1/3 cost of a blood glucose meter, 2 test strips/day, 2 syringes/week, and 4 HbA1c tests/year. Costs were expressed in USD, and as % of Gross National Income (GNI) (PPP) per capita.
Results: Minimum costs (range (median)) of purchase through the private system were: insulin 100 IU/ml equivalent vial: $5–25 ($7.65), blood glucose meter: $15–121 ($34); test strip: $0.15–1.20 ($0.49); syringe: $0.10–0.56 ($0.20); HbA1c test: $5–20 ($9.25). Annual cost varied from $255 in Pakistan to $1,185 in Burkina Faso (median $552). Annual cost as % GNI was 5–370% (88%). For the lowest 20% of income earners in each country, annual cost varied from 20 to 1,535% of income (153%).

Only St. Lucia and Mongolia had consistent insulin supply by the public health service. No country provided meters and strips, which were the most expensive supply (median 65% of total cost).
Discussion: The study shows that in less-resourced countries, the cost of even minimal care is beyond the resources of many families. It was not possible to determine the actual cost to families, as in some cases there is partial/intermittent provision of supplies via the public health service or from charities. In addition, families face additional costs such as consultations, travel expenses and indirect costs.

P133
Association between metabolic control and lipid parameters in Indian children with type 1 diabetes

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Objectives: (i) To compare lipid parameters between diabetic children and healthy controls,

(ii) determine factors influencing lipids in diabetic children,

(iii) examine effect of lowering of glycosylated hemoglobin on lipid levels in diabetic children at 1 year.

Methods: Anthropometry, diet, physical activity, body composition (DXA) were measured in 80 (39 boys) diabetic children (10.7 ± 3.4 years) and 54 age-gender matched controls, tests were repeated after 1 year in a subset of 45 diabetics. Fasting blood was tested for lipid profile (Enzymatic) and HbA1C (HPLC).
Results: Mean HbA1C was 10 ± 2%. Around 35% diabetic children had high LDL-C, 18% had low HDL-C. Diabetic children had higher LDL-C (95.3 ± 27.7 vs 84.5 ± 26.4 mg/dl) and lower HDL-C (48.2 ± 13.1 vs 53.1 ± 11.9 mg/dl) as compared to controls. Moderate physical activity ($\beta = -0.487$, $p = 0.014$) was protective for LDL-C. HbA1C ($\beta = 6.838$, $p = 0.00$) was positive predictor and age at diagnosis ($\beta = -2.986$, $p = 0.014$) negative predictor of total cholesterol and LDL-C. When percentage change of LDL-C and HbA1C were computed at the end of 1 year in 45 diabetic children, it was noted that in children whose metabolic control improved, 63% showed a reduction in their LDL-C levels and for those whose HbA1C deteriorated, 72% showed increase in LDL-C levels.
Conclusion: Improving metabolic control among diabetic children is cardinal to reduce cardiometabolic risk; encouraging physical activity and good metabolic control may prove beneficial.

P134
Effect of multi-micronutrient supplementation on total antioxidant status in Indian children and adolescents with type 1 diabetes

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Objectives: i) to compare the total antioxidant status (TAS) of children with type 1 diabetes with healthy controls

ii) to investigate the effect of 3 months supplementation with multi-micronutrient syrup on TAS and diabetes parameters.
Methods: 62 diabetic children (mean age 11.55 ± 3.61 years, 33 boys) and age matched healthy controls were enrolled. Diabetic children were allocated to either of the intervention arms: Group 1 ($n = 32$)-standard treatment with dietary advice or Group 2 ($n = 30$)-standard treatment, dietary advice and 15 ml of a mulit-micronutrient syrup/day. Fasting blood was tested for TAS (Randox kit), lipid profile (Enzymatic) and HbA1C (HPLC).
Results: Diabetic children had lower TAS (0.69 ± 0.2 vs 1 ± 0.24 mmol/l, $p < 0.05$) as compared to controls. Anthropome-

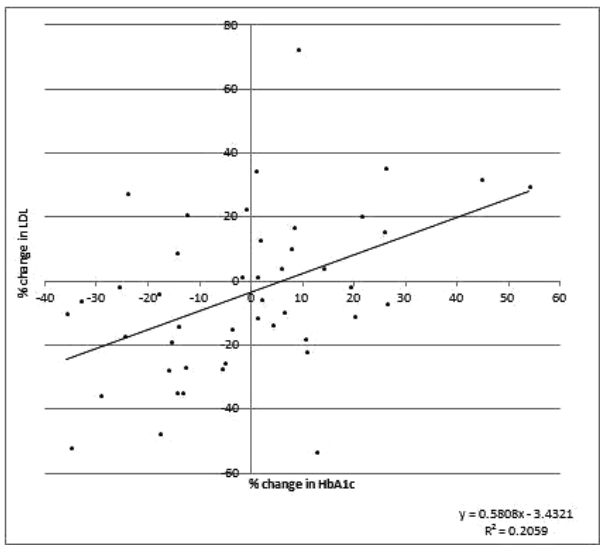

Figure Percentage change of LDL-C and HbA1C over 1 year.

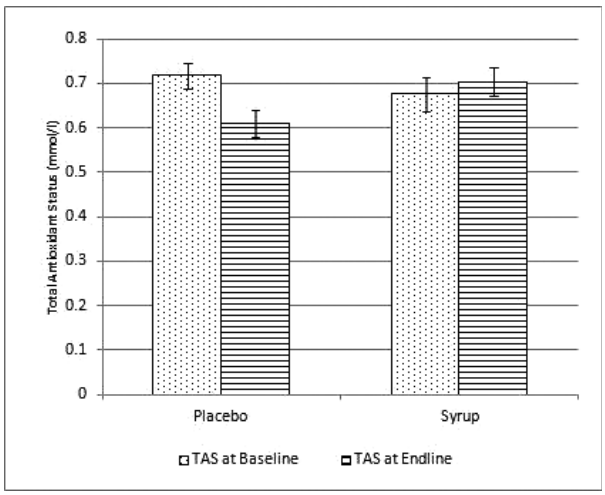

Figure Comparison of TAS at baseline and endline.

try and biochemical parameters at baseline were similar in both groups of diabetic children ($p > 0.05$). Group 1 showed significant deterioration in TAS at endline (0.71 vs 0.60 mmol/l, $p = 0.008$). Change in TAS recorded in the supplemented group was from 0.66 to 0.70 mmol/l. Percentage change in TAS from baseline to endline for the two groups was significantly different (−12% vs −10%, $p = 0.014$). There was negative association between %change in TAS and %change in HbA1C in group 2 ($R = -0.451$, $p = 0.021$) i.e. with improvement in TAS deterioration in HbA1C was noted.

Conclusion: Indian diabetic children have compromised antioxidant status which may be improved with multi-micronutrient supplements.

P135
Clinical profile of type 1 diabetes mellitus in children referred to a tertiary care centre

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Objectives: 1) To observe clinical profile of children with Type I Diabetes mellitus and factors associated with the same.

2) To assess glycemic control in children with Type I Diabetes mellitus.

Methods: A cross sectional study on 50 (male- 24) children under the age of 18 years diagnosed to have Type I Diabetes mellitus referred to tertiary care teaching hospital was done. A thorough clinical examination, including features at the onset of illness, complete physical examination, and present glycemic control were carried out. Biochemical analysis including glycosylated hemoglobin and C-peptide levels was done.

Results: (1) In 50 observed children (male 24), incidence of diabetes was maximum between the age groups of 5–10 years of age (45%) followed by 10–15 years of age (27%).

(2) All children had higher HbA1C levels (mean −11.3) and low C- peptide levels (mean −0.29)

(3) Height and weight faltering at presentation was more in girls as compared to boys.

(4) Most of the children (75%) were treated with spilt-mixed regimen.

Conclusions: (1) Type I Diabetes mellitus is one of the commonest endocrine disorder of childhood with peak age of onset being in pre-adolescent age with no sexual preponderance.

(2) Polyuria and polydipsia are the most common presenting features.

(3) Females showed greater faltering in weight and height Z scores, as compared to boys with better BMI Z scores. This could suggest gender bias still prevalent in the community.

(4) Glycosylated hemoglobin is the best marker of prolonged glycemic control and is influenced by multiple factors including duration of disease, insulin regimen and compliance.

(5) About 75% of children were managed by Split -mix regimen highlighting the higher cost involved in treating the children with basal bolus regimen which is many a times not affordable to the patients.

P136
Estimate of numbers of children and youth <26 years of age in lower-income countries who need help to receive standard diabetes care

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Objective: Provide the first estimate of the numbers of children and youth (<26 years) in low- and lower-middle income countries (LIC/LMIC) needing external assistance in order to receive standard care for diabetes. Standard care is defined as adequate insulin, 2+ blood glucose tests per day, HbA1c testing, and access to care and diabetes education by health professionals knowledgeable in diabetes.

Methods: There ar 84 LIC/LMIC. Numbers supported by IDF Life for a Child Program (LFAC) and Changing Diabetes in Children (CDiC) in 41 LIC/LMIC were attained as at end 2014. Coverage by the two programs of people <26 years was estimated as 12.5% in India & Pakistan, and 70% overall in the other 39 countries (in nearly all of these there is one main centre/network of centres, in India and Pakistan there are many independent centres).

For the 43 countries not covered by either program, 7 were excluded from estimates (Egypt, Paraguay, and the 5 LIC/LMIC in Europe) as it is believed that the kind of support provided by LFAC/CDiC is generally provided by the respective Government.

Numbers in need in the 36 remaining countries were extrapolated by relative population (0.576 billion people in the 36 unsupported countries vs 1.252 billion in the 39 supported (excluding India and Pakistan)).

Results: In the 39 countries, LFAC was supporting 12,132 young people and CDiC 9,136, giving a calculation of 9,115 others still needing support. In India and Pakistan, the numbers were 3,597 (LFAC), 4,063 (CDiC), and 53,620 needing support. In the 36 countries not covered, the estimate was 13,991. The total for all 77 countries is 105,654.

Discussion: There is substantial uncertainty in the estimates, particularly re coverage in India. However, the total provides a guide for the need, and show that substantial progress has been made to meet this need. We further estimate that numbers are rising 10% or more annually due to reducing mortality and possibly also increasing incidence.

P137
Poor quality of diabetes care in a university hospital clinic in a developing country years after initiating essential changes to improve care

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Aim: To assess quality of care at Children's Diabetes Clinic, Ain Shams University Hospital, Cairo, Egypt 7 years after initiating essential changes. Clinic cares for a large number of patients and dispenses treatment.

Methods: In 2006/2007 a baseline evaluation of care of 602 clinic patients was done (included type and regimen of insulin, insulin

delivery methods, HbA1c% and SMBGs, hypoglycemia, DKA frequency, DM education, microvascular complications (frequency of screening and % affected) and school performance). Changes done included starting a computerized database, writing detailed guidelines, shifting type 1 DM to basal bolus intensive insulin therapy, stopping use of premixed insulins and appointing first multidisciplinary team (MDT). In 2014, evaluation of quality of care was done; by assessing doctor performance and following of guidelines (using a checklist, all clinic doctors were included), assessing aspects of care received by patients (included the 300 patients in regular follow up then), assessing outcome of care and both doctor and patient satisfaction.

Results: Increase in incidence of new cases with a drop in mean duration of DM in clinic from 4.55 ± 3.76 to 3.56 ± 3.19 years. Mean HbA1c dropped from 9.04 ± 2.3 to 8.9 ± 1.63% ($p > 0.05$). In 2014, 69% of patients reported repeated hospital admission due to either severe hypoglycemia or DKA. Less than 1/3 patients received DM education. Only 3 (of 18) doctors followed ≥50% of what guidelines require. Mean time for patient care and writing treatment was 3 min/patient. Eighty-four% of doctors and 57% of patients were unsatisfied with clinic structure/service. Database was not updated for long, MDT approach was not implemented for each patient.

Conclusion: Crowded clinics in developing countries need more doctor training with a punctual policy if local guidelines are not followed, clinics should not be overwhelmed with dispensing treatment, follow up of implemented changes to ensure continuance is a must.

Poster Tour 14: Diabetes in Developing Countries II

P138

Comparison of the split mix (SM) and multiple daily injection (MDI) insulin regimen for children with type-1 diabetes mellitus (T1DM) in a developing country

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Background: MDI regimen provides superior glycemic control in children with T1DM. There are very few studies from the developing world.
Aim of the study: Comparison of effectiveness and feasibility of the MDI and SM in Indian children with type-1 diabetes.
Methods: Children with T1DM who are under follow-up at our unit were initiated o basal bolus regimen or split mix regimen as per the convenience of the families. Glycemic control, growth, hypoglycaemic episodes and pubertal development assessed over a period of 1 year (Jan 2014 to Jan 2015).
Results: During the study period, 59 and 43 children were on MDI and SM regimen, respectively (mean age 8.4 ± 2.3 years, 52 males). Children on MDI showed a reduction in glycosylated haemoglobin (12.4 ± 1.2 to 8.6 ± 2.1) versus SM (10.7 ± 1.1 to 10.0 ± 1.4; $p < 0.05$). The former had higher percentage of glucose readings above target versus the latter (75.3% vs 64.4%; $p < 0.05$). The number of hypoglycaemia episodes were lower in children on MDI (0.329 ± 0.426) versus SM (0.729 ± 0.79) episode per person per year ($p < 0.05$). Children with MDI showed higher increment in height Z-scores, body mass index Z-scores and pubertal progression compared to children on SM in 1 year period ($p > 0.05$).
Conclusion: MDI offers better glycemic control and growth without increasing the frequency of hypoglycaemia - is indeed feasible in a developing country.

P139

Improving diagnosis and care of type 1 diabetes (T1DM) in Nigeria

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Objective: Evaluate the impact of a Diabetes in Practice (DIP) course for health care teams by data collection of incidence & prevalence of T1DM.
Method: In countries with limited access to medical care the diagnosis of T1DM is often overlooked or misdiagnosed & accurate data on the incidence & prevalence is unavailable. The national T1DM register in Nigeria includes records of 241 children in a country of 177 million inhabitants. In November 2013 the second ISPAD DIP course in Africa was held in Ibadan, Nigeria. The course taught about the diagnosis & treatment of T1DM & T2DM and related complications. After 1 year, a questionnaire was sent to be completed by each regional centre (18 in total) including questions on incidence, prevalence & T1DM related deaths, staffing changes & barriers to improved service provision.
Results: 60 medical & allied health professionals from 18 centres attended the DIP. Course outcomes included establishing parent lead support groups, strategic plans to improve regional T1DM care & events to celebrate world diabetes day. 14 of 18 questionnaires were returned showing an increased number of patients of T1DM of 43% & related deaths of 3.8% and most centres increased their staff numbers. Barriers for change included lack of insulin & consumables, industrial disputes & security challenges.
Conclusion: Although an increased number of patients have been diagnosed, many challenges persist, including socio-political barriers to the provision of T1DM care to Nigerian children. Given the initial qualitative & quantitative changes, further follow up and repeat DIPs should be considered.

P140

Poverty associated childhood diabetes in India: clinical profile, complications, comorbidities and challenges (1987–2011–2015)

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Objective: To analyze longitudinal [2011–2015] clinical profile, glycemic control, complications and co-morbidities of a cohort of underprivileged children with diabetes [onset 1–18 years] DISHA Free Clinic, India.
Methods: DISHA: Beginning 1987, 3,000 children provided free insulin, syringes, health counseling, 24 h helplines. Since 2006, BG meters and 5–10 strips/month added. Basal bolus insulin [meal time regular + bedtime NPH] 100%. DISHA + CDiC/LFAC: 2011-ongoing: [Changing Diabetes in Children and Life for a Child with Diabetes] 241 children receiving enhanced support - 100 BG strips/month, limited biochemical evaluations [TSH, quarterly HbA1c, annual urine albumin: creatinine ratio].
Results: 1. Type 1 Diabetes 95%;

2. Type 2 Diabetes 1% (discontinued insulin on follow-up);

3. Other Specific Types 4% [A. Monogenic Diabetes: Permanent Neonatal Diabetes 5 (Wolcott Rallison syndrome 1; Insulin gene mutation 1; under genetic analysis 3); Wolfram syndrome 2; D. Chronic pancreatitis 3];

4. Gestational Diabetes Mellitus 0%.

Age onset T1DM: 9.6y; 0–5 years: 20%; 6–10 years: 34%; 11–15 years: 39%; 16–18 years: 7%. Duration Diabetes: 8.6y; Rural: Urban = 48: 52. Follow up 3 years. HbA1C trend (%) Improvement: 39%; Stable: 50%; Worsening: 11%. Nephropathy trend (%) On ACE inhibitors/ARB = 25%. Retinopathy: Non-proliferative: 3%; Proliferative 1%. Hypothyroidism: 21% (at enrollment 14%; new diagnosis 7%). Acute myocardial infarction: One 20 year girl with T1DM from age 4 year.

HbA1C trend (%) and Nephropathy trend (%)

HbA1c	Enrollment	Latest	Albuminuria	Enrollment	Latest
<8%	11	23	Normo	60	66
8.1–10%	24	34	Micro	32	27
>10%	65	43	Macro	8	8

Conclusions: Childhood onset diabetes in economically underprivileged in India is almost exclusively type 1 [cf: type 2 diabetes in (*affluent*) children 16–46% USA; ? India - but increasing]. Aggressive poverty alleviation of masses and better health and longevity of children with diabetes remain challenge and dream - India.

P141
Growth characteristics and development in economically underprivileged type 1 diabetes children in India

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Objective: To analyze longitudinal [2011–2015] growth and development of a cohort of economically underprivileged children with type 1 diabetes [onset 1–18 years] DISHA Free Clinic, India.
Methods: DISHA: Beginning 1987, 3,000 children provided free insulin, syringes, health counseling, 24 h helplines. Since 2006, BG meters, 5–10 strips/month added. Basal bolus insulin [meal time regular + bedtime NPH] 100%.

DISHA + CDiC/LFAC: 2011- ongoing: [Changing Diabetes in Children and Life for a Child with Diabetes] 241 children are receiving enhanced support - 100 BG strips/month, limited biochemical evaluations [TSH, quarterly HbA1c, annual urine albumin: creatinine ratio].
Results: Age onset T1DM: 9.6 years; 0–5 years: 20%; 6–10 years: 34%; 11–15 years: 39%; 16–18 years: 7%. Duration Diabetes: 8.6 years; Rural: Urban = 48: 52. Follow up 3 years.

Growth Groups - Height % Δ: Improved: >10; Stable: +10 to −10; Decline <−10. Follow up 3 years. Means.

"Growth decline" was associated with younger age [prepubertal], better initial height and weight SDS and higher prevalence of newly diagnosed hypothyroidism. On follow up, this group demonstrated decrease in height and weight SDS and lesser improvement of HbA1c.
Conclusions: Growth faltering in T1DM children is related to impairment of the GH/IGF-1 axis, but they are also more at risk of hypothyroidism and celiac disease. At puberty, persisting abnormalities of the GH/IGF-1 axis and inability to reverse these totally, even with intensified insulin therapy, contribute to blunted pubertal growth. In underprivileged, malnutrition and protein calorie deprivation are contributory. Close monitoring of growth and puberty, and prompt rectification of the pathogenetic deficits are critical to ensure optimal health and achievement of these future citizens.

P142
Type 1 diabetes, growth retardation and diabetic cheiroarthropathy: story, disappearance and update

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Objective: To review Diabetic Cheiroarthropathy, through an illustrative case of a young lady, DISHA Free Clinic, India.
Methods: 1994 - Age 3: T1DM. 1994–2009: Blood glucoses always above 300–400; Lab BG q 6 m; Insulin Split Mix / Premixed Bid. Doctor continued same insulin dose!!!! "All is well - continue same." 2000- Age 9: Stiff fingers - toes. 2009- Age 17 year: Referred to DISHA. Ht: 150 cm [<3%]; Wt: 49 kg [25%]; PR:136; BP 105/67; Prayer sign: Positive. Puberty Normal. FBG 459, PPBG 594, HbA1c 13.7; Urine Alb: Creat ratio 373 µg/mg creat; S Creatinine 0.76 mg/dl; TSH 21 [0.3–5.5]; TPOAb positive; Fundus: NPDR. Diabetic neuropathy Autonomic.
Result: Management: SHBGM first time in life !!; Basal Bolus Insulin qid 84 U/d. Thyroxine 125 µg/d. 2009–2015: HbA1c 7–7.5;

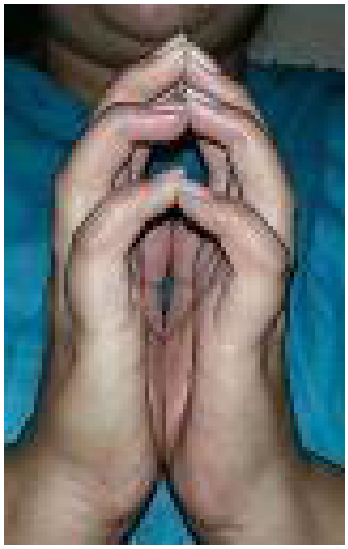

Figure Namasthe Prayer Sign Diabetic Cheiroarthropathy.

Growth type 1 diabetes

Growth groups	Age y	Initial height %	Initial height SDS	Height SDS Δ	Initial weight %	Initial weight SDS	Weight SDS Δ	TSH uU/ml	Hypothyroid % new
Improved 26%	14	9	−2.2	1.9	19	−1.2	0.75	2.01	0
Stable 64%	15	9	−2.0	0.3	12	−2.1	0.69	4.01	6
Decline 10%	10	42	−0.3	−0.6	35	−0.5	−0.9	10.03	33

LDL-c 106; Atorvastatin 10 mg; Ramipril 10 mg; Metaprolol 50 mg; PDR laser. Polycystic ovarian disease; Wt: 79 kg; Metformin: 2000 mg. Juvenile Cataract S/P Surgery. Psychiatry counseling. Currently volunteers in DISHA Clinic and employed.

Conclusions: Diabetic Cheiroarthropathy: Prevalence: 8–50% reported (previously) in T1DM. Signs: Painless limited extension of proximal metacarpophalangeal joints, interphalangeal joints; tight waxy skin surface over dorsum of hand.

Genesis: Multifactorial - Hyperglycemia - glycosylation and cross linking of collagen. Significance: Strong association [x 3] with increased prevalence of microvascular disease in type 1 diabetes.

P143

Detection of risk factors for type 2 diabetes mellitus in female medical students

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Objectives: According to World Health Organisation, type 2 diabetes has recently escalated in younger and younger age groups especially in high-risk population. More females than males are now diagnosed with type 2 diabetes This underscores the need for mass awareness and screening programmes in females to detect diabetes at an early stage and early age. So purpose of the study is to find risk of type 2 diabetes mellitus at an early age using IDRS in females. To assess Random Capillary Blood Glucose (RCBG) in students having high IDRS score.

Material and method: 332 female medical students were screened using IDRS which included age, family history of diabetes, exercise status and waist circumference. After scoring them they were categorised into mild, moderate and high risk group. In students who were having score more than 50, Random Capillary Blood Glucose (RCBG) was assessed with the help of glucometer.

Result: We have assessed 332 female students till now. It was observed that 22%, 63% and 14% students in high, moderate & low risk group respectively for developing type 2 D.M. Mean abdominal obesity in high risk students was 77.37 ± 11.19 as compared to 82.78 ± 11.08 in moderate and low risk students (>0.05). Family history of diabetes in either or both parents was present in 29% female students. 63% students were having sedentary lifestyle. Mean RCBG in students having score more than 50 was 93.92 ± 11.63 mg/dl. 31% students have waist circumference >90 cm.

Conclusion: More sedentary lifestyle among women contributes to increased score. To prevent and to postpone the risk of type 2 diabetes mellitus, health education programme, exercise and diet planning can be recommended for these students.

P144

Abstract withdrawn.

P145

Management of type 1 diabetes in Congo: prospective assessment of acute complications, glycemic control and diabetes issue in Pointe-Noire

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Background: Type 1 diabetes management in developing countries still faces many difficulties. DKA is common in hospitals and interruption of treatment is the major cause, glyceamic control is poor. Difficult access to insulin in Africa is the major cause of acute and early chronic complications with high mortality. Pointe-Noire was included in IDF "Life for a Child" Program in 2012.

Objectives: To assess acute complications and diabetes issue before/during the "Life for a child" program. To evaluate the impact teh program in Pointe-Noire. To estimate the incidence of T1DM in Pointe-Noire.

Methods: It is a prospective study including type 1 patients from September 2010 to April 2015. Studied parameters: age, sex, acute complications, hospitalizations and causes, mortality, A1c, education. Data were analyzed by SPSS 16.0 and Excel 2007.

Results: We included 89 patients, 42% Male and 58% female. The incidence is 16–18 patients/year. The mean age was 19 years and mean duration of diabetes 42.5 months. There were 36 admissions before the program due to Interruption of treatment (81.6%), Infections (13. 16%), during the program 34 admissions due to interruption of treatment (59.4%), infections (28.12%). A1c screening has improved, before mean A1c1- 11.7% (n = 26), A1c2- 8.8% (n = 10), A1c3- 9.6% (n = 5), A1c4- 10.6% (n = 4), A1c5- 9% (n = 2), during the program A1c1- 10% (n = 42), A1c2- 9.8% (n = 45), A1c3- 10% (n = 45), A1c4- 9.5% (n = 48), A1c5- 10% (n = 49), A1c6- 9.7% (n = 46). There were 42 episodes of DKA before and 23 during the program. 56% patients never attended education. 11 Patients (12.36%) died, (8 cases, 72.73%) before the program.

Conclusion: Free access to insulin has improved mortality and acute complications. Diabetes education is the main challenge for improvement of the high level of DKA, poor control and mortality.

Acknowledgements: To the IDF's "Life for a Child" Programme for the support

P146

Level of control among patients with type 2 diabetes mellitus attending diabetic clinic under family medicine compared to diabetic clinic under endocrinology at King Abdul-Aziz medical city for National Guard - Riyadh

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Objectives: To asses and compare level of control of type 2 diabetic patients attending diabetic clinic under family medicine service and patients attending diabetic clinics under endocrinology service, and to explore the effect of different variable on the level of control in both groups.

Methods: Retrospective cross-sectional study by reviewing diabetic patients' medical records and lab studies from Hospital Information System at King Abdul-Aziz Medical City, National Guard, Riyadh - Saudi Arabia using predesigned sheet for data collection.

Results: Among 352 patients enrolled in the study, 176 (50%) patients were from the family medicine setting and 176 (50%) patients were from the hospital setting. The mean HA1c for the whole study population was 8.97 ± 1.87. There was no significant difference between the two groups in regard to level of control (9.01 ± 1.75 in the family medicine setting compared to 8.93 ± 1.98 in the hospital setting). No significant correlation was found between level of control and age, duration of disease and number of follow up in both settings.

Conclusion: Patients with type 2 diabetes mellitus in this study were found to be poorly controlled in both setting, diabetic clinic under family medicine and diabetic clinic under endocrinology. More to be done toward improvement of diabetic patient care at diabetic clinic under family medicine which is expected to be more accessible, more convenient to patients and more cost effective.

P147

Etiology of anaemia among young children (age under five years) in South India

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Objective: Globally, severe anaemia is one of the critical public health problems in developing countries. About 89 million children are living with anaemia in India. The present study examined the prevalence of anaemia with review of existing program of the anaemia among children in South India.

Methods: The study has used recently available fact sheet of District Level Household and Facility Survey (DLHS-4, 2012–2013) which was conducted during 2012–2013 and National Family Health Survey (NFHS-3) data (2005–2006). Bivariate and chi-square test have been used.

Results: The prevalence of severe anaemia (haemoglobin level, below 7 g/dl) is 21.2% in Andhra Pradesh followed by Telangana (13.3%) and Karnataka (14%) among children (under age 5 years). On this contrast, the lowest prevalence of severe anaemia is 3% in Kerala and Tamil Nadu (3.7%). Previous literature have shown that children's anaemic mothers, less educated mothers and mothers belongs to the lowest quintile are the contributing factors for the severe anaemia among children. The study has found that huge geographic variations of severe anaemia among children in Southern India.

Conclusions: The present study found that the prevalence of severe anaemia is high in Andhra Pradesh and Telangana. Through, previous literature study found that most of the program was focussed on providing iron folic tablets that were not sufficient for the reduction of anaemia. Hence, study has recommended that there is need to monitor the program at ground level and provide active training facility to resources person of the program.

P148

Evaluation of physician awareness of the presentations of type 1 diabetes in children and adolescents in Egypt, a pilot study

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Aim: Assessment of physician knowledge and practice in Egypt when managing a child presenting with a possible symptom of type 1 diabetes (T1DM).

Methods: Assessment of knowledge of 60 doctors working at Children Diabetes Clinics at 4 referral hospitals (2 university and 2 Ministry of health hospitals) by means of a questionnaire asking if DM is included in differential diagnosis (DD) of possible presenting symptoms of T1DM, asking about local prevalence of T1DM in children and its' trend, about T1DM etiology and if it must present in DKA. Two hundred diabetics/caregivers at DM clinics of the university hospitals were asked about their presenting symptoms and duration till T1DM diagnosis.

Results: Included doctors were 12 GPs and 48 pediatricians. Mean duration of practice was 5.93 ± 5.78 years. Only 53.3% of doctors considered DM in DD if presentation is weight loss, 100% if there is polyuria/polydipsia, 46% if nocturnal enuresis, 65% if vomiting or shortness of breath and 73% if abdominal pain. Only 13% knew local prevalence of childhood T1DM, 53% knew it is rising. Eighty% answered that T1DM must present in DKA and about 40% that child must have a family history of DM. Only 10% knew early case detection may lower DKA frequency. Forty three% answered that T1DM is best treated with premixed insulins. Patient data showed weight loss was commonest presenting symptom across all ages (46% of patients). Of newly diagnosed patients, 56.92% were in DKA and 18.5% required ICU admission. Commonest duration of hospital admission at diagnosis was 4–7 days. Mean duration between presentation and diagnosis was 20.99 ± 6.95 days and wasn't significantly affected by having a family history. Commonest initial misdiagnoses were gasto-enteritis, pharyngitis and anemia.

Conclusion: Physician education in Egypt about childhood T1DM natural history, presentations and management is badly needed. Use of IDF poster for early diagnosis should be implemented to lower burden of DKA at presentation.

P149

Prevalence of Mauriac syndrome in type 1 DM in Ahmedabad, Gujarat, India- an observational retrospective study

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Objective: To study the prevalence of Mauriac syndrome in type 1 diabetic patients in Ahmedabad, Gujarat, India.

Methodology: Study design: Retrospective study. No. of subjects: 200. Inclusion criteria: Type 1 diabetic patients in the age group of 11–16 years with an HbA1c level of the range 7.5–9.5% with type 1 DM of more than 5 years. Exclusion Criteria: Type 1 patients with pre established chronic complications due to diabetes and genetic

anomalies. The clinical data gathered from various camps which were conducted across the city of Ahmedabad for management and education of type 1 DM patients, was observed retrospectively for anthropometric data (height, weight, BMI, waist and hip) and the pubertal development according to the Tanner's scale of the subjects. A growth chart was plotted. Their laboratory analysis of the previous visits were observed for HbA1c, TSH, Serum Creatinine, lipid profile, C- peptide levels and GAD antibodies if any available. A growth hormone level, IGF1 and serum cortisol level was done for all the patients with growth impairment and delayed puberty along with notable cushingoid features. An ultrasound of abdomen was suggested and carried out for the patients who were highly suspected for hepatomegaly.

Results: It was observed that 54% (n = 108) patients had growth retardation. Out of these 27.7% (n = 30) had low GH levels. IGF-1 was significantly below the normal range in 57.4% (n = 62). Cushingoid features were observed in 45 patients. Delayed puberty and dealyed appearance of secondary sexual characteristics was observed in 45% (n = 90). The abdominal USG findings revealed that 14 patients had mild hepatomegaly and 3 more showed significant hepatomegaly.

Conclusion: According to this study, 8.5% (n = 17) patients were concluded to have Mauriac syndrome. It was observed to be as a result of poor glycemic control and/or decreased IGF-1 levels.

Poster Tour 15: Diabetes Technology

P150
Continuous subcutaneous insulin therapy in very young children with type 1 diabetes: efficacy and safety

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Objectives: Type 1 diabetes mellitus (T1DM) in very young children has unique features both in diagnosis and management. Continuous subcutaneous insulin (CSII) therapy has been introduced in this group of children increasingly over the past 10 years. We report the efficacy and safety of CSII in a group of pre-school children with T1DM in Kuwait.
Methods: Glycated hemoglobin (HbA1c), total daily insulin (U/kg/day), BMI z score, ketoacidosis (DKA) and severe hypoglycemia before compared to values during pump therapy for children less than 6 years at pump initiation.
Results: A total of 68 children were followed-up for 36 months. Age at pump initiation (mean ± SD) was 3.4 ± 1.2 years. Mean HbA1c pre-pump was 8.8 ± 1.66%, decreased to 7.77 ± 0.71% at 12 months and continue to drop significantly throughout the study period. Total insulin dose at pump initiation was 0.87 ± 0.22 U/kg/d and decreased to 0.66 ± 0.1 at 36 months, $p < 0.001$. The incidence of severe hypoglycemia was 62 episodes per 100 patient-year. It decreased to 51 by 12 months, 40 at 24 months and 31 episodes per 100 patient-year by the end of 36 months, $p < 0.001$. There was 2 DKA in the whole group during the pre-pump year. No patients experienced DKA during the 36 months. No patient on CSII discontinued the pump therapy during or after the end of the study period.
Conclusions: These data support the existing evidence that CSII is an effective and safe method for insulin delivery in very young children with type 1 diabetes mellitus.

P151
A Kuwait-based pilot study to assess the efficacy of continuous glucose monitoring system to improve therapeutic adjustments in children with poorly controlled type 1 diabetes

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Background: Type 1 diabetes mellitus (T1DM) has become a rapidly growing global disease. IN 2002 the prevalence of T1DM in school children aged 6–18 in Kuwait was reported as 269.9 per 100,000. T1DM is a chronic metabolic disorder that may lead to various acute and chronic complications if glycaemic control (GC) is not achieved. The goal of GC is to achieve target blood glucose range and reduce blood glucose variability without hypoglycemic events. Retrospective continuous glucose monitoring system (rCGMS) is widely used internationally to guide changes in insulin regimens and has demonstrate efficacy in diabetes management by detecting postprandial hyperglycemia and hypoglycemia. CGMS is considered a relatively new technology in the Arabian Gulf, and is a new area for research.
Objectives: To investigate the efficacy of using rCGMS in improving diabetes control in children and adolescents with T1DM in a specialized center in Kuwait and in detecting postprandial hyperglycemia, unrecognized hypoglycemia.
Methods: Thirty three children and adolescents aged 2.0–18.0 years old with T1DM were referred for rCGM over 6 months. The rCGM was inserted subcutaneously. Patients daily maintained a diary of three blood glucose level registrations, food intake, and exercise during CGM use. The glucose sensor was again inserted after 12-weeks interval. The change in glycosylated hemoglobin (HbA1c) from 0 to 3 months, mean daily CGMS standard deviations, mean absolute difference (MAD), area under curve of hypoglycemia and hyperglycemia were compared.
Results: The mean age of the subjects was 12.26 ± 4.46 years and 60.6% were females. The mean DM duration was 6.56 ± 4.07 years, and HbA1c 9.43 ± 1.47% (79.6 ± 16 mmol/mol). After 3 months a significant reduction in HbA1c (0.35% $p = 0.044$), MAD 5% ($p = 0.01$) was observed.
Conclusions: rCGM improved metabolic control in children with T1DM and offers opportunities to guide advanced insulin management.

P152
Prepubertal children need more bolus insulin than derived from the 500-rule

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Objectives: The "500-rule" has been used extensively to find the insulin:carbohydrate (IC) ratio when carbohydrate counting is practiced, both in adults and children. Data is lacking on validating this in young children.
Methods: We initiated carbohydrate counting by finding the individual IC for each child by dividing the carbohydrate content in grams by the insulin dose (breakfast and other meals separately). Insulin correction factor (ISF) was defined by the "100-rule" (100 divided by total daily insulin dose (TDD). IC and ISF were adjusted at each visit. Data was taken from pump downloads. IC and ISF were recalculated to "rules" (IC/ISF divided by TDD).
Results: 21 prepubertal children aged 7.0 ± 2.3 (±SD; range 2–10) years with diabetes duration 3.0 ± 1.9 (0.5–7.7) years used the pump bolus guide for carbohydrate counting (CC) and correction boluses. 15 had started with a pump from the onset of diabetes. Their HbA1c was 53 ± 6 mmol/mol (7.0 ± 0.5%), and none had experienced severe hypoglycemia with unconsciousness or seizures since diabetes diagnosis. Their total daily dose was 0.7 ± 0.1 U/kg/24 h (range 0.5–1.0), and their percentage basal insulin was 38 ± 11%. The median breakfast rule was 211 (Q, quartiles 137;285), and for other meals 434 (Q 336;532). The median ISF rule was 113 (Q 99;127) in the morning, and 122 (Q 107;137) during the rest of the day. There was a significant correlation between the total daily insulin dose (U/24 h) and both IC and ISF.
Conclusions: Prepubertal children seem to need more bolus insulin for meals than calculated from the 500 rule, but less insulin for corrections than calculated from the 100 rule. When adjusting the

bolus wizard according to the downloaded data and parent's experience of insulin effect, a good metabolic control can be achieved with a low rate of severe hypoglycemia.

P153
Use of the dual wave bolus feature in children and adolescents with type 1 diabetes on insulin pump therapy - does it improve glycaemic control?

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Objective: To investigate the number of children and adolescents with type 1 diabetes on insulin pump therapy using the dual wave bolus feature and compare their glycaemic control, as measured by HbA1c against those not using it.
Method: A retrospective observational study assessing all patients on a Medtronic pump who attended our diabetes clinic over a 3-month period. Information relating to the use of the dual wave bolus feature i.e. the number of times it was used during the 2-week download, the time of day it was used and the amount of carbohydrate it was used for were collected from saved Carelink™ reports. Additional information regarding weight, height, HbA1c and duration of diabetes were collected from electronic scanned medical records.
Results: A total of 210 Carelink™ reports were included in the study. Of these, 32 reports (15%) illustrated use of the dual wave bolus feature at least once during the 2-week download period (average of 4.3 times). The mean Hba1c tended to be lower for those using the dual wave bolus feature (7.4%) compared to those not using the feature (7.8%; $p = 0.08$) but the difference was not significant. Of those subjects using the dual wave bolus feature, 76% used it for the evening meal. Many variations in settings were seen, however a 50/50 split was the most common dual wave bolus setting used (60%). Almost 50% of dual wave boluses used were set with an extended bolus time of 60 min or less, below the clinic recommendation of 120–180 min. The average carbohydrate amount that the dual wave bolus was utilised for was 53 g.
Conclusions: Only 15% of patients in the diabetes clinic were found to be using the dual wave bolus feature. Those that were using the feature tended to have a lower HbA1c but given the small sample size, further evaluation studies are required.

P154
The use of mobile applications among adolescents with type 1 diabetes: results from diabetes Youth - Australia

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Objectives: The use of mobile applications ("apps") for diabetes management is a rapidly developing area, and has relevance to adolescents who tend to be early technology adopters. However, little is known about app usage in this population. One objective of the Diabetes MILES Youth - Australia study was to explore app usage amongst adolescents with diabetes.
Methods: 728 young people (M/F: 289/439) with type 1 diabetes (T1D) and aged between 10 and 19 years (14.3 ± 2.6) participated in a national, online survey, which included a series of study-specific app usage questions.
Results: 35% (255/728) indicated they used an app for diabetes management. Of these, 86% (219/255) reported carbohydrate counting as the most common purpose; with 64% (163/255) reporting use of "Calorie King", a food database app. Although there were no gender differences, the relationship between age and app usage was significant ($\chi^2(9) = 25.3$, $p < 0.01$; see Figure). Of those not using apps, 67% (319/473) indicated that this was due to either no knowledge of apps, or a belief that apps could not help.
Conclusions: This national survey offers a unique insight into app usage of Australian adolescents with T1D. Only one in three were using apps, the majority of which were not diabetes-specific despite being used for diabetes self-management (e.g. carbohydrate counting). Future research needs to identify what drives app usage and how to support adolescents wanting to engage in this emerging use of technology.

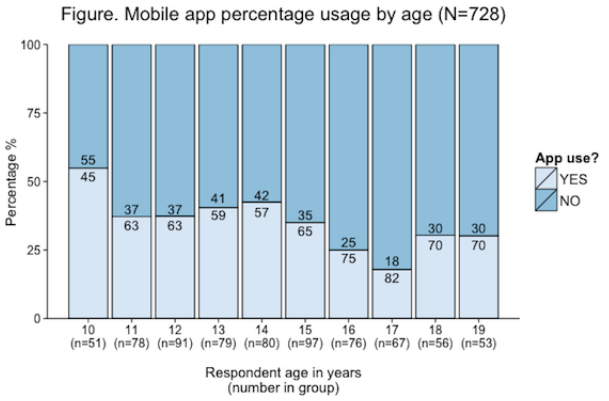

Figure: Mobile app percentage usage by age ($N = 728$).

P155
Evaluation of overnight insulinemia and venous glucose profiles, in closed and open loop system, in children, 6 to 12 years, with type 1 diabetes

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Objectives: Comparison of insulinemia and time spent in target glucose range, based on venous glucose measurements, 3.9–8.0 mmol/l, in overnight closed to open loop insulin treatment.
Methods: 15 children, 6–12 years, on insulin pumps, participated in this open-label single centre randomized cross over study. They were admitted to the research facility for 2 overnight stays (1 week in between). During the in-patient overnight (23:00–07:00) stays venous blood samples were taken for glucose and insulin measurements hourly. Outcome of automated closed loop glucose control (closed loop: CL) using Florence D2 system (University of Cambridge, UK) was compared to real time glucose sensor augmented insulin pump treatment (open loop: OL). All children received aspart insulin.

Plasma insulin levels were measured centrally by immunochemiluminometric assay (Invitron, Monmouth, UK). Venous blood glucose was measured by glucose oxidase method (I-Stat, Abbott).
Results: 12 patients with complete sensor and closed loop data were analyzed. Insulin levels tended to be lower during overnight closed loop period (mean: CL 189.92 ± 170.15 pmol/l; OL: 229.28 ± 176.53 pmol/l), without reaching statistical significance. The number of venous blood measurements in target range was not different in both treatment groups (CL: 5.75 ± 2.80; OL: 5.75 ± 2.05). However, a tendency to less hypoglycemia was observed in the closed loop group. Sensor (Navigator II) glucose value at start of closed loop did not show a statistically significant influence on insulin or blood glucose levels overnight. Graphic inspection did not show an influence of age, gender or diabetes duration on overnight insulin and venous blood glucose levels.
Conclusion: During overnight closed loop a tendency to lower insulin levels and less hypoglycemia was observed in children with type 1 diabetes. Further studies with larger patient groups and longer duration are needed to confirm outcome of this preliminary study.

P156
Performance of a hybrid closed loop insulin delivery system with insulin limits algorithm designed to mitigate hypoglycemia, under serial hypoglycaemic challenges

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Objective: To assess whether an algorithm with maximum basal insulin limits in a hybrid closed loop system reduces hypoglycaemia risk, in scenarios likely to induce hypoglycaemia: an over-reading glucose sensor, an over-reading sensor in combination with exercise, and a more aggressive carbohydrate ratio.
Methods: Adolescents with T1D were commenced on a Medtronic hybrid closed loop system for a 4 day in-clinic study. All participants had pump settings optimized prior to the study. Closed loop control was established on day 1. On day 2 glucose sensors were intentionally over-calibrated by 20% for the next 48 h. On day 3, participants exercised at 55% of VO_2 max for 45 min. Carbohydrate ratios were made more aggressive for the study duration (12–30%). Primary outcome was hypoglycaemic event frequency (plasma glucose <3.5 mmol/l, or symptomatic hypoglycaemia with plasma glucose <4.0 mmol/l).
Results: Data from four completed studies are available. Two participants had no hypoglycaemia. There were no hypoglycaemic events during exercise or overnight. Two participants had 7 hypoglycaemic events, all in relation to meal bolus. All 7 events were preceded by cessation of basal insulin delivery by the system; mean 68 ± 33 min. Mean time that hypoglycaemia followed an insulin bolus for carbohydrate was 138 ± 46 min. Overall mean plasma glucose was 8.0 mmol/l (±1.0 mmol/l). Time in target plasma glucose range (4–10 mmol/l) was 78 ± 13.6%. Time spent <4 mmol/l, 10–15 mmol/l and >15 mmol/l was 1.9 ± 1.7%, 19.2 ± 13.6%, and 0.9 ± 1.2% respectively.
Conclusions: There was no overnight or post exercise hypoglycaemia using a Hybrid closed loop insulin system even when the glucose sensor was over-reading and with exercise. However hypoglycaemia did occur following insulin boluses for meals, indicating that accurate carbohydrate counting and appropriate carbohydrate ratios are still required for avoiding hypoglycaemia when using a hybrid closed loop system.

P157
CGM-related skin problems are most common in very young users but not associated with atopy

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Objective: Skin problems are the major limiting factor in the use of CGM. This study describes the frequency of skin problems in different pediatric age groups of CGM users. We also wanted to explore whether skin problems are associated with length of exposure to CGM. Another aim was to study whether CGM-related skin problems are more common in children with atopy.
Methods: A questionnaire was distributed to CGM (Dexcom G4® or Medtronic Enlite®) users and completed at a routine visit to the diabetes clinic during the period Nov 2014 to March 2015. SPSS was used for calculations. The chi-square test was used for analyses and significance was set at $p \leq 0.05$.
Results: The questionnaire was answered by 61 CGM users (38 answers by children and 23 by parents). Mean age (range, SD) of users was 10.0 (1–17, 4.7) years (where 16 were 1–6 years, 23 were 7–12 years, and 22 were 13–17 years). Of these, 42 had used CGM for over 6 months, 14 for 1–6 months, and 4 for under 1 month (1 no answer). A total of 21 users (34%) reported a skin problem. Skin problems were most common in the youngest age group (63% reported a problem), least common in the oldest age group (14%) and intermediary in the middle age group (35%) ($p = 0.007$). Skin problems were more common in children with over 6 months of exposure compared to the others (43% vs 17%, $p = 0.05$). Presence of atopic diseases was not associated with more frequent skin problems ($p = 0.6$).
Conclusions: Skin problems are common in very young CGM users. Prolonged CGM use is associated with increased frequency of CGM-related skin problems. Diabetes teams need to develop skin protective care strategies from the initiation of CGM to facilitate CGM use, especially in the youngest patients.

P158
Adherence to insulin pump behaviors among young children with type 1 diabetes (T1D): opportunities for intervention

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Objective: Parents of young children bear the burden for daily T1D cares including insulin bolusing. For optimal insulin management with a pump, 3 data points are needed: a blood glucose result (BG), an estimate of carbohydrates to be consumed, and the amount of insulin bolused. Previously, pump adherence behaviors have been described in teens with T1D; we now describe these behaviors in a sample of young children (<7 years).
Methods: Pump data covering between 14 and 30 consecutive days were obtained for 62 children. Measured adherence behaviors were BG ≥4 times/day, entered carbohydrates ≥3 times/day, and bolused insulin ≥3 times/day. We also describe the percent of times parents bolused for glucose levels ≥13.8 mmol/l.
Results: Children's mean age and HbA1c were 5.2 ± 1.4 years and HbA1c 8.2 ± 1.4% (66.1 mmol/mol), respectively. Parents performed ≥4 BG checks/day on 78 ± 29% of days, entered carbohydrate ≥3 times/day on 70 ± 24% of days, and bolused insulin ≥3

times/day on 75 ± 24% of days. Parents corrected for BG values ≥13.8 mmol/l only 35 ± 29% of the time. Notably, only 37% of children had carbohydrates entered ≥3 times/day and only 23% of children had bolused insulin ≥3 times/day for all recorded days. Only 1 child corrected for BG values ≥13.8 mmol/l 100% of the time. Percent of days with ≥4 BG checks/day correlated with children's mean daily glucose ($r = -0.32$, $p < 0.01$), but the other pump behaviors did not correlate with children's daily glucose.

Conclusions: Like teens, parents of young children with T1D show substantial variation in their adherence to pump behaviors. Adherence to BG checks ≥4 times/day correlated with children's mean daily glucose, but it was surprising that adherence to bolused insulin ≥3 times/day and correcting for BG values ≥13.8 mmol/l did not. We examined total insulin boluses here, but in young children, adherence to mealtime insulin should be evaluated; it may be more directly related to mean daily glucose and thus a better adherence measure.

P159
Insulin pump-associated adverse events in New Zealand children and adults

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Background: Insulin pumps (CSII) as part of an intensive insulin regimen are commonly used in the treatment of type 1 diabetes (T1DM). There have been many outcome-focussed studies on CSII and its advantages, as well as several considering adverse events (AEs). However, none which compare pump manufacturers, set/site type, ethnicity, or socioeconomic status on experience of AEs, as well as incidence outside of the Australian context.

Objectives: To estimate the incidence and describe the characteristics of insulin pump-associated AEs in NZ adults and children with T1DM.

Methods: We approached adults, and families of children on CSII for T1DM in three major NZ centres, as part of an on-going study exploring the introduction of an educational tool. Participants completed a questionnaire examining pump-related issues over the preceding 12 months.

Results: Response rate was 54.3% (126/232). 85% of subjects reported one or more CSII-associated AEs in the previous 12 months, and 9.8% reported an event serious enough to require a hospital presentation, all of whom reported high ketones or DKA. Set/site problems were the AE most commonly reported (58%), followed by cutaneous complications (44%), and pump malfunction (34%). 15% of respondents experienced a pump malfunction that resulted in pump replacement, taking on average 2.0 days to replace. Predictors of events were also examined. There was no association with age and events experienced across all categories. Pumping duration was associated with malfunction ($p = 0.004$), and severe hypos with diabetes and pumping duration, $p < 0.001$ and $p = 0.029$ respectively.

Conclusions: AEs appear common and should be anticipated by patients and health professionals alike. While insulin pumps are able to alert patients to some problems, frequent self-monitoring is important in order to prevent complications associated with pump AEs. Anticipatory education and training is vital to the successful and safe use of CSII.

P160
Assessment of metabolic outcomes following cessation of continuous subcutaneous insulin infusion (CSII)

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Objectives: Cessation of CSII occurs for a variety of reasons. We aimed to explore the reasons for CSII cessation & to document its effect on glycaemic control at our centre.

Methods: All youth who commenced and subsequently ceased CSII at RCH prior to December 2014 were identified by a review of departmental records and clinical notes; demographic information was recorded. Clinical notes were reviewed to identify the primary reason for cessation of CSII & classified as a patient choice (PC) or clinician- recommendation (CR). Glycaemic control measured by HbA1c at CSII commencement, cessation, +4 to 6 months, +12 months and +24 months post cessation were documented.

Results: Complete data (minimum one post cessation HbA1c) were available for $n = 53$ (male = 21) youth. PC accounted for $n = 20$ (38%). Reasons included reluctance to wear a pump, loss of confidence in pump & persistently high HbA1c. CR accounted for 33 (62%) on the grounds of increasing HbA1c, multiple DKA, failure to bolus & "unsafe" behaviour. Mean age at CSII start & cessation 12.3 and 15.0 years respectively with no difference between groups. Differences in glycaemic patterns were evident between the two groups. Mean HbA1c both pre-pump & at cessation were lower in PC than CR group: 8.0% versus 8.7% ($p < .02$) and 8.4% versus 10.1% ($p < 0.001$) respectively. In PC group, mean Hba1c was similar at pump commencement, cessation and all further timepoints (p = NS). In contrast, mean Hba1c rose significantly in CR group while on CSII (8.7–10.1%, $p < 0.0001$), and remained elevated thereafter (9.9%, 9.5% and 9.6%; p = NS), despite a return to injections.

Conclusion: CSII is an intensive modality and is not universally suitable. In our cohort, cessation of CSII by PC had no impact on HbA1c. In contrast cessation by CR stabilised an increasing HbA1c, but without improvement on injected therapy. These data may inform future discussions with youth where cessation of CSII is being considered.

Poster Tour 16: Growth and Puberty

P161

Growth hormone therapy in Kuwait: first report on characteristics and response in treated children

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Background: Recombinant Growth hormone (rGH) treatment is approved in many countries for treatment of short stature in a number of childhood diagnoses. rGH was first introduced in Kuwait in the 1990s. Since its introduction, there has been no reported data on the clinical profile of treated children. There is a huge gap in knowledge of use and response to Paediatric rGH therapy in Kuwait and the region.

Objective and hypotheses: The objective of this study is to report the clinical profile and response of children treated with rGH by the Endocrine Division at an academic centre in Kuwait.

Method: This study is a retrospective chart review of children treated regularly with rGH by the Pediatric Endocrine Clinic at Mubarak Al-Kabeer Hospital in Kuwait between December 2013 and December 2014.

Results: A total of 64 children were treated with rGH in the centre. Mean age at rGH initiation was 8.3 years (±3.0). There was no significant gender difference between treated children, males were 33 (47.6%) and females were 33 (52.4%). The most common indications for therapy were in order; Growth Hormone Deficiency GHD (49.1%), Small for Gestational Age SGA (16.9%) and Turner syndrome and variants TS (11/9%). Pre-GH height SDS were −2.8 (±0.52), −2.5 (±0.53), and −2.8 (±0.70) for GHD, SGA, and TS respectively. Mean height SDS difference at first year of therapy were +0.55 SDS, +0.62 SDS, and +0.54 SDS respectively for GHD, SGA, and TS. One-year significant response to therapy (≥0.5 SDS difference in height) was associated with younger age of rGH initiation ($p = 0.03$).

Conclusion: The clinical profile of use of rGH in children in Kuwait was similar to other reported studies internationally. Similar to reported literature, younger age of initiation of therapy predicts significant response at 1 year follow-up. Such report will be enriched with investigating data at 2 years follow-up from multiple centres in the country.

P162

Primary gonadal insufficiency in male and female childhood cancer survivors in a long term follow up clinic

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Objective: Childhood cancer survivors (CCS) are at increased risk of primary gonadal insufficiency (PGI). This study evaluated the prevalence and risk factors for PGI in a CCS cohort.

Methods: We collected data prospectively from 276 CCS attending an Australian paediatric oncology long term follow up clinic (January 12–August 14), >5 years disease free. Participants were 20% of the CCS cohort ($n = 54$; males 32) who met criteria for PGI.

Results: Pubertal staging and hormone deficiency symptoms were documented for 97% males and 96% females. At primary diagnosis 87% participants were Tanner stage I and at follow-up 89% were Tanner stage V. More females (96%) than males (41%) were treated with hormone development therapy (HDT) and 7 males required pubertal induction. There was no significant difference between HDT-treated and not-treated, in serum LH, FSH, testosterone (T) or oestradiol (E2). Eight males (25%; 5 on HDT) had low T and 9 females (41%; 7 on HDT) had low E2. Five males on HDT (42%) reported improved androgen deficiency symptoms. AMH was low in 3 of 4 females. Six males had semen analysis, 5 were azoospermic and 1 had reduced sperm density. Psychological assessment was documented in 61% participants, of whom 21 (males 12) reported fertility concerns.

Table 1 Results: participant demographics

Median age: years (IQR)	
At primary diagnosis	4.8 (3.0–9.7)
At extracted LTFU visit	22.3 (18.2–25.7)
Primary diagnosis: % cohort (*n*)	
Leukaemia	35.2 (19)
Sarcoma	25.9 (14)
Brain tumour	13.0 (7)
Other	25.9 (14)
Gonadotoxic agent: % cohort (*n*)	
Alkylating chemotherapy	96.3 (52)
Radiotherapy	70.3 (38)
Total body irradiation	29.6 (16)
Combined agents	68.5 (37)
Bone marrow transplantation	51.9 (28)
Hormones measured: % cohort (*n*)	
LH/FSH	94.4 (51)
Testosterone (M)	96.9 (31)
Oestradiol (F)	95.5 (21)
Inhibin B (M)	0 (0)
AMH (F)	18.2 (4)

Conclusions: PGI is an evolving phenotype, common in CCS exposed to gonadotoxic therapy. Ongoing assessment is required to ensure prompt diagnosis and management of PGI and subclinical deficiency and to promote HDT adherence. Future directions include routine measurement of AMH (ovarian reserve marker) and inhibin B (spermatogenesis marker).

P163

Treatment response comparison for children born small or appropriate for gestational age (SGA or AGA) within the Australian indications for growth hormone (GH) therapy: an OZGROW analysis

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Objectives: SGA is not an indication for GH treatment in Australia although SGA patients are seen within each Australian indication. We are interested in if SGA patients respond differently to AGA patients within GH Deficiency (GHD), Short Stature and Slow Growth (SSSG), Turner Syndrome (TS), and Prader-Willi Syndrome (PWS).

Methods: 6277 patients treated between 1977 and 2014 were identified in the OZGROW database. SGA was defined as birthweight below the 10th Australian centile for gestation period. % SGA was calculated for each of GHD, SSSG, TS, and PWS, and each gender (F, M). %'s were compared to an expectation of 10%. Response to treatment was measured as a change in height standard deviation score (dSDS) after 1, and 3 years of treatment. Mean responses were compared (SGA vs AGA) within each indication/gender.

Results: SGA was overrepresented: GHD-22% (F20%, M23%), PWS-55% (F54%, M57%), SSSG-41% (F46%, M38%), TS-48% (each $p < 10^{-6}$). Sample sizes ranged: PWS 3rd year (F-AGA, SGA = 24.29; M-AGA, SGA = 21.31) to SSSG 1st year (F = 423,226; M = 740,461). Only significant result, 3rd year TS.

Conclusions: SGA individuals are overrepresented in Australian GH indications. SGA thus meet criteria for treatment under existing guidelines. SGA patients were not seen to respond significantly differently from AGA patients within their specific indication/gender cohort over the first 3 years of treatment. The exception (TS 3 years) indicated a plateauing of response. The current indications adequately accommodate SGA. TS SGA may need further scrutiny.

Mean dSDS

Years		1			3		
Indic.	Gend.	AGA	SGA	P	AGA	SGA	P
GHD	F	0.68	0.56	0.28	1.5	1.5	0.83
	M	0.53	0.59	0.38	1.4	1.3	0.37
PWS	F	0.42	0.32	0.36	0.86	1.0	0.47
	M	0.37	0.55	0.14	0.93	0.92	0.97
SSSG	F	0.33	0.34	0.82	0.95	0.93	0.74
	M	0.30	0.33	0.08	0.85	0.91	0.17
TS	F	0.28	0.27	0.74	0.73	0.58	0.04

P164
'Smelling SOX and sound for sex': SOX10 Mutations in Kallman syndrome with deafness

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Objectives: We describe a case and review literature for SOX10 mutations in Kallman syndrome (KS) with deafness.

Methods: A 14 year old boy with sensorineural deafness, hypopigmented irides, presented with delayed puberty, micropenis and very small (< 0.5 mL) testes. Baseline LH/FSH were undetectable with modest virilisation but limited testicular growth in response to prolonged HCG and FSH treatment. Anosmia was confirmed by interview, blinded olfactory testing and imaging, and confirmation of SOX mutation is underway.

Results: We summarise clinical characteristics of published KS with deafness cases (1–4). SOX10 mutations in Waardenburg syndrome (WS), cause sensorineural deafness and pigmentation abnormalities (5). The chance finding of olfactory bulb agenesis on imaging (6) in 88% of WS patients led to the finding of five pathogenic SOX10 mutations in 13 (~40%) KS with Deafness cases, versus only two SOX10 mutations in 86 (0.02%) control KS cases (1).

Nueral-Crest derived olfactory ensheathing cells (OECs) express SOX10 in mice and human embryos (7). OECs in homozygous Sox10 mutant mice were almost absent with abnormal routing of embryonic olfactory axons, resulting in impaired GnRH neuron migration to the hypothalamus (1,8). SOX10 is crucial in cochlear glia (9) and expressed in sertoli cells (10–12).

Conclusions: As complexity and cost of genetic testing for KS/HH grows (13,14) we propose that SOX10 should be the first gene tested in patients with KS and deafness.

Image-References.

P165
Growth hormone (GH) provocation testing in the assessment of children with disorders of growth- a 16 year experience from one tertiary centre

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Introduction: The diagnosis of growth hormone deficiency (GHD) in children and adolescents with short stature and poor growth involves obtaining a relevant clinical history, examination and if indicated pituitary imaging. Confirmation of biochemical GHD is a complex process involving GH provocation testing.

Aim: To describe the clinical and biochemical characteristics of patients undergoing GH testing in the last 16 years at one tertiary paediatric endocrine unit.

Methods: A retrospective chart review of all the subjects who had undergone GH testing between 1998 to 2013 was performed. Five hundred and ninety-one subjects undertook GH testing; 97 subjects were excluded as their clinical data was unavailable, Data collected included age, height, weight, body mass index, clinical diagnosis as per ESPE diagnostic code, bone age, growth hormone provocation test results (combined arginine-glucagon test), thyroid function, FBC, ESR, coeliac serology, Karyotype, ELFT.

Results: The mean ± SD age of subjects was 9.6 ± 4.2 year (age 0.23–19.35); 34.7% were females and 65.3% were males. Within the total group 75.8% of subjects were prepubertal with no statistical significant difference in pubertal status between the GHD and non-GHD groups. 428 subjects (86.6%) had a peak GH response >10 mU/l on GH testing so were classified as non-GHD, The majority of these subjects (48.7%) had idiopathic short stature. 13.4% of them had GHD defined as peak GH level <10 mU/l during both tests. GHD subjects had significantly higher weight and BMI SDS than the ISS non-GHD group ($p < 0.0001$ by ANOVA between the groups).

Summary and conclusion: Only 14% of children were diagnosed with GHD, while 86% of subjects were GH sufficient. Overall these results suggest that the clinical criteria that prompts GH testing has low specificity and sensitivity for diagnosing GHD, so an improved clinical algorithm for ordering GH testing to diagnose GHD in a child with short stature or growth failure appears warranted.

P166

Assessing the endocrine profile in children with cerebral palsy to PREDICT their future health needs

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Cerebral Palsy (CP) is the leading cause of physical disability in childhood, impacting on more than 1 in 500 Australian children. Despite of its prevalence CP remains under-researched in comparison to other disabling conditions in childhood. There is an urgent need to develop effective translatable strategies to improve physical and neurodevelopmental outcomes for children with CP.

This project has been developed in complement with the *PREDICT Outcomes to inform services for children with Cerebral Palsy (2014–2019)*, an NHMRC Partnership Project led by Prof. Ros Boyd and Peter Davies. The PREDICT study combines comprehensive information about motor, cognitive, and nutrition outcomes of children with CP. This proposed complementary project will perform additional hormonal tests and evaluations on the data of $n = 245$ to be collected at the next data point of 8–9 years of age.

The majority of children with CP are known to have poor growth and altered body composition. Many children with CP are shorter and lighter with a delayed bone age in comparison to typically developing children, despite adequate nutrition. Low muscle tone and bone mass, altered metabolism, and short stature point to the existence of hormonal deficiency.

From the children currently enrolled in the PREDICT CP cohort (ages 8–9, $N = 245$ total), we aim to:

1. Measure clinical markers of overall health, key hormones, and bone health markers in the blood of all participants
2. Measure clinical markers of metabolism and lipids in the blood a subset of the PREDICT cohort
3. Identify novel biomarkers for predicting deficits or enhancing outcomes a subset of children with characteristics of hormonal imbalance

These data will provide health care professionals and parents with predictors of hormonal imbalance prior to the long-term complications of skeletal weakness and cognitive/ behavioral impairment worsening in later childhood.

P167

Growth hormone deficiency is rare in short children with attention-deficit hyperactivity disorder taking psychostimulants - a re-evaluation of GH testing in this diagnostic group

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Introduction: Attention deficit hyperactivity disorder (ADHD) is one of the most common psychiatric/behavioural disorders in childhood. Children with ADHD on psychostimulants may exhibit poor growth necessitating a paediatric endocrine referral to exclude growth hormone deficiency and other causes of poor growth.

Aim: To determine if there are any distinct clinical or biochemical parameters in children with ADHD on psychostimulants compared with children with Idiopathic short stature (ISS) who were referred for GH provocation testing.

Methods: As part of a retrospective chart review of all children who underwent GH provocative testing (combined arginine-glucagon) between 1998 and 2013, we identified 51 subjects with ADHD who were taking pyschostimulants. Data collected included age, sex, height, weight, body mass index (BMI), pubertal staging, ESPE diagnosis code, GH provocation test results, thyroid function tests, serum IGF-1 and IGF-BP3 levels.

Results: The total group with non-GHD short stature included 428 subjects: 283 males (66%) and 146 females (34%). In the ADHD group ($n = 51$), 45 were males (88.2%) and 6 were females (11.8%). There was statistically significant difference in the gender among the groups (Chi square degrees of freedom one = 13.31; p = 0.00). There was no significant difference in stage of puberty between the two groups with 68.6% prepubertal in the ADHD group compared to 75.6% in non-ADHD group (χ^2 df (3) = 2.808; p = 0.422). All the subjects in the ADHD group had a normal serum IGFBP3 level while 20 out of 51 patients in ADHD group had a low serum IGF-1.

Summary and conclusion: There was a significant difference in age and gender between subjects within the ADHD and the non- ADHD groups.

GHD in children with poor growth associated with ADHD and psychostimulant medication is rare. This suggests GH testing in short children with ADHD is generally unnecessary and perhaps serum IGFBP3 rather than IGF-1 may be used as a surrogate marker of GH sufficiency.

P168

Does skeletal disproportion in children with idiopathic short stature influence response to Growth Hormone (GH) therapy?

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Background: Children with ISS have an array of causes that lead to short stature and/or poor growth velocity. Genetic causes of short stature, notably SHOX mutations, can be associated with subtle skeletal disproportion with shorter limbs.

Hypothesis: Children with ISS and skeletal disproportion have a diminished growth response to GH treatment compared to children with proportionate short stature after 1 year (short-term) and at near-adult height (NAH; long-term).

Methods: ISS patients registered in Pfizer International Growth Database with a stimulated peak GH >10 μg/l and treated with GH were included. Short- and long-term growth responses were analyzed. Sitting height % SDS was grouped as: normal (SDS −1.0 to <1.1), mild (SDS 1.1 to <2.1), and moderate (SDS >2.1) disproportionate short stature. Wilcoxon rank sum test was used for univariate statistical comparisons. ANOVA was used for group comparisons. $p < 0.05$ was considered significant.

Results: Prior to GH treatment, the ISS group displayed Gaussian distribution for skeletal proportion. For short-term analyses, the number of patients in each group was: normal ($n = 193$), mild ($n = 191$), and moderate ($n = 140$) skeletal disproportion. The corresponding number of patients in each group attaining NAH

was: normal (57), mild (52), and moderate (28). Short-term growth responses, expressed as Studentized Residuals using the KIGS ISS 1st-year prediction model (1), showed a trend toward poorer growth response with greater severity of disproportion (mean values; normal = −0.04, mild = −0.16, and moderate = −0.25, p = 0.07). Long-term growth showed a larger difference, expressed as delta height SDS from GH start to NAH (median values; normal/mild = 1.75 versus moderate = 1.39, p < 0.05)

Conclusions: Children with ISS and skeletal disproportion (shorter limbs) have reduced long-term height responsiveness to GH compared to those without disproportion suggesting subtle GH resistance in the former.

P169
Influence of pubertal development and body composition on bone mass accrual in apparently healthy school children aged 6–17 years

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Objectives: To evaluate progression of BMD during pubertal development and Influence of body composition and vitamin D on BMD and BMC in children.

Material and method: This cross sectional study was part of an ongoing health survey of school children which recruited 1905 apparently healthy school children (835 boys; 1070 girls) in the age group of 6–17 years. After brief history, anthropometry and pubertal assessment, blood samples were collected for measurement of serum 25-hydroxy vitamin D (S.25Vit D) and intact parathyroid hormone (iPTH). Whole body DXA scans were performed using GE Lunar Prodigy scanner. Areal BMD was computed. Fat Mass Index (FMI) was calculated by total fat mass in kg/square of height in meters.

Results: The mean age of subjects was 13.27 ± 2.48 years and mean FMI was 5.59 ± 3.1 kg/m^2 (boys: 4.65 ± 3.1; girls: 6.5 ± 2.81). Vitamin D deficiency (S.25Vit D <20 ng/ml) was present in 96.8% subjects. BMD and BMC increased progressively with progression of puberty in both boys and girls but maximum gain was observed from pubertal stage 2 to 4. In pre-pubertal children, boys had significantly higher Total BMC and BMD/BMC at spine than girls but Femur Neck (FNBMD/BMC) was not different. Boys showed higher percentage rise in BMD from stage 1 to 5 in comparison to girls. FMI showed significant positive correlation with TBMC; r = 0.40, p = <0.001, lumber spine BMD (LSBMD); r = 0.11, p = <0.001 and with FNBMD; r = 0.13, p = <0.001; but did not show any significant correlation with S.25Vit D or iPTH. Similarly, total lean mass also showed significant positive correlation with TBMC, LSBMD and FNBMD in all subjects as well in all pubertal groups. S.25Vit D was also positively correlated with TBMC (r = 0.13, p = <0.001), LSBMD (r = 0.15, p = <0.001) and FNBMD (r = 0.06, p = 0.006).

Conclusion: BMD progressively increases during pubertal development with maximum gain occurring between pubertal stages 2 and 4. FMI is positively correlated with BMD/BMC all three sites.

P170
Changes in stature following treatment for childhood acute lymphoblastic leukaemia

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Objective: A retrospective review of children diagnosed with acute lymphoblastic leukaemia (ALL) to determine longitudinal changes in statural growth.

Methods: Between 2003 and 2007, 66 children were diagnosed with pre-B and T-cell ALL and received chemotherapy only at Princess Margaret Hospital for Children (PMH). All patients were treated on Children's Cancer Group or COG protocols. Auxological data was extracted from medical records. Height measurements were converted to age- and sex-adjusted z-scores and analyzed using linear mixed effects modelling, including fixed effects for time since start of treatment and time-dependent interactions with sex, NCI risk, steroid dose, age at diagnosis and height z-score at the start of treatment.

Results: Median age at diagnosis was 4.63 years. 92.4% were diagnosed with pre-B ALL and 77.3% were standard risk. Median duration of treatment for males was 3.18 years and 2.18 years for females. A sharp decline in height z-scores in the early phase of treatment followed by a gradual increase during the maintenance phase was observed. Seven years post diagnosis the unadjusted mean height z-scores remain below the value at diagnosis.

Age at diagnosis, NCI risk and height z score at diagnosis were associated with height z-score trajectories. Increasing age at diagnosis was associated with greater height z-scores (0.045 SD increase per year, p = 0.002). A high NCI risk was associated with an average decrease of 0.37 SD in height z-score compared to standard NCI risk (p = 0.005). A time dependent association between height z-score and height at diagnosis (p = 0.0018) was detected. No associations were detected between height z-scores and sex or total maintenance steroid dose.

Conclusions: ALL patients who have not received radiotherapy have minimal growth impairment at the end of treatment using modern COG protocols. The longer-term impact on growth warrants further study.

P171

Dizygotic twins with skeletal dysplasia and resistance to hormones signalling through G protein-coupled receptors and the Gsa/cAMP/PKA pathway - severe craniosynostosis and hypertrophic cardiomyopathy

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Dizygotic twins had decreased length, rhizomelia and frontal bossing at birth, with elevated TSH levels before commencing thyroxine. Maternal features included round face, short stature, brachydactyly, normal intellect, thyroxine treatment in adulthood, polycystic ovarian syndrome and assisted conception.

Twin 1 (male), now 4 years old with developmental delays, developed extensive calcinosis cutis, obesity and growth failure. PTH levels increased until treated with calcium and 1,25-dihydroxyvitamin D3. He is GH deficient, responsive to GH started at age 3 years (likely GHRH resistance). His head shape progressively altered, with CT showing diffuse skull thickening and premature fusion of the coronal, sagittal and lambdoidal sutures with minimal CSF spaces.

Twin 2 (female) died at 6 weeks of age due to rapidly progressive hypertrophic cardiomyopathy of unclear aetiology. She was never hypocalcaemic, with no intracardiac calcification at autopsy.

Overlap exists in the phenotype of pseudohypoparathyroidism type 1A (PHP1a) (due to maternal heterozygous loss-of-function mutations of Gsα) and acrodysostosis due to gene mutations downstream of Gsα. Acrodysostosis type 1 is due to mutations in P*RKAR1A,* encoding the cAMP-dependent protein kinase type 1 regulatory subunit protein. Acrodystostosis type 2 is due to mutations affecting *PDE4D* encoding phosphodiesterase (PDE) 4D, a class IV cAMP-specific PDE. Hormonal resistance, long described in PHP1a has been observed more in acrodysostosis type 1 than 2.

The apparent inheritance pattern, phenotypic and radiographic features suggest PHP1a in the twins. Genetic testing is indicated to confirm and hence guide surveillance, as patients with these conditions present specific features, illustrating the unique contribution of Gsα, PRKARIA and PDE4D to the signalling pathway. Craniosynostosis has been described in one case of PHP1a. To our knowledge, hypertrophic cardiomyopathy has not been described in these disorders.

Poster Tour 17: Monogenic and Other Forms of Diabetes

P172
GCK gene mutation in boy with diabetes, hyperinsulinemism and insulin resistance

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We present the clinical case of diabetic patient with GCK mutations in combination with insulin resistance (IR) and hyperinsulinemism.

Boy, 12 years old, admitted to Endocrinology Unit with the diagnosis of DM. Fasting hyperglycemia 7.7 mmol/l without clinical signs was accidentally revealed at 8 years old. OGTT was performed: 6.6–11.2–11.8–15.3–9.6 mmol/l. Patient had no glycosuria, HbA1c – 6.4%. T1D was diagnosed, rapid-acting insulin and NPH was started in total dose 5 U/day. Insulin was administered irregularly, skip the injections did not give the significant changes of glycemia. Diet was is not strict. Dynamics of HbA1c: 6.6–7.79%. On admission: BMI 17.3 kg/m^2, SDS BMI −0.21, acanthosis nigricans are absent. OGTT revealed impaired glucose tolerance, significant hyperinsulinism (insulin to 442.1 U/l) and IR (index Caro 0.02, HOMA 92.82, Matsuda 0.2). Antibodies to GAD, ICA, IAA, IA2 are negative. OGTT in father of boy was performed: fasting hyperglycemia (7.5 mmol/l), normal glucose tolerance. Mother, second-degree relatives had no metabolic disorders. Taking into consideration the mild diabetes for over 4 years and hyperglycemia in his father, despite the significant IR, CGK gene sequence was performed. The heterozygous mutation p.E256K was revealed (MIM #: 138079, reference sequence NM_000162.3). Insulin was canceled, metformin was started at a dose of 1,700 mg/day. During hospitalization in 1 year HbA1c was 6.9%, the results of OGTT revealed DM (glycemia in 2 h −15.4 mmol/l), increased hyperinsulinemism (up to 508.9 U/l) and IR (HOMA −114.26, Matsuda −0.15). Hyperinsulinemic euglycemic clamp was performed: patient had M- value 2.85 mg/kg/min, which indicates in significant IR.

Nosological interpretation of the case remains open and quite intriguing. It could not exclude the MODY 2 in combination with type 2 diabetes. Accumulating of diabetes clinical cases with this mutation will clarify its role in the development of different types of DM.

P173
Permanent neonatal diabetes (Kir6.2 mutation): two case reports - a successful switch from insulin to glibenclamide

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Introduction: Neonatal diabetes mellitus is defined as diabetes diagnosed within the first 6 months of life. It is rare with a reported incidence of 1:100,000–260,000. In permanent neonatal diabetes mellitus, activating mutations in KCNJ11 encoding the Kir6.2 subunit of the ATP-sensitive potassium (K_{ATP}) channel is the most common cause.

Objective & methods: To report two patients with Kir6.2 mutation who were successfully switched from insulin to glibenclamide at our centre. Genetic study was done at Exeter, UK. The protocol for transfer from insulin to sulphonylurea (SU) by Professor A.Hattersley was used as a reference.

Results: Our patients are both girls with normal growth and development. Patient A was a term SGA baby, birth weight of 2.3 kg. She is currently 10 years old and presented at 2 h of life with poor feeding, hyperglycemia but no ketoacidosis. Patient B was delivered term, birth weight of 2.6 kg. She is 6 years old and presented at age 3 months with severe DKA. They were successfully switched from insulin to glibenclamide at age 4 and 3 years respectively. Prior to that, both were on insulatard twice daily and aspart with a total daily insulin dose of 1 unit/kg/day. After 2 months on glibenclamide, there was a significant and sustained reduction of HbA1c level in both patients. Patient B had transient mild nocturnal hypoglycemia. No other adverse effects were reported.

Conclusion: We report a safe and successful transition from insulin to sulfonylurea in two patients with Kir6.2 mutation. It highlights the importance of genetic testing in early-infancy diabetes that can lead to a tremendous change in treatment.

SU dose and HbA1c results

	Patient A	Patient B
Highest SU dose during transition (mg/kg/day)	1.6	1.4
Current dose of SU	1.5	0.7
HbA1c		
Baseline	8.0%	10.4%
Two months after SU	5.7%	8.0%
Latest (April 2015)	5.9%	6.1%

P174
Early success of sulfonylurea therapy in a patient with diabetes mellitus due to GATA4 deletion

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Objectives: A recent report (1) confirmed that mutations or deletions in the zinc finger transcription factor GATA4 causes a spectrum of childhood onset diabetes. All cases reported to date have been treated with insulin. We aimed to assess whether sulfonylurea therapy would be successful as an alternative to insulin in achieving glycemic control, and thus present the case of one of the previously reported patients with a GATA4 deletion.

Methods: A 13 year old female presented with 6 months of polyuria, polydipsia. HbA1c was 12.6%. Islet autoantibodies were negative, ketones negative and C-peptide was 2.6 ng/ml. Due to a history of developmental delay and congenital heart disease, she was known to have a 12 Mb terminal deletion of chromosome 8p22, which contains the GATA4 gene. Imaging showed hypoplasia of the pancreatic body and tail. She required low doses of insulin with total daily insulin requirements of 0.2–0.4 units/kg/day. 3 years later, on insulin, stimulated c-peptide level was 3.8 ng/ml. HbA1c was 5.6–6.9%. After 4.5 years of insulin treatment, a decision was made to trial glyburide and attempt a wean off insulin.

Results: At baseline, HbA1c was 6.9%. Glyburide was commenced at 2.5 mg twice daily and titrated up 5 mg twice daily (0.2 mg/kg/day), with glargine weaned from 12 units daily. After 7 weeks, she was off all insulin and has been maintained on sulfonylurea only.

HbA1c on glyburide has ranged between 6.5 and 6.7%, essentially unchanged from levels on insulin. After 1 year of glyburide, C-peptide is 4.5 ng/ml, while average BGL over 30 days is 116 mg/dl. Occasional postprandial hyperglycemia >200 mg/dl is evident, but no severe hypoglycemia.

Conclusions: Sulfonylurea treatment may be an effective treatment for patients with diabetes due to GATA4 deletions. Longer term follow-up is required to show efficacy persists over time.

Reference:

1. GATA4 mutations are a cause of neonatal and childhood-onset diabetes. Diabetes. 2014; 63(8): 2888–94.

P175

KCNJ11 neonatal diabetes a diagnosis worth making 18 years after diabetes diagnosis

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Objectives: Young man 18 years old, has diabetes mellitus characterized as type 1 since the age of 2 months. He was on multiple injection insulin regimen with very good glycemic control initially (HbA1C 5.6–7.6%) but with deterioration of glycemic control the last 3 years (HbA1C 8–10.6%). He was negative for autoantibodies (GAD <0.1 U/ml, IA2 0.4 U/ml), No other indicators of autoimmunity. C-peptide 0.3 ng/ml. Genetic investigation was performed with sequence analysis. Analysis identified a heterozygous *KCNJ11* missense mutation, p.R201C, result confirming a diagnosis of permanent neonatal diabetes due to a heterozygous mutation in the Kir6.2 subunit of the pancreatic ATP-sensitive potassium channel. Testing for parents showed that mutation has arisen *de novo*. The patient was hospitalized for transfer to high dose sulphonylurea therapy according to previously described 6-day protocol. Initial dose of glivenclimide was increased gradually from 0.1 to 1.55 mg/kg/day in 28 days. The last is the current dose of treatment. Insulin was gradually discontinued within 10 days of initiation of sulphonylurea treatment. HbA1C decreased from 9.3 to 6.4% and C-peptide increased to 1.83 ng/ml within 3 months. There were no significant side effects from the high dose of sulfphonylurea except from mild transient diarrhea.

Conclusions: While present guidelines are to genetically test as soon as a diagnosis of diabetes is made in the first 6 months of life there are patients in paediatric clinics diagnosed with diabetes before the potassium channel research was published. Therefore is still worth making this diagnosis 18 years later as transfers but does require higher doses.

P176

Neonatal diabetes by mutation of ABCC8 gene and successful switch from insulin to glibenclamide for two sisters aged 5 and 36 months

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Serine is hospitalized for diabetesat the age of 3 months. Parents are not consanguineous. Clinical examination is normal. Neonatal diabetes is mentioned but the investigation cannot be pushed further. Treated as type 1 diabetes by regular insulin and NPH bellow 1 U/kg/day, her HbA1c ranges from 6 to 8%. Ines is hospitalized at the age of 29 days for diabetes discovered by chance at 15 days of life. She is eutrophic, without dysmorphia orneurological abnormality regarding her age. Placed under insulin pump therapy, glycemic control is difficult to obtain and HbA1c is 12%.

The genetic study is performed at the Molecular Genetics Formation Unit of the Robert Debré Hospital. It shows, for both of the two sisters and their father, the mutation of ABCC8coding gene of the SUR1 subunit of the β cell.

Glibenclamide treatment was introduced progressively, then withgradually reduced doses until cessation of insulin at day-3 for Serine and day-14 for Ines.

The first glibenclamide intakeled to an instant increase of C-peptide. At day-7 of treatment for Serine and day-15 for Ines, glycemic control is achieved with 0.15 mg/kg/day and 0.4 mg/kg/day of glibenclamide respectively. This balance is maintained over months with a reduction to 0.3 mg/kg/day for Ines.

These cases clearly illustrate the benefit of a genetic investigation for any diabetes occurring before the age of 6 months for diagnostic as well as therapeutic and prognostic purposes.

P177

Clinical characteristics of 13 children with MODY

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Objectives: We investigated the clinical characteristics in 13 MODY patients diagnosed under 15 years of age in our hospital.

Methods: Subjects included one child with MODY1, 9 with MODY2 and 3 with MODY3. They were identified as MODY by genetic analyses due to a strong family history of diabetes and no evidence of diabetes related autoantibodies and mitochondrial 3,243 mutation. We retrospectively investigated their clinical course and treatment.

Result: All the patients were non-obese. Mean age at diagnosis was younger in MODY2 patients than those in MODY1 and MODY3 patients (8 vs 11 and 11.3 years old). All MODY1 and MODY3 patients were diagnosed by the urine glucose-screening at school, whereas 4 out of 9 MODY2 patients were diagnosed by chance examination at a younger age. 11 out of 13 patients had similar genetic background in the family member.

The Mean HbA1c (NGSP) at diagnosis was 10.5% in MODY1, 6.5% in MODY2, 8.5% in MODY3. MODY2 had the features of high fasting plasma glucose in spite of low HbA1c in MODY. The majority of MODY2 patients had mild glycemic disorders at diagnosis, and continued adequate glucose level without any

medications, whereas some gradually required oral hypoglycemic drugs to achieve optimal glycemic control.

On the other hand most MODY1 and 3 patients showed moderate to severe glycemic disorders at diagnosis and progressed to pharmacological therapies mostly using insulin.

Conclusion: There was substantial heterogeneity in a clinical course and treatment in MODY patients.

P178
Patients with Wolfram syndrome show a uniquely altered profile of serum microRNAs

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Wolfram syndrome (WFS) is a severe neurodegenarative disorder linked to endoplasmic reticulum stress. Progressive apoptosis of pancreatic beta cells noted in WFS leads to diabetes. We investigated alterations of serum profiles of microRNA in patients with WFS with the hope of using those in the future as biomarkers of the disease or its progression.

The study group for the profiling experiment consisted of 10 patients with WFS (average age 18.98 $\pm$ 3.92 years), 10 patients with type 1 diabetes (18.20 $\pm$ 10.20 years) and 10 non-diabetic individuals (27.26 $\pm$ 4.49). Quantitative PCR arrays (Exiqon, Copenhagen, Denmark) were used to profile 742 miRNAs present in the human serum. Average expression of miRNAs present across all samples was used for normalisation.

We noted 29 miRNAs to differ significantly between the three groups (Bonferroni-adjusted ANOVA $p < 0.05$). Among those miRNAs 9 were significantly upregulated in patients with WFS with miR-106b showing the greatest difference against controls (fold change 49.6) and miR-30e showing the greatest upregulation against T1DM (fold change 17.2). Among the 20 down-regulated miRNAs the most significantly decreased expression was noted for miR-134 (fold change 0.03 against controls and 0.06 against T1DM). Discriminant analysis showed perfect separation (with one false positive T1DM case misclassified as WFS) of the three groups to be possible with the use of just three miRNAs: miR-19a, let-7g and miR-331. Moreover, serum expression of miR-10b correlated with age ($R = 0.91$; $p = 0.004$) whereas miR-2100 with duration of diabetes ($R = -0.84$; $p = 0.017$) in patients with WFS hinting at their potential utility in monitoring disease progression.

Although the presented group is small in number we were able to show that serum miRNA profiles of patients with WFS are severely altered. Further validation will be needed, but initial results show promise for miRNAs to be used as either diagnostic biomarkers or for disease monitoring in WFS.

P179
Genetic testing for monogenic diabetes with next generation sequencing: the first 6 months

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Introduction: The incidence of monogenic diabetes is estimated to be 2–5% of the diabetic population. To date over 30 genes have been reported to cause monogenic diabetes. In the past, diagnostic strategies have relied on the clinical and biochemical phenotype to determine the target gene(s) and testing sequence. This approach is expensive, time consuming, and often unsuccessful. Next Generation Sequencing (NGS) offers a fast and cost effective alternative for screening for monogenic diabetes. NGS enables the simultaneous analysis of multiple genes in a single test at a fraction of the cost of traditional Sanger sequencing methods.

Objective: We describe our experience after 6 months of testing for monogenic diabetes by NGS.

Methods: Genetic testing was performed using a custom NGS panel that contained probes for 15 of the most common genes associated with monogenic diabetes Maturity Onset Diabetes of the Young or Permanent Neonatal Diabetes. Previously, the laboratory had employed Sanger sequencing to test for a limited number of genes. Target enrichment was carried out using the custom Illumina Nextera rapid capture probe set, followed by sequencing on an Illumina MiSeq. Data analysis was carried out by CLC Genomics Workbench and genetic variants were annotated using Cartagenia software.

Results: We tested 59 patients referred to the laboratory for monogenic diabetes. We detected mutations in 24 patients in 9 different genes (*ABCC8*, *GCK*, *HNF1A*, *HNF1B*, *HNF4A*, *INS*, *INSR*, *KCNJ11* and *PAX4*). Approximately 46% of these cases would not have been detected with our previous Sanger sequencing approach. In these cases there was either a mutation in a gene that had not been requested for sequencing, or a mutation in a gene that had not been previously tested by Sanger sequencing in our laboratory.

Conclusions: NGS has significantly increased the number of patients given a molecular diagnosis in a cost effective and clinically relevant timeframe.

P180
Incidence, clinical spectrum and genetic characteristics of neonatal diabetes in Abu Dhabi, United Arab Emirates

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Background: Neonatal diabetes (NDM) is a form of monogenic diabetes that can be transient (TNDM) or permanent (PNDM). Data on NDM from the Gulf region are limited. It is expected that neonatal diabetes is more frequent in areas like the Gulf where consanguinity is common.

Objectives: To describe the genetic and clinical spectrum of NDM and estimate its incidence in Emirate of AbuDhabi.

Method: Patients were identified from the paediatric diabetes centers in the Emirate based on the clinical criteria. Genetic testing for known NDM genes was conducted in all families.

Results: 24 patients from 15 families were diagnosed during 1985–2013 giving an incidence of 1 in 31,839 live births. 22/24 had PNDM (incidence 1:33,419) and 2/23 with TNDM (incidence 1:350,903). 11/24 had extra-pancreatic features and two children had pancreatic aplasia. Genetic cause was detected in 20/24 (83%). In PNDM 9 had recessive *EIF2AK3*, 6 had homozygous *INS*, one *KCNJ11*, one novel

ABCC8 variant and 4 had no mutations in 20 known PNDM genes. One TNDM patient had 6q24 methylation defect and another was homozygous for *INS* c-331C>G. This mutation also caused PNDM with variable age of onset from birth to 18 years. A mother of a child died of Wolcott-Rallison syndrome delivered a healthy girl following preimplentation genetic diagnosis and a child with *KCNJ11* mutation was successfully switched from insulin to oral sulphonyluria.

Conclusions: The incidence of PNDM in Abu Dhabi is among the highest in the world and it has a similar spectrum to Saudi Arabia and Turkey rather than Europe and USA.

There is an intra-familial phenotype variability in some. Our cohort includes the first reported case of liver transplant and the first reported pre-implantation genetic diagnosis done in Wolcott Rallison syndrome. Genetic testing has significant implications on the clinical management.

P181
Six Chinese children with MODY2 due to GCK gene mutations

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Backgrounds: Type 2 Maturity Onset Diabetes of the Young (MODY2) is a monogenic autosomal disease characterized by a primary defect in insulin secretion and hyperglycemia. It results from GCK gene mutations that impair enzyme activity. We analyzed the clinical and molecular characteristics of children with MODY2 in an attempt to improve the diagnosis and treatment of MODY2 in China.

Methods: The clinical data of 6 patients with MODY2 were reviewed. GCK gene mutational analysis was performed by PCR and direct sequencing in the probands and their parents.

Results: Six patients were admitted between the age of 3 months to 9 years and 6 months due to mild hyperglycemia. Fasting blood glucose was elevated at 6.2–8.5 mmol/l, hemoglobin A1C 5.2–6.7%. Physical exam was unremarkable without dysmorphic features or acanthosis nigricans. The oral glucose tolerance test (OGTT) showed fasting glucose 6.1–8.17 mmol/l, insulin 2.0–24 mIU/l, 2 h glucose 6.81–9.85 mmol/l, insulin 5.06–61.4 mIU/l. Six different heterozygosis mutations of the GCK gene were identified in the 6 patients. Four mutations (c.554G>A, IVS4 + 2T>A, c.451_453delTCC, IVS6 + 1G>A.) had been reported previously and two mutations (c.34_44 + 15del26, c.169_170delATinsG) were novel.

Conclusions: The clinical features of MODY2 are persistent and stable fasting hyperglycemia over a period of months or years and small blood glucose increment (less than 3 mmol/l) after an OGTT (2 h glucose - fasting glucose). The molecular diagnosis of MODY2 is important: to classify the type of diabetes correctly and predict prognosis.

P182
Misdiagnosed cases of type 1 diabetes

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Objectives: To observe the prevalence of misdiagnosed type 1 patients in the Diacare clinic data.

Study design: Retrospective study Number of subjects: 70. Based on the clinical data c-peptide levels of 70 subjects was observed who had been taking insulin treatment and were diagnosed as type 1 diabetes.

Results: It was observed that 4 out of 70 patients (5%) were having optimal c-peptide levels (1–2 ng/ml).

Conclusion: According to our study, at least 5% of the patients were misdiagnosed with type 1 diabetes and were already receiving inappropriate insulin treatment. These patients have more chances of hypoglycemia as they already have normal insulin production. Furthermore, due to the exogenous insulin supply due to insulin treatment, c-peptide levels may get suppressed which has been seen to be associated with an increased risk of microvascular complications. Thus we can see that it is important to differentiate type 1 diabetes from other forms of diabetes since the protocol for management is different.

Poster Tour 18: New Insulins and Pharmacologic Agents

P183

Sodium orthovanadate and Trigonella foenum graecum prevents neuronal parameters decline and impaired glucose homeostasis in alloxan diabetic rats

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Objectives: The Indian traditional system of medicine is replete with the use of plants for the management of diabetic conditions. The use of biguanides, sulfonylurea and other drugs are valuable in the treatment of diabetes mellitus, their use, however is restricted to their limited action, pharmaco kinetic properties, secondary failure rates and side effects. The present study was carried out to observe, the antihyperglycemic effect of sodium orthovanadate (SOV) and *Trigonella foenum graecum* seed powder (TSP) administration on blood glucose and insulin levels, membrane linked enzymes (monoamine oxidase, acetylcholinesterase, Ca^{2+}ATPase), intracellular calcium (Ca^{2+}) levels, lipid peroxidation, membrane fluidity and neurolipofuscin accumulation in brain of the alloxan induced diabetic rats and to see whether the treatment with SOV and TSP was capable of reversing the diabetic effects.

Methods: Diabetes was induced by administration of alloxan monohydrate (15 mg/100 g body weight.) and rats were treated with 2 IU insulin, 0.6 mg/ml SOV, 5% TSP in the diet and a combination of 0.2 mg/ml SOV and 5% TSP separately for 3 weeks.

Results: Diabetic rats showed hyperglycemia with almost four fold high blood glucose levels. Activities of acetylcholinesterase, Ca^{2+}ATPase decreased in diabetic rat brain. Diabetic rats exhibited an increased level of intracellular Ca^{2+} levels, lipid peroxidation, neurolipofuscin accumulations and monoamine oxidase activity. Treatment of diabetic rats with insulin, TSP, SOV and a combined therapy of lower dose of SOV with TSP revived normoglycemia and restored the altered level of membrane bound enzymes, lipid peroxidation and neurolipofuscin accumulation.

Conclusions: Our results showed that lower doses of SOV (0.2 mg/ml) could be used in combination with TSP to effectively in normalization of altered metabolic parameters and membrane linked enzymes without any harmful side effect.

P184

Abstract withdrawn.

P185

Earlier onset and higher early exposure of faster-acting insulin aspart vs insulin aspart in children, adolescents and adults with T1D

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Objectives: Faster acting insulin aspart (faster aspart) is a new formulation of insulin aspart (IAsp), with faster initial absorption following s.c. injection. This trial assessed pharmacokinetic (PK) and pharmacodynamic (PD) profiles of faster aspart versus IAsp in children, adolescents and adults with T1D.

Methods: Twelve children, 13 adolescents and 15 adults (mean ages: 10.4, 15.1, 20.2 years, respectively) received a 0.2 U/kg dose (mean: 8.3, 12.8, 15.6 U) of faster aspart or IAsp before a meal test (68% carbohydrates, adjusted for body weight) in a randomised, double-blind, crossover trial.

Results: Faster aspart had a significantly faster onset of appearance versus IAsp (Table). Insulin exposure at 30 min was higher for faster aspart versus IAsp (Table). Total exposure and maximum concentration were similar for faster aspart and IAsp for all age groups. Faster aspart had a greater glucose-lowering effect versus IAsp (ΔPG_{av}, significant in children). PG_{1h} treatment difference (faster aspart-IAsp; estimates [95% CI], mmol/l): children, −1.87 [−3.71; −0.04]; adolescents, −0.64 [−2.26; 0.97]; adults, −1.10 [−2.64; 0.44]. Treatment effect did not differ significantly between age groups (PG_{1h}, p = 0.56; ΔPG_{av}, 0–1 h, p = 0.15; ΔPG_{av}, 0–2 h, p = 0.32).

Conclusion: Faster onset and higher early insulin exposure with faster aspart versus IAsp led to a greater early glucose-lowering effect, although only significant for children, who are prone to rapidly fluctuating glucose levels and unplanned food intake.

PK and PD results for faster aspart vs IAsp

	Treatment ratio faster aspart/IAsp (95% CI)		
	Children (*n* = 12)	Adolescents (*n* = 13)	Adults (*n* = 15)
Onset of exposure			
Onset of appearance	0.53 (0.30; 0.78)	0.49 (0.34; 0.65)	0.45 (0.32; 0.57)
$t50\%C_{max}$	0.75 (0.58; 0.94)	0.79 (0.67; 0.93)	0.71 (0.62; 0.80)
Early insulin exposure*			
$AUC_{0\text{-}15min}$	3.24 (1.62; 6.47)	4.34 (2.47; 7.62)	5.66 (3.58; 8.95)
$AUC_{0\text{-}30min}$	1.78 (1.16; 2.75)	1.98 (1.38; 2.85)	2.47 (1.85; 3.30)
$AUC_{0\text{-}1h}$	1.26 (0.95; 1.67)	1.28 (0.99; 1.66)	1.38 (1.17; 1.62)
Glucose-lowering effect			
PG_{1h}	0.85 (0.73; 0.99)	0.95 (0.84; 1.07)	0.91 (0.79; 1.03)
$\Delta PG_{av,0\text{-}1h}$	0.68 (0.49; 0.87)	0.93 (0.77; 1.11)	0.90 (0.59; 1.35)
$\Delta PG_{av,0\text{-}2h}$	0.63 (0.30; 0.92)	0.95 (0.67; 1.32)	0.81 (0.44; 1.31)

Based on free serum insulin aspart; AUC, area under curve; CI, confidence interval; PG, plasma glucose; ΔPG_{av}, mean change in plasma glucose concentration; $t50\%C_{max}$, time to 50% maximum concentration.

P186

Add-on treatment with dapagliflozin, a sodium-glucose co-transporter (SGLT) 2 inhibitor, in type 1 diabetes (T1D) - a case report

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Objectives: Severe insulin resistance is frequently a major burden to achieve optimal glycaemic control in young patients with T1D, particularly in those with obesity and during puberty. Novel antidiabetics like sodium-glucose co-transporter (SGLT) 2 inhibitors may open new possibilities, not only in patients with Type 2 Diabetes.
Methods: We are reporting on a 16 3/12-year old obese boy (BMI 34.7 kg/m^2, >99th percentile) with T1D onset at the age of 9 6/12-years (BMI at T1D-onset 23.3 kg/m^2 = 97th percentile). Under intensified insulin treatment with multiple daily injections he gained weight continuously and required high amounts of insulin. Change to CSII at the age of 10 4/12-years and treatment with metformin did not lead to an improvement. Therefore, we decided for an off-label use of Dapagliflozin as add-on treatment.
Results: Low dose of Dapagliflozin (5 mg p.o.) lead to a rapid improvement of glycaemic control and significantly lowering of insulin parameters (Table 1). Fasting monitoring of ß-hydroxybutyrate in blood over 6 weeks gave normal values between 0 and 0.4 mmol/l. So far, no side effects are reported.
Conclusion: Preliminary experience from add-on treatment with Dapagliflozin is promising. Further extended studies are required in order to clarify the indication and therapeutic value of SGLT 2 inhibitors in the treatment of patients with T1D.

P187

Comparative study to monitor the efficacy and the safety of biphasic human insulin (Insulin H Mix-Recombinant DNA, 30/70)

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Objective: To confirm efficacy and safety of biphasic H-Mix insulin manufactured by SEDICOfrom raw material of Wockhardt&Biocon compared to the reference insulin (Mixtard insulin), regarding the dose of insulin, BMI and local reaction to injection.
Design: Patient blinded, comparative controlled study.
Method: 212 diabetic patientswere grouped into 4 groups as follows: Group 1A (Type 1 DM, Insulin H-Mix), Group 1B (Type 1 DM, Mixtard Insulin), Group 2A (Type 2 DM, Insulin H-Mix), and Group 2B (Type 2 DM, Mixtard Insulin). All enrolled subjects underwent medical evaluation at 3 months intervals.
Results: Fasting blood glucose (FBG) decreased 14.7% and 6.8% between V1 and V3 in group 1A and 1B respectively. There was decrease of 2.4% and 4.2% between V1 and V3 in group 2A and 2B respectively. Glycosylated hemoglobin (HbA1c)decreased 5.9% between visit 3 and 1 in group 1A andincreased by 1.1% in group 1B. HbA1cincreased 0.2% and decreased 5.2% in groups2A and 2Brespectively, with no statistical significant difference between the 2 groups.

An increase of 0.2% and decrease of 4.6% in total daily insulin dose/kg/day between V1 and V3 in groups1A and 1B respectively. There was an increase of 23% and 14.8% in total daily dose/kg/day between V1 and V3 in groups2A and 2B respectively, with no statistical significant difference between the 2 groups. No local reaction to insulin injection occurred in group 1A between V1 and V3, while 2% in group 1B, 14% in group 2A and 9% in group 2B had local reactions.
Conclusion: Insulin H-Mix of SEDICO raw material of Wockhardt&Bioconis effective in lowering fasting blood glucose and HbA1c and safe as well as the reference insulin (Mixtard insulin) in the treatment of diabetes mellitus type 1 and type 2.

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Abstract withdrawn

Clinical characteristics prior and after treatment

	Add-on treatment with Dapagliflozin	
	Prior to	After 6 weeks
HbA1c		
%	9.0	7.2
mmol/mol	74.9	55.2
Blood glucose values (2-weeks period)		
Mean per 24 h (mg/dl)	356.9 ± 66.4	192.4 ± 33.2
No of BG measurements per 24 h	5.3 ± 1.2	7.7 ± 2.4
Insulin treatment settings		
Basal rate (U/24 h) (U/kg body weight)	72.5 (0.69)	61.4 (0.57)
Insulin units per 10 g carbs (breakfast, lunch, dinner)	4.0, 4.0, 4.4	3.5, 3.5, 3.9
Insulin sensitivity rates (breakfast, lunch, dinner)	20, 40, 30	30, 40, 30
Insulin requirements (2-weeks period)		
Daily total dose (U/kg body weight)	132.7 ± 26.2 (1.3)	127.8 ± 15.3 (1.2)
Basal rate (%)	55.3 ± 13.1	48.1 ± 7.5
Number of daily boluses	5.8 ± 2.1	7.4 ± 1.4
Hypoglycaemia (2-weeks period)		
Hypoglycaemic episodes (BG <60 mg/dl) per week	0.0	1.0 ± 0.0
Severe hypoglycaemia	0.0	0.0

Poster Tour 19: Nutrition and Exercise in Diabetes

P189

Dietary intake and glycaemic control of children and adolescents with type 1 diabetes: Kuwait's experience

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Objective: The aims of this quantitative, prospective cohort pilot study is to compare the habitual diet of children and adolescents with T1DM against the International Society for Paediatric and Adolescents Diabetes (ISPAD); and to examine the association between nutritional intake with haemoglobin A1c (HbA1c) among children and youth with T1DM attending Dasman Diabetes institute.
Methods: Children and adolescents (N = 40, mean age = 12.3 years, SD = 0.9 years, mean HbA1c = 9.0, SD = 1.8) reported on youths' dietary intake via 3-day food diary. Dietary intake was scored using The Food Processor Software and glycaemic control was assessed by measurement of HbA1c.
Results: According to the ISPAD recommendations, we found 12.5% exceeded the limits for carbohydrate intake, whereas 55% met the recommendation and 32.5% consumed less the recommendation. In addition, 7.5% consumed more protein than the recommendations and 32.5% met the recommendations, whereas 60% consumed less amount of protein compared to the recommendations. Fifty percent exceeded the limit of total fat intake and only 15% consumed less than the recommendations and 35% met the recommendations. Overall, of this sample, only 7.5% of the study subjects met all ISPAD recommendation of carbohydrate, protein and dietary fat intake. Further, no significant correlation was found between children's HbA1c and carbohydrate intake (r = 0.092, p = 0.103). There was also no significant correlation between children's HbA1c and protein intake (r = 0.056, p = 0.508). However, a statistically significant negative correlation was found between HbA1c and total fat (r = −0.543, p = 0.002).
Conclusion: Fifty percent did not meet ISPAD recommendations for total fat intake. This may place them at increased risk factor for diabetes-related complications, specifically cardiovascular disease in the future. Thus, a new approach about healthy eating, or alternative interventions are required to improve the individuals with diabetes's health outcome.

P190

Introduction of extended boluses for fat and protein using an insulin dose calculator sheet - patient feedback

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Background: Children who use insulin pumps do not always use all the bolus options and only dose for carbohydrate in meals.
Aim: To teach patients how to use extended boluses for fat and protein, and review their use.
Method: We developed an insulin dose calculator based on the Warsaw equation to calculate a standard bolus for the carbohydrate in an evening meal and an extended bolus for up to 5 h for the fat and protein using the calorie and carbohydrate value of the meal. Parents of 16 children familiar with carbohydrate counting were taught to count the calorie value of a meal using calorie tables, a calorie calculator sheet and other resources. They were given an insulin dose calculator sheet based on an insulin to carbohydrate ratio slightly lower than the normal ratio to allay fear of hypos. We reviewed their experience of using this at the next clinic and the impact that it had on their reported use of different bolus options.
Results: Only 9 of the 16 families tried adding an extended bolus for fat and protein to the meal dose. Feedback about the method was largely as follows: The insulin dose calculator sheet was easy to understand. It was only relevant for some meals. The bolus calculator within the pump was set at the usual insulin to carb ratio not the lower one when using the insulin dose calculator sheet and they did not want to change it each time. Many children prefer to bolus as they eat a meal. Planning a whole meal in advance was difficult for many families. Parents felt making more decisions at a meal time was detrimental to the enjoyment of a family meal.
Conclusions: Families familiar with using an insulin pump are reluctant to change how they do this despite potential benefits. Calculation of additional insulin for fat and protein needs to be simpler. Using standard additional doses for fat and protein in meals introduced from the very beginning of pump therapy may be more successful. This could then be refined with experience.

P191

Is carbohydrate counting enough? A comparison of three mealtime insulin dosing algorithms

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Objective: Continuous glucose monitoring has demonstrated limitations in the current approach for mealtime insulin dosing, which is based primarily on carbohydrate counting. To overcome this, novel algorithms have been developed to account for the glycemic impact of fat and protein. The aim of this study was to compare three prandial insulin dosing methods: Carbohydrate counting (CC), Pankowska equation (Pank) and Food Insulin Index (FII), on postprandial glycemia in children using CSII.
Methods: In this RCT at 2 Pediatric Centers, seventeen subjects aged 8–18 years were given 2 test meals - one high protein and one high fat, with identical CHO content. Subjects consumed both meals on three occasions and used the respective insulin dosing algorithm once for each meal. Insulin was administered 15 min prior to the meal. The bolus amount and duration were determined by the dosing method. Postprandial glycemia was assessed by 5 h of continuous glucose monitoring.
Results: The mean insulin doses for the higher protein meal were 4.1 (CC), 6.2 (Pank) and 3.3 (FII) units; and the higher fat meal were 4.1 (CC), 6.4 (Pank) and 5.2 (FII) units. There was an increased risk of hypoglycemic episodes (<3.5 mmol/l) after Pank compared to CC and FII (n = 11, 2 and 0 respectively; p < 0.01). Percent time in target glucose range (3.9–10.0 mmol/l) following CC and FII were not different (p = 0.6), with 49.8% and 54.0% of glucose readings in range over 5 h. Pank resulted in less time above the target range

(25.0%) than CC (49.6%; $p < 0.01$) and FII (44.3%; $p = 0.016$). Mean peak glucose excursions were lower for Pank compared to CC (3.4 vs 5.0 mmol/l; $p = 0.026$), but not to FII (3.4 vs 4.4 mmol/l; $p = 0.133$).

Conclusions: Current prandial insulin dosing algorithms have limitations in the context of mixed meals. Postprandial hypo- and hyperglycemia remain a challenge despite the development of novel insulin dosing methods.

P192

One potato two potato: assessing carbohydrate (CHO) counting accuracy in teens with type 1 diabetes (T1DM)

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CHO counting is a recommended daily practice to help manage blood glucose levels in T1DM. Evidence suggests that CHO estimates should be within 10–15 g of the actual meal for optimal post-prandial blood glucose control, but there is a paucity of studies assessing how accurately adolescents CHO count. Information about accuracy level can help ascertain the need for clinical accuracy check and re-education.

Objective: To assess accuracy of CHO counting in adolescents with T1DM who self-identify as counting CHO.

Methods: Adolescents (aged 12–17 years) living with T1DM (for >1 year) who self-identified as regular CHO counters, were recruited from the SickKids Diabetes Clinic. Adolescents completed the Peds Carb Quiz (PCQ) and evaluated CHO content of test trays (3 meals + 3 snacks) that were randomly assigned. ANOVA, chi-square, Fisher's exact tests were conducted to compare factors related to accuracy of counting. Univariate and multivariate regression were conducted to determine factors related to accuracy of counting and PCQ score.

Results: 140 participants (78 female), age 14.7 ± 1.8 years, A1c 8.6 ± 1.5%, T1DM duration 7.1 ± 4.1 years, insulin regimen: Pump 53%, MDI 28%, TID 19%, CHO counting self-reported frequency: Always 72%, Sometimes 24%, Rarely 4%. PCQ Correct: 81 ± 10%. Meal Accuracy: Accurate (<10 g) = 42%, Inaccurate (10–20 g) = 44%, Grossly inaccurate (>20 g) = 14%. Underestimation (79%) was more common than overestimation (20%) of CHO. PCQ scores were higher in teens counting accurately (<10 g) than in those with gross inaccuracy (>20 g; $p < 0.05$). On multivariate regression, there were no significant factors predicting CHO counting accuracy. In contrast, on multivariate regression of PCQ scores, those who reported they "always" CHO counted had higher scores than those who rarely counted ($t = 4.1$, $p < 0.0001$).

Conclusion: Underestimation of carbs is more common than overestimation. Less than half of teens are accurate within 10 g/meal, however, the majority of teens are within 15 g/meal.

P193

Intuitive eating is associated with glycaemic control in adolescents with type I diabetes mellitus

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Background: While there have been considerable advances in the medical management of Type 1 Diabetes Mellitus (T1DM), for many, glycaemic control remains substandard. Nutrition and eating behaviour are important additional factors to consider with regards to T1DM management and outcomes. With this in mind, we have investigated whether intuitive eating may provide a novel tool to identify those with eating behaviours that potentially impact on their diabetes management and subsequent glycaemic control.

Methods: A case-control study of adolescents with established T1DM, and age/sex matched controls was conducted. Demographic information, the Intuitive Eating Scale (IES), and HbA_1c were collected. Statistical analysis was undertaken to explore associations between the IES and HbA1c as a marker of glycaemic control.

Results: Data on 38 adolescents with T1DM, and 39 age/sex matched controls were obtained. Those with T1DM had subtle but statistically significantly lower IES scores compared to controls ($p = 0.009$). Higher values of both total IES and the "eating for physical rather than emotional reasons" subscale were associated with lower HbA1c (22% lower/ unit increase in total mean score, 11% lower/unit increase in "eating for physical rather than emotional reasons" mean score), $p = 0.017$ and $p = 0.009$ respectively. HbA1c was not associated with diabetes duration, but was lower amongst those who self-monitored blood glucose more often ($p = 0.041$).

Conclusions: In adolescents with T1DM lower levels of intuitive eating, in particular the effect of emotion on eating, were strongly associated with worse glycaemic control. In addition, adolescents with T1DM have subtly lower scores for their intuitive eating behaviour compared to controls. Continuing efforts are needed to fully understand the important dynamics of diabetes, adolescence, diet, emotion, and how these factors affect long term outcomes in those with T1DM.

P194

Role of oral cholecalciferol as an adjuvant therapy in type 1 diabetes mellitus: a randomized controlled trial

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Objectives: The objective of this study is to examine the role of cholecalciferol in modulating the altered immune response in Type 1 Diabetes Mellitus, thereby improving parameters of glycemic control and residual pancreatic B-cell function, measured objectively by Hemoglobin A1c levels, Human GAD65 antibody titers and C-peptide levels.

Method: 52 T1DM patients aged 1–18 years attending JIPMER Pediatrics department in year 2014 were randomized into two groups. High dose oral cholecalciferol therapy (1.2 lakh IU/month) was instituted in addition to insulin in Intervention arm, while only insulin was continued for other arm for 6 months.
Results: The cases and controls were comparable with regards to the mean age, sex, body mass index, duration of disease, diabetes medication, daily insulin requirement, Vitamin D status and mean HbA1c levels at baseline. As high as 63.5% T1DM patients in our study were found to be Vitamin D deficient with mean serum 25 hydroxy vitamin D (25-OHD) level of 20.7 ng/ml.

Six months supplementation of high dose oral cholecalciferol (1.2 lakh IU/month) caused significant rise in serum vitamin D levels to sufficient range in Cholecalciferol group with mean serum 25-OHD level of 68.64 ng/ml. There was highly significant difference in the serum vitamin D levels between cases and controls at end of 6 months ($p < 0.01$).

Overall, mean change in HbA1c trended towards a greater reduction in the Cholecalciferol group over 6 months than the control group, but this difference failed to reach statistical significance ($p = 0.057$). However, the sub-group that was severely Vitamin D deficient (25-OHD level <20 ng/ml) achieved significantly lower HbA1c levels on becoming Vitamin D replete (25-OHD >30 ng/ml) as compared to controls, at end of 3 and 6 months ($p < 0.05$).

The mean C-peptide levels and antiglutamic acid decarboxylase 65 (GAD65 antibody) titers were similar at baseline for cases and controls. The mean C-peptide levels were significantly greater for cases as compared to controls ($p < 0.05$) at end of 6 months.

The daily insulin dose requirement and GAD65 antibody levels did not show a significant difference between the two groups over 6 months follow up.

No adverse events due to Cholecalciferol therapy were reported in our study.
Conclusions: In our study, supplementation of high dose oral Cholecalciferol led to increased pancreatic secretion of C-peptide as compared to controls. The Vitamin D replete group who were earlier Vitamin D deficient also achieved better metabolic control as measured by HbA1c levels. Our study shows that high dose oral Cholecalciferol concomitant with insulin therapy is safe and is related to slow decline of residual Beta-cell function in T1DM patients, thereby enhancing glycemic control. Cholecalciferol may become an interesting adjuvant in combination with insulin. Its role as an immune-modulator needs to be further researched in T1DM patients. An affordable, safe and easily obtainable vitamin may serve as a novel approach in the fight against a costly, debilitating, chronic disease.

P195
Children's activity weekends - can a scientific approach to the adjustment of insulin doses help in maintaining blood glucose levels within target range during and after activity, and overnight

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Background: The Oxfordshire Children's Diabetes Service runs an annual activity weekend and it is challenging to adjust insulin appropriately for various activities.
Aims: The staff planned to be more scientific in the way insulin was given in relation to the planned activities. The aim was to keep more blood glucose (BG) levels in target during and after exercise and overnight and to use this opportunity to educate the children about exercise management.
Methods: In October 2014, 32 children (age 8–11 years) attended an activity weekend; 20 were using insulin pumps, 11 multiple daily injections (MDI) and 1 twice daily (BD) mixed insulin. Activities included climbing, dry slope skiing, kayaking, archery, sliding down the ski slope on rings, and velodrome track cycling, in small groups. Clinic staff recorded all BG levels pre meal, pre bed and in between activities, when required, following a protocol for reduction of both background and bolus insulin according to the activity planned for the group.
Results: For some activities eg; climbing, novice skiing and track cycling, there was an initial rise in BG and when this was within 2 h of a meal, bolus reduction was too great. For other activities bolus reduction did not match with the timing of the activity. Children who removed their insulin pump during kayaking saw a rise in BG (mean BG 9.9 mmol/l pre and 13.4 mmol/l post). Those using MDI/BD or kept their pump on, had no change in mean value pre and post activity. One activity (sliding down the dry ski slope and running back up) showed the most marked fall in BG levels. Overnight mean BG's were lower on the second night but hypos were minimal, with 4 children waking at BG 3.7 on Saturday and 4 with BG 2.6–3.9 on Sunday.
Conclusions: Insulin dose adjustment during an activity weekend can be standardized using a protocol. However the timing and type of activity have large effects on BG levels. Results will inform the team's management for the next weekend.

P196
Exercise behaviors in youth with type 1 diabetes on insulin pump therapy

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Objectives: Insulin adjustments can reduce hypoglycemia during and after exercise, but little is known about their use in youth with T1D, and no assessment tools currently exist. The goal of this study was to pilot a tool to assess exercise practices in youth with T1D on insulin pumps, and to examine how different types of activity (intermittent high-intensity and endurance) relate to behaviors and glycemic outcomes.
Methods: We developed the "Type 1 Diabetes Report of Exercise Practices Survey (T1D-REPS)", a 33 point questionnaire, and piloted this tool in 65 youth with T1D, 45% female, aged 10–18 years, with T1D for >2 years, on a pump for >3 months, with BMI <95th percentile. Participants completed a 3-day physical activity (PA) recall and 30 days of pump/glucose data were collected. Chart review was conducted for key clinical markers.
Results: 80% of participants modified their insulin regimen around exercise. 38% reported adjusting prandial insulin immediately before exercise, 27% suspend basal insulin with exercise, while 66% report some modification (suspension or decrease) of basal insulin during exercise. Following exercise, only 13% report reducing overnight basal insulin. Average BGL was lower in those who reduced prandial insulin prior to exercise (190 vs 214 mg/dl; $p = 0.05$). No other behaviors associated with glycemic outcomes.

Of those who participated in intermittent high-intensity exercise ($n = 39$), 49% adjust their prandial insulin prior to exercise, versus 22% of endurance exercise participants ($n = 26$; $\chi^2 = 4.4$, $p = 0.04$). 39% of the intermittent high-intensity group modified their basal rate prior to exercise versus 9% of the endurance group ($\chi^2 = 6.5$, $p = 0.01$).
Conclusions: Despite studies showing the frequency of hypoglycemia during and after exercise, many youth are not adjusting insulin accordingly. A tool to inform exercise practices is needed to improve safe exercise participation in youth with T1D.

Poster Tour 20: Insulin Resistance and Obesity

P197

Measuring obesity and lack of physical activity in Saudi school children due to excess television viewing: a case - control study

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Background: The incidence rate of obesity among children has been found to be increasing all across the globe. One of the trends that have been accredited to this increased obesity is the excessive television watching. However, research regarding this trend's impact on obesity has not been carried out much in the Saudi Arabia.
Aim of the study: The predefined aim of the study was to evaluate the relationship amid watching television and obesity amongst the children belonging to the age group of 9–14 years in Saudi Arabia.
Methods: The study implied case controlled study design among the school students within the age group of 9–14 years, who visited the health clinic of the school, in King Abdul Aziz Housing for National Guard (Iskan), Riyadh, Saudi Arabia, for the duration of the study period (February to April, 2012). During each visit, random selection method was applied for selecting 397 students.
Results: The results indicated that greater number of television hours at home ($\chi^2 = 33$, $p < 0.001$) was linked with higher BMI, along with weekend TV watching for more than 3 h/day, night-time TV watching and the chosen amount of time for watching TV by the siblings. The logistic regression analysis presented that the existence of more than one TV at home, the augmentation in child's age, presence of child`s own TV and amplification in the number of TV watching hours at weekend were strongly correlated with augmenting the risk of obesity in children.
Conclusion: The current study presented that watching TV for longer times is an important hazard for the development of school-aged obesity.

P198

Erythropoietin activates heat production and lipolysis on brown adipose tissue and consequently reduces obesity in dietary-induced obese mice

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Background, aims and objectives: Erythropoietin (EPO) induces body weight loss and improves insulin resistance in obese mice. To show the mechanism of EPO in obesity we investigated classical brown adipose tissue (BAT).
Methods: Four-week-old male C57BL/6J mice were divided into 4 groups: normal chow (NC); high-fat diet (HFD); NC mice injected with recombinant human (rh)EPO and HFD mice with injected with rhEPO (HFD-EPO). rhEPO (200 IU/kg) was administered by intraperitoneal injection three times/week for 4 weeks. Oxygen consumption (VO2) was measured in order to estimate the metabolic rate and a thermal imaging camera was used to quantify heat generation on interscapular BAT (iBAT). We also analyzed the protein and gene expressions of uncoupling protein 1 (UCP1), PRDM16, as well as other marker genes related to thermogenesis and lipolysis on iBAT. Data are shown as means ± SEM. Single-group data were assessed using Student's *t*-test. Repeated measurements of analysis of variance (ANOVA) with Tukey-Kramer post hoc comparisons were performed for multiple comparisons.
Results: At 8 weeks of age, body weight loss, an increase in VO_2 and surface temperature in iBAT, a reduction of blood glucose level and improvement of insulin resistance in HFD-EPO mice were observed compared with HFD mice. Furthermore, a weight gain of iBAT and weight loss of white adipose tissue (WAT) was observed. mRNA expression (PRDM16, PPARα, CPT1, and FGF21) and protein levels (PRDM16, PPARα, FGF21, beta3ADR and UCP1) were increased in iBAT of HFD-EPO mice compared with HFD mice. MEF2c mRNA and miR133a expression was downregulated in HFD-EPO mice compared with HFD mice.
Conclusions: A low dose of EPO activates heat production and lipolysis in classical BAT through MEF2-miR133-PRDM16 under HFD conditions to improve obesity and insulin resistance.

P199

Relationship between ghrelin gene polymorphisms and obesity in Japanese children

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Objective: Recently, ghrelin has attracted attention as a hormone connected with appetite. The relationship between ghrelin gene (*GHRL*) single nucleotide polymorphisms (SNPs) and obesity has been widely analyzed in adults, but there are few studies in children. We performed an analysis of *GHRL* SNPs and examined their role as potential biomarkers of childhood obesity.
Methods: We analyzed 165 controls (84 boys, 81 girls) who received a medical examination at school in the northern area of Kyoto, Japan, and 46 obese children (31 boys, 15 girls) treated in our pediatric obesity clinic from 2010–2014. The average age at first visit was 13.7 and 11.3 years for controls and obese children, respectively. We selected five *GHRL* SNPs: g.A-604G (rs27647), g.C-501A (rs26802), g.C247A/Leu72Met (rs696217), g.A265T/Gln90Leu (rs4684677), and g.G62T (rs35683), and examined their association with the following clinical data: age at first visit, obesity index, BMI, BMI z-score, total serum cholesterol (TC), HDL-cholesterol, LDL-cholesterol, triglycerides, fasting plasma glucose, fasting insulin (FINS), HOMA-IR, and HbA1c. SNPs were genotyped using an Applied Biosystems ABI 7500 Fast Real-Time PCR System and TaqmanÒ SNP Genotyping Assays.
Results: The g.C-501A polymorphism (AA genotype vs AC/CC genotypes) was significantly associated with Japanese childhood obesity (odds ratio 14.05; 95% confidence interval 5.76–34.28; $p < 0.001$). There were no significant relationships with the other four SNPs ($p > 0.05$). The g.C-501A was significantly associated with obesity index ($p < 0.001$), BMI ($p = 0.001$), the BMI z-score ($p < 0.001$), TC ($p = 0.04$), LDL-cholesterol ($p = 0.006$), FINS ($p < 0.001$), HOMA-IR ($p < 0.001$), and HbA1c ($p < 0.001$); in each case the C allele was protective.

Conclusions: Our observations suggest that the *GHRL* g.C-501A polymorphism is significantly associated with Japanese childhood obesity.

P200
Metabolic disturbances in adolescents with "Double Diabetes" and in adolescents with obesity

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Objective: Type 1 diabetes (T1DM) and obesity are the risk factors of metabolic disturbances connected with cardiovascular diseases. In the last decades the prevalence of both T1DM and obesity has been increased in pediatric population.

The aim of study was to compare the metabolic disturbances in obese T1DM adolescents ("double diabetes" DD) and the group of adolescents with obesity (OB).

Methods: 62 DD adolescents and 103 adolescents with OB aged 10–18 years were included into the study. In all patients body mass, height, waist circumference, blood pressure, HbA1c level, serum HDL, triglyceride (TG) and uremic acid concentration were measured. The mass of the body fat (FAT) and muscle mass (PMM) were evaluated by bioimpedance method. Metabolic syndrome was diagnosed according to International Diabetes Federation (IDF) definition.

Results: In DD adolescent the lower concentration of TG (104.6 vs 139.6 mg/dl, $p = 0.003$) and uremic acid (4.91 vs 6.25 mg/dl, $p < 0.001$) and higher HDL (55.1 vs 47 mg/dl, $p < 0.001$) were found in comparison to OB adolescents. There were no differences in blood pressure in ABPM. In OB adolescents fat mass trunk was greater (31.6 vs 28.7%, $p = 0.016$). MS was diagnosed in 39.6% OB group and in 45.9% DD ($p = 0.538$).

Conclusion: In OB adolescents more athoregenic lipid profile and higher concentration of uremic acid than in DD group was found. The prevalence of MS in both groups was similar.

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P201
Comorbidities of overweight and obesity are associated with increasing weight/height ratio and BMI z-score but not abnormal glucose metabolism in a paediatric population

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Objectives: At a population level, increasing Body Mass Index Z-score (BMI-Z) is associated with increased risk of complications. However, it is unclear whether severity of obesity is a good predictor of comorbidities within groups of obese children. This knowledge is required to inform clinical management and pathways of care.

Method: Anthropometric, biological and comorbidity data were collected from obese paediatric patients attending the weight management service at The Royal Children's Hospital (Melbourne). Activity level (Actical© accelerometry) and dietary consumption (Australian Food Frequency Questionnaire) data were additionally collected. Statistical analysis was performed using chi-squared, one-way ANOVA, Pearson's correlation tests and linear regression as appropriate.

Results: There were no significant differences in cohort demographics ($n = 349$, male; 169, age; 10.6 (±3.6) years, BMI-Z; 2.46 (±0.46)). Comorbidities were common; hypertension (50%), IGT (38%), non-alcoholic fatty liver disease (NAFLD, 32.9%), hyperlipidaemia (23.9%), obstructive sleep apnoea (OSA, 22.3%), polycystic ovarian syndrome (14.4%), mental health disorders (11.4%), type 2 diabetes (3.6%), eating disorders (1.4%) and neurological complications (0.3%). Both increased WHtR and BMI-Z were associated with comorbidities, with WHtR being the better predictor ($p < 0.01$). Neither, WHtR or BMI-Z were associated with measurements of glucose metabolism. Lower daily vitamin C intake and higher vitamin A and retinol consumption were significantly associated with comorbidities. Reduced activity levels showed no association with obesity comorbidities in this obese population.

Conclusion: WHtR better associates with comorbidities than BMI-Z in an obese paediatric population, but neither predicts the presence of abnormal glucose metabolism. Alterations in dietary micronutrient consumption may be an important association for the development of comorbidities in this group of patients.

P202
Improvement of apolipoprotein B in Argentine indigenous school children after vitamin D supplementation

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Objective: To determine whether vitamin D supplementation improves non-traditional cardiovascular disease (CVD) risk factors such as Apo B levels among indigenous children.

Methods: A prospective 2-year study evaluated a treated cohort of 190 children (104 males) aged 9.4 ± 2.2 years from a low socioeconomic level. Anthropometric measures, and serum levels of glucose, lipids, Apo B, and vitamin D were measured. All children received vitamin D supplementation of 100,000 u/year in 2013 or 2014 and were divided into two groups: Group A had never been treated with vitamin D and received vitamin D in 2014 ($n = 104$; 54.7%); while group B received vitamin D in 2013 but not in 2014 ($n = 86$; 45.3%).

Results: The prevalence of overweight and obesity per CDC was 12.7% (24), of low HDL-C 16.9% (32), of high triglycerides 21.3% (40), and of hyperglycemia 1.1% (2), in 2013. There was not a significant difference in the prevalence of overweight/obesity, hyperglycemia, and hypertriglyceridemia either between groups or between all children in 2013 and in 2014. Changes in vitamin D levels were significantly higher in Group A, which was supplied in 2014, than in Group B, which was not supplied in 2014 (6.8 vs 0.96 ng/dl; respectively). Accordingly, in 2014 there was a significantly higher prevalence of vitamin D sufficiency (>20 ng/ml) in Group A than in Group B (73.1% (76) vs 37.2% (32); respectively). Levels of LDL-C and Apo B were improved in Group A versus Group B: LDL-C (−5.7 vs 6.9 mg/dl respectively) and Apo B (−0.9 vs 11. mg/dl respectively). Several multiple regression linear analyses showed that changes in vitamin D were significantly associated with lower LDL-C levels (Beta −0.41, $p < 0.01$; $R^2 = 0.07$); and with lower Apo B levels (Beta −0.37, $p < 0.01$; $R^2 = 0.17$). This result suggests that vitamin D supplementation among indigenous children improved LDL-C and Apo B levels. Further studies are needed to determine the potential benefits of vitamin D supplementation.

P203

Prevalence of fatty liver and cardiometabolic complications in overweight Indian adolescents

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Objectives: Non-alcoholic fatty liver disease is emerging as an important complication of obesity and insulin resistance. The aim of the study was to assess the prevalence of fatty liver and cardiometabolic complications in overweight Indian adolescents.

Methods: We recruited 100 overweight adolescents aged 10–14 years and their parents. Those with liver disease, diabetes and syndromic obesity were excluded. Fasting glucose, lipid profile, ALT, AST and insulin were measured. Body fat (BF%) was measured by bioelectrical impedance. Ultrasonography was done by a single radiologist for subjects and parents.

Results: Mean age, BMI and BF% were 11.6 ± 1.6 years, 26.7 ± 4.8 and 37.2 ± 5.3%, respectively. 32% of the subjects were prepubertal, 69% were boys. Hypertension was noted in 14%, low HDL cholesterol (<40 mg/dl) in 51% and hypertriglyceridemia (≥130 mg/dl) in 22%. Insulin resistance was present in 61% and impaired fasting glucose in 12%. Fatty liver was present in 57% (Table 1). Among parents, >90% were overweight/ obese, and 56% of mothers and 68% of fathers had fatty liver.

Biochemical and USG parameters (n = 100)

Parameter	Summary statistic
Fasting glucose (mg/dl); impaired	86.7 ± 9.9; 12%
Fasting Insulin (mIU/l)	17.7 ± 13.2
HOMA-IR; >2.5	3.7 ± 2.7; 61%
ALT (IU/l); High (> 30 IU/l)	44.3 ± 32.1; 66%
AST:ALT ratio >1	39%
Grade of Fatty liver: mild; moderate; severe	35%, 19%, 3%

On comparison among subjects with and without fatty liver, BMI, waist circumference, BF% and fasting insulin were significantly higher among those with fatty liver. Gender and pubertal status distribution, ALT, cholesterol and triglyceride levels were similar in both groups.

Conclusion: Insulin resistance and fatty liver are present in nearly 60% of the overweight adolescents, highlighting the significant lifetime risk of type 2 diabetes and chronic liver disease in them. Efforts for prevention of obesity among children need urgent bolstering.

P204

Association of *FTO* rs9939609 polymorphism on insulin resistance in obese female adolescents in Indonesia

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Objective: To investigate an association between FTO rs9939609 polymorphism and insulin resistance in obese female adolescents in Indonesia.

Methods: A total of 78 obese female adolescents were ascertained in this case-control study. The genetic marker was examined using allele-specific polymerase chain reaction (PCR) in genomic DNA for association studies. Insulin resistance was determined based on homeostasis model of assessment for insulin (HOMA-IR) ≥3.14.

Results: Allele A of the FTO gene rs9939609 polymorphism was found in 44.2% obese female adolescents. FTO rs9939609 risk allele (A) carriers did not have higher risk of insulin resistance (OR = 1.12; 95% CI = 0.59–2.12), nor higher fasting insulin concentration ($p > 0.05$) and HOMA-IR ($p > 0.05$) compared to non-risk allele (T) carriers.

Conclusion: Our study suggested that FTO rs9939609 polymorphism may not associate with insulin resistance in Indonesian obese female adolescents.

Poster Tour 21: Psychosocial Issues in Diabetes I

P205

Body image disturbance in young people with type 1 diabetes

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Objectives: Diabetes management tasks bring direct attention to a person's body and food intake. Patients are expected to inject insulin into subcutaneous "fat" and focus intently on their food intake. Due to this it can be anticipated that body image concerns and eating problems are common in young people with diabetes. Our objective was to determine the prevalence of eating problems and the quality of life in our pre-teen and teenage patients with Type 1 diabetes.
Method: Patients aged 11–15 years who attended age-banded group education programmes at the Waikato Paediatric Diabetes Service in New Zealand, completed the Diabetes Eating Problems Scale - Revised and the Diabetes Quality of Life Questionnaire - Short Form. A total of 28 patients during 2014 completed the questionnaires. In addition, their age, insulin regimen, and most recent HbA1c and BMI were obtained from clinical records.
Results: In comparison to other studies, the rates of eating problems were similar with 25 percent of patients indicating diabetes related eating problems. Diabetes eating problems and diabetes quality of life were positively correlated.
Conclusions: This information has been used to alter the way psychology and dietetic clinics are run within the paediatric diabetes service. Given the relationships between psychology and dietetics, joint appointments are now occurring more regularly. Screening tools for eating problems, quality of life, and emotional distress are common practice to ensure that we are identifying areas of concern early so that appropriate interventions can be implemented.

P206

The quality of life of Filipino pediatric patients ages 10–18 years consulting at the Philippine General Hospital diagnosed with diabetes mellitus type 1 using the PedsQL 4.0 generic core scale Filipino version

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Background: Quality of life (QOL) is a person's total well-being and includes the emotional, spiritual, and physical aspects. Patients with chronic illnesses have a different perspective in their QOL due to the burden of disease. Diabetes mellitus type 1 (DM type 1) is a chronic illness, affecting about 7,800 Filipino children. Studies show that lower health-related QOL is associated with poor glycemic control.

The PedsQL 4.0 Generic Core Scale is a generic health-related QOL questionnaire developed for diverse pediatric population. The Filipino translation has been validated and is reliable.
Objectives: 1. To measure health-related QOL in adolescents 10–18 years old with DM type 1 and consults at the Philippine General Hospital using the PedsQL ™ 4.0 Generic Core Scale Filipino version.

2. To determine the association of HbA1c with QOL.
Methods: Adolescents who are (1) diagnosed with DM type 1 for at least 1 year, (2) on regular follow-up, and (3) with HbA1c levels within 3 months prior to interview were enrolled and given a self-administered questionnaire. Exclusion criterion are patients with co-morbidities other than diabetes. Data were analyzed using regression analysis (SPSS 10.0 software).
Results: Forty four patients (23 females and 21 males) were included in the final analysis. The means are as follows: age - 14.5 years old, HBA1c - 10%, and duration of illness - 4 years. Age ($p = 0.718$), gender ($p = 0.713$), and duration of illness ($p = 0.607$) are not significant factors in the overall QOL. Age ($p = 0.519$), gender ($p = 0.273$) and duration of illness ($p = 0.188$) are not signifcant factors affecting HBA1c. However, a lower HBA1c is correlated with an improvement in the QOL in terms of other people ($p = 0.045$), school ($p = 0.037$), and overall quality of life ($p = 0.031$).
Conclusion: Age, gender, and duration of illness are not significant factors in the QOL and HBA1c. But, a lower HBA1c is correlated with an improvement in the overall QOL.

P207

New risk stratification tool: development and use of a risk assessment tool for patients and families with type 1 diabetes mellitus

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Objective: To develop a screening tool for risk categorization of patients/ families at diagnosis of new onset T1DM; Plan follow up strategies to mitigate the effects of high risk factors; To correlate risk stratification with A1c at 3, 6, and 9 months post-diagnosis.
Methods: A multidisciplinary team developed a new risk assessment tool with a set of 25 criteria recognized to influence diabetes and categorized them as low, moderate, or high risk.

Team members individually stratified patients and families for risk level using this tool, at the time of hospital admission for new onset type diabetes. A more intensive clinic follow up plan was developed for those in the high risk category.
Results: Data collected for 129 patients and their families. Results revealed: 21% were low-risk, 59% were moderate-risk, and 20% were at high-risk, as being predictive of their diabetes care and control using this new tool. HbA1c at 9 months were 7.75%, 8.72%, 9.23% respectively in the low, moderate, and high risk groups.
Conclusions: Using a risk stratification system, we are able to identify patients and families at moderate and high-risk for future diabetes care. This early risk identification may delineate families that would benefit from more intensive follow-up by allowing multidisciplinary team to address barriers early. Further work on this project aims to validate this tool and to incorporate more objective evaluation system to improve inter-rater reliability.

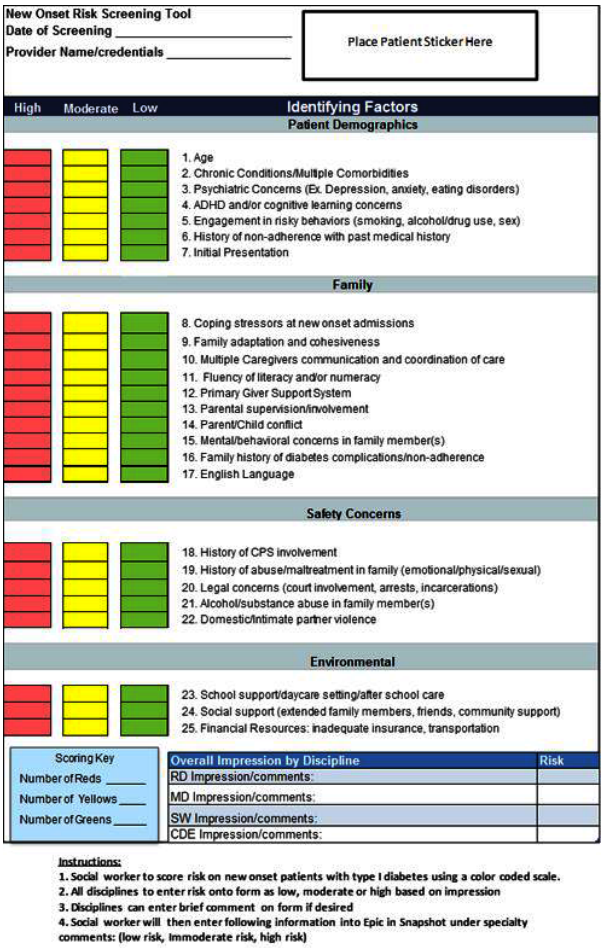

Figure New Onset DM Type 1Risk Screening Tool.

P208

Beyond the referral to paediatric consultation liaison service: an evaluation of mental health issues in type1 diabetes

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Background: The Paediatric Consultation Liaison Program (PCLP) is based at Princess Margaret Hospital (PMH) and provides assessments and short term intervention to patients with co-morbid mental health and medical issues. PCLP clinicians work alongside medical specialists to assist the treating team. Inpatients and outpatients 0–16 years are referred to PCLP by the medical specialist from the hospital. The PCLP is a hybrid CL program providing general consultations to patients across the hospital but also has clinicians allocated to specific medical teams to provide more intensive liaisons. Clinicians use individual, group and family interventions. Education and training and research are also significant aspects of the PCLP services.
Objective: Identify the characteristics of young people with Type 1 Diabetes referred to PCLP.
Method: Medical and psychology charts were reviewed for young people referred by the PMH Endocrinology and Diabetes Department to PCLP over a 12 months calendar year. The charts were evaluated according to particular criteria. These included Age, Sex, and HbA1c at time of referral; Duration of Diabetes and Mental Health Diagnoses. The type of study involves a large amount of data collection and some statistical analysis.
Results: The data from over 75 referrals (both inpatients and outpatients) indicated that: HbA1c's ranged from 6.2 to 14.1%; ages ranged from 6 to 18 years; duration of diabetes ranges from several months to 13 years; 50% more females were referred; and mental health diagnoses ranged from mildly elevated psychological distress to very severe co-morbid multiple diagnoses.
Conclusions: This data assist with understanding the client population being referred and targeting effective interventions. It also assists us to provide the right support to the Diabetes Team.

P209

Screening for depression among parents and patients of type 1 diabetes mellitus

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Objectives: 1. To analyze presence of depressive symptoms among children with type 1 Diabetes and their parents.
2. Examine correlation between depression in children & parents and glycemic control.
Methods: Thirty-Two children (M = 14, F = 18) with type 1 DM and their parents completed self-report questionnaires to assess mental depression. Beck Depression inventory (BDI-II) was used to assess depression among parents and Centre for epidemiological studies depression scale for children (CES-DC) was used for assessment of depression in children. HbA1C value done within last 3 months was recorded in the along with other details. Microsoft Excel was used for statistical analysis.
Results: 72% of parents had depressive symptoms. Parents with severe depression were 34%. Only 23% of children reported depressive symptoms .There was strong correlation between grade of depression in parent and glycemic control as judged by HbA1c of child ($p < 0.001$).
Conclusions: There is high prevalence of depression among parents of type 1 DM children. Depressive symptoms among parents is negatively associated with glycemic control in patient of type 1 DM.

P210

Positive well-being in young adolescents with type 1 diabetes (T1D)

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Objective: Early adolescence is a period of many psychological and physiological shifts with implications for future behavioral and health outcomes. For youth with T1D shifts in management responsibility may begin and this is often a turning point for mounting emotional distress, decreasing treatment adherence, and worsening glycemic control. Compared to challenges, less is known about positive well-being (PWB) during this period. The aim of this study was to characterize PWB and its relations with distress, behavioral, and glycemic outcomes in young adolescents with T1D.
Method: 56 young adolescents age 12–13 years (*M* age = 12.8 ± 0.6; 50% male; 38% racial/ethnic minority; 60% basal bolus injections; *M* T1D duration = 4.5 ± 3.7 years; *M* A1C = 8.2 ± 1.6%) completed questionnaires about PWB (WHO-5), depressive symptoms (CDI-SF), and diabetes burden (PAID-T).

Mean daily blood glucose monitoring frequency (adherence) was assessed via meter download and glycemic control via A1C, drawn from medical records.

Results: WHO-5 scores ranged from 20 to 100, M = 69.2 ± 21.9, and did not significantly differ by gender or race/ethnicity. Higher WHO-5 scores were correlated with shorter T1D duration ($r = -0.39$, $p < 0.005$) and lower depressive symptoms ($r = -0.51$, $p < 0.0001$) and diabetes burden ($r = -0.40$, $p < 0.05$). Higher WHO-5 scores were correlated with lower A1C ($r = -0.36$, $p = <0.05$) and were not significantly associated with adherence.

Conclusion: Young adolescents with T1D experience a range of PWB, with mean WHO-5 scores at levels comparable to the general population and older youth with T1D. Greater PWB was associated with less distress and better A1C. Null associations with adherence may reflect some continued parent T1D management in this group and call for study of mechanisms linking PWB with diabetes outcomes. Initial exploration of PWB in young adolescents with T1D suggests this may be a valuable target for routine monitoring and prevention/promotion efforts during a critical developmental transition.

P211

Gender and age differences in diabetes distress and depressive symptoms among adolescents with type 1 diabetes: results from diabetes MILES Youth - Australia

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Objectives: Prior to puberty, general emotional well-being is similar for boys and girls but begins to decline after puberty among girls. Such gender differences have rarely been explored among adolescents with type 1 diabetes (T1D). We examined depressive symptoms and diabetes distress (DD), and explored differences by gender, age and diabetes duration, among respondents to the Diabetes MILES Youth - Australia national online survey.

Methods: 540 adolescents aged 13–19 years (62% girls; mean age 16 ± 2 years; diabetes duration 6 ± 4 years; 50% insulin pump) completed questionnaires about depressive symptoms (Patient Health Questionnaire 8-item adolescent version; PHQA) and DD (Problem Areas in Diabetes-Teen; PAID-T). Mean scores, symptom severity and items endorsed were analysed separately by gender. Relationships between DD and depressive symptoms, age, diabetes duration and mode of insulin delivery were explored.

Results: Overall, 18% girls and 5% boys reported moderate-to-severe depressive symptoms (PHQA ≥15; $p < 0.001$). Twice as many girls as boys had severe DD (PAID-T ≥108; based on mean +1 SD) (24% vs 10%, $p < 0.001$). On average, girls rated a mean of 7 ± 7 PAID-T items 'a very serious problem' compared with 4 ± 5 items for boys ($p < 0.001$). For most girls (52%), the most distressing aspect of diabetes was being 'worried about my weight', while 31% boys were most concerned about family and friends' support. For girls, there was a weak correlation between age and depressive symptoms ($r = 0.30$, $p < 0.001$), and DD ($r = 0.26$, $p < 0.001$) but these relationships were not observed for boys. Diabetes duration and insulin delivery mode were not significantly related to either outcome or to gender.

Conclusion: Significant differences in depressive symptoms and DD were observed between boys and girls, and this discrepancy increased with age. Interactions among DD, depressive symptoms and age need further exploration among girls with T1D.

P212

Behavioural and psychological predictors of HbA1c in adolescents with type 1 diabetes: results from diabetes MILES Youth – Australia

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Objectives: Studies among adults with type 1 diabetes (T1D) suggest that diabetes distress (DD) is a better predictor of HbA_{1c} than depression, though little is known about DD among adolescents. We investigated demographic, behavioural and psychological predictors of HbA_{1c} among adolescents with T1D.

Methods: 551 adolescents (aged 13–19 years) with T1D completed a national cross-sectional survey online. Multivariate regression was conducted with self-reported HbA_{1c} as the outcome, controlling for age, gender and age of T1D onset, and the following variables entered in blocks: mode of insulin delivery (pump/injections); frequency of self-monitoring of blood glucose (SMBG); depressive symptoms (Patient Health Questionnaire 8-item adolescent version; PHQA); DD (Problem Areas in Diabetes-Teen; PAID-T).

Results: 437 (79%) respondents with T1D duration ≥1 year reported their most recent HbA_{1c} (mean ± SD: 65 ± 17 mmol/mol (8.1 ± 4.0%), age 16 ± 2 years, 63% girls, age at T1D onset 9 ± 4 years, 54% insulin pump, 5 ± 2 SMBG checks/day). 13% ($n = 57$) reported moderate-to-severe depressive symptoms and 20% ($n = 89$) severe DD (PAID-T ≥108). Both depressive symptoms ($r = 0.26$) and DD ($r = 0.36$) correlated with HbA1c ($p < 0.001$). Gender and mode of insulin delivery were not significant, while age of T1D onset and SMBG negatively predicted HbA1c ($p < 0.001$). The effect of depressive symptoms on HbA1c was no longer observed when DD ($p < 0.001$) was included. Overall, the final model explained 22% of the variance in HbA_{1c}.

Conclusion: One in five adolescents experienced substantial DD, which was more prevalent than moderate-to-severe depressive symptoms. Consistent with adult studies, we found that DD was a stronger predictor of HbA1c than depressive symptoms. Younger age at T1D onset, more frequent SMBG and less DD were independent predictors of lower self-reported HbA_{1c}. Interventions that focus on DD rather than depression may be more likely improve glycaemic control in adolescents with T1D.

P213

Health-related quality of life of children with type 1 diabetes and the relation to metabolic control

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Objectives: To investigate the health-related quality of life in children with T1D, with focus on the differences between age, gender and metabolic control and to compare children's self-reporting with reports provided by parents.

Methods: Cross-sectional data was collected from children (n = 133) with T1D and parents as proxy (n = 164) using DISABKIDS Chronic Generic Measure -37 and the diabetes specific module (DM-10). Data on HbA1c was downloaded from the Swedish national quality registry for children with diabetes (SWEDIABKIDS). Non-parametric tests were used to investigate differences.

Results: The main findings showed that there were differences between girls and boys, and that girls reported lower HRQOL than boys did (p = 0.003). There were also differences in HRQOL depending on the level of metabolic control, but to a larger extent when parents were reporting about their child's HRQOL (p = 0.044 in self reports and p = 0.001 in proxy reports).

Conclusions: Measuring health-related quality of life (HRQOL) is a way to view an individual`s perspective on health, and how type 1 diabetes (T1D) affects a child's everyday life. One important aspect is to understand how signs and symptoms of problems in the child's life can affect the medical care of children with T1D. Assessment of HRQOL can add a functional perspective on diabetes care, which is an important outcome in clinical practice. Children with T1D need to find the correct balance between psychosocial functioning and maintaining appropriate blood glucose values, which requires assessment of HRQOL contributory to metabolic control.

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P214

"Exploring Kuwaiti adults' perceptions and experiences towards insulin pump therapy (IPT) and its effect on their quality of life and glycemic control": a qualitative study

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Introduction: IPT has been shown to be an effective and safe alternative to Multiple Daily Injection (MDI) in all age groups of patients with T1DM. Innovation of insulin pump was designed to improve both glycemic control and at the same time the Quality of Life (QoL) of people with T1DM. Furthermore, the delivery of insulin via the pump system is so flexible that it allows the health care providers or the insulin pump users to adjust the insulin delivery rate whenever it is necessary.

The effectiveness and benefit of IPT has not been investigated in Kuwait. Healthcare providers and their diabetic patients need more information when making decisions to initiate this type of therapy.

Objectives: 1. To explore the experiences of Kuwaiti adults about the use of IPT, in the context of their quality of life.

2. To gain in-depth understanding of the perceptions of Kuwaiti adults with T1DM about IPT and its use for diabetes management.

Methods: Eight Kuwaiti adults with T1DM; (50% males and 50% females, mean age 34.0 ± 8.4, IPT duration 4.18 ± 2.82), were recruited. Every participant was individually interviewed by the interviewer using the topic guide. The semi-structured interview helped to explore the impact of IPT on the participants regarding the therapy benefits, effectiveness and disadvantages from their viewpoint.

Results: The thematic analysis of the transcripts led to the detection of six main themes; Health Benefits, Lifestyle Flexibility, Mood and Emotion Improvement, Practical Trouble, Physical & Personal Influence and Self-Confidence of Managing Diabetes.

Conclusion: There was general conformity among participants that the IPT had positively affected their QoL; they reported that the benefits of IPT did overcome its disadvantages. The main positive change was centered on enhanced flexibility and lifestyle regarding many aspects such as; glycemic control, eating times, food selection and exercise.

P215

The impact of sleep on adherence behaviors in adolescents with type 1 diabetes mellitus

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Objective: Adherence to the type 1 diabetes (T1D) regimen, while predictive of glycemic control, decreases during adolescence. During adolescence, attaining adequate sleep is an additional challenge. Although recommendations advise all teens to sleep 8.5–9.5 h a night, only 20% achieve this goal. This study evaluates the impact of sleep on adherence behaviors in teens with T1D.

Methods: 45 youths ages 12–17.99 years, logged their sleep for 2 weeks on a written diary. Two reviewers transcribed the sleep times into an electronic database to calculate each night's sleep duration, while corresponding insulin pump/glucometer downloads were also obtained.

Results: Data from 20 girls and 25 boys, with a mean age of 15 ± 1.6 years and mean A1c of 8.7% (68 mmol/mol) were analyzed. Self-monitored blood glucose (SMBG) frequency ranged from 0 to 17 checks per day (mean 4.6 ± 3, with only 61% of days having ≥4). Average sleep was 8.6 ± 0.9 h per night. Sleep diaries showed 31% of teens achieved the recommended goal, but on recall, 44% reported adequate sleep time. Sleep durations of 605 nights were compared to the next day's SMBG and total daily insulin bolus frequency using Generalized Least Squares and Panel Analysis. Associations were found between sleep and SMBG and sleep and insulin bolus frequencies. As compared to the mean minutes slept, every 1 min increase in sleep was associated with a 1.4% increase in SMBG frequency ($p < 0.03$) and a 1.2% increase in insulin bolus frequency ($p < 0.001$).

Conclusion: Sleep time as recalled and reported by teens was at the low end of recommendations. Our analyses suggest as sleep increases, there is an associated increase in self-management behaviors. As such, a 15 min increase in sleep is associated with 1 additional SMBG check and 1 additional insulin bolus. Given these results and the known impact of adherence on glycemic control, diabetes care teams should consider counseling teens on the importance of adequate sleep.

P216

Personality and mental health assessment: a useful pre-transition tool for youth with type 1 diabetes?

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Objectives: The transition of care from paediatric to adult services for young adults with type 1 diabetes mellitus (T1DM) is potentially associated with declining clinic attendance and deterioration of glycaemic control. Questionnaire tools to identify those most vulnerable during the transition process have not been evaluated.

Methods: This was a sub-study of participants recruited to a randomised controlled trial assessing the effect of a case management intervention on post transition clinic attendance for youth with T1DM ($n = 120$). All participants were asked to complete a web-based questionnaire assessing anxiety and depression levels (HADS) and core personality traits (NEO-FFI) at the time of transition. Clinical data included pre- and post-transition HbA1c and clinic attendance.

Results: For those with 12 months follow-up data the response rate was 57/77 (74%). Overall, moderate-severe rates of anxiety and depression were detected in 24 (30.1%) and 7 (8.9%) respectively, more commonly in females ($p < 0.01$ and $p = 0.02$). Anxiety scores predicted mean HbA1c in the first 12 months post-transition after adjustment for the pre-transition HbA1c ($\beta = 0.06$, $p = 0.02$), whereas no effect was seen with depression. Low openness was associated with reduced odds of attending the first scheduled adult

appointment (OR = 0.1, p = 0.02). Conversely, after adjustment for sex low neuroticism predicted an increase in the number of clinics attended in the first 12 months post-transition (β = 0.7, p = 0.04). No other personality traits influenced clinical outcomes.
Conclusions: Personality traits and mental health, in particular neuroticism and anxiety may interact within the individual to influence clinical outcomes. Anxiety at the time of transition identifies those at risk of deteriorating glycaemic control post-transition. Key personality traits relate to clinic attendance and difficulties with the transition process.

P217
Type 1 diabetes and disturbed eating behaviors - comorbidity, prevalence, psychological correlates and metabolic control

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Aim: To assess prevalence and psychological correlates of comorbid Type 1 Diabetes (T1D) and Disturbed Eating Behavior (DEB), and its relation to metabolic control, in a population based study.
Material and methods: A total of 770 adolescent males and females (aged 11–19 years), recruited from the Norwegian Childhood Diabetes Registry (NCDR), completed the Diabetes Eating Problem Survey - Revised (DEPS-R). A subset of 105 participants additionally underwent an in-depth investigation of eating disorder psychopathology and psychological correlates (illness perceptions, coping strategies and insulin beliefs). The NCDR collected clinical data, including HbA1c.
Results: Satisfactory psychometric properties of the Norwegian translation of the DEPS-R were reported. A total of 27.7% of the females and 8.6% of the males scored above the cut-off for DEB. Further, a total of 31.6% of the participants reported insulin restriction and 6.9% reported insulin omission following overeating. DEB and insulin restriction were associated with higher HbA1c. HbA1c correlated significantly with eating restriction, illness perception and coping strategy among females. The illness perception *personal control* contributed significantly to HbA1c in a regression model, explaining 23% of the variance among females (β = 0.48, p < 0.001). None of the variables were significantly associated with HbA1c among males.
Conclusion: DEB and insulin restriction are common among young females with T1D, and routine screening of DEB is recommended. The DEPS-R can be recommended for clinical use. Eating disorder psychopathology and psychological correlates are significantly associated with HbA1c among females.

P218
Including measures of health related quality of life into a national register requires the development of age and gender specific scores - validation of the Danish version of DISABKIDS®

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Objectives: Addressing quality of life improves metabolic control. In Denmark the aim is to include yearly screening in the National register DanDiabkids. The aim of this study was therefore to translate the HrQoL questionnaire DISABKIDS into Danish and determine validity and reliability of the Danish DISABKIDS®-Chronic-Generic-Module (DCGM-37) and Diabetes-Specific-Module (DSM-10) questionnaires in children and adolescents with T1D.
Material and methods: Children with type 1 diabetes attending the out-patient clinic at Herlev Hospital aged 8–18 years were eligible. There were 99 families accepting participation, 95 children responded. The RASCH modelling was used to test (i) unidimensionality, (ii) monotonicity, (iii) local independence, and (iv) lack of differential item functioning (DIF). The Rasch model includes statistical sufficiency meaning that it justifies the data reduction to a summated scale. If the pure RASCH model was rejected the graphical loglinear Rasch models (GLLRM) was used.
Results: The mean age was 13.1 years. There were 49% boys. Mean duration of T1D was 2.6 years and mean HbA1c was 60.3 mmol/mol. Pen treated amounted 46.4% of the children; 53.6% were on pumps. The pure RASCH model was rejected due to lack of fit. The RASCH model identified problems with item 6. Excluding item 6 improved the fit, but the model was still rejected. The model identified local dependency and some DIF. Local dependency means that the answer to one item depends on the answer to another item. Furthermore, there were gender and age differences (DIF). Therefore the GLLRM was applied to allow for local dependency and DIF. The fit of the GLLRM was satisfactory for the Danish version of the Disabkids.
Conclusions: The Danish version of Disabkids is reliable and valid for addressing quality of life. Though before starting yearly screening with Disabkids, a way to adjust for age and gender has to be developed.

P219
Diabetes-management empowerment intervention "youth for adolescents with type 1 diabetes"

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Background: Education, motivation, patient empowerment and support are the cornerstones of management of patients with type 1 diabetes (T1D). Given the increasing importance of peer relationships and role-models in adolescence, peer support has been recognized as an important factor that can affect compliance in adolescents with chronic illness.
Objectives: To present diabetes-management empowerment intervention for adolescents with poor metabolic control and to evaluate

their improvement in psychological adjustment, self-efficacy and metabolic control.

Methods: Thirty-two adolescents aged 13–18 years with poorly controlled T1D (HbA1c >8.5%) were enrolled in the program "Youth for adolescents with T1D" lasting 9 months. Intervention included monthly group meetings moderated by doctor and psychologist and mentorship program. Each participant was assigned a mentor- a young diabetic patient with excellent glycemic control. Participants were encouraged to communicate to their mentors on a daily basis using Facebook group.

HbA1c levels were measured at the beginning, at the end of the program and 6 month afterwards. Psychological adjustment to diabetes and self-efficacy were evaluated at the beginning and at the end of the program using ACC-19 and CIDS questionnaires.

Results: Eighteen (56%) patients completed the program. At the end of the intervention they showed improvement in self-efficacy ($t = 3.977$, $p < 0.01$) and had lower HbA1c level (10.12 vs 9.26%; $t = 2.613$, $p < 0.05$). Psychological adjustment to diabetes did not change. Six months after the intervention, HbA1c was still lower then at the beginning, although not significantly. During studied period, there was no change in HbA1c in dropouts.

Conclusion: Intervention programs involving peer-mentors might help adolescents with poor glycemic control to achieve better self-efficacy and improve metabolic control. However, in spite of numerous motivational activities through the program, we encountered poor compliance.

P220
What is it like to parent a child or adolescent with type 1 diabetes: A qualitative study?

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Objectives: This qualitative descriptive study explored the meaning of diabetes, emotional adjustment, and responsibility for diabetes. The aim was to explore parents need and preference for parenting intervention.

Methods: Eighteen interviews were conducted with parents of children and adolescents with type 1 diabetes. Parents were from metropolitan and rural area throughout Australia. Parents also completed on-line surveys to determine self-efficacy, and confidence in managing type 1 diabetes The survey included the Family Background Questionnaire to determine demographics, and questions about what parents would like included in a parenting intervention.

Results: This group of parents had high self-efficacy and confidence in managing type 1 diabetes. Seven themes emerged from the telephone interviews including diabetes burden, worries about the future, being like everyone else, life is not the same, incorporating diabetes into daily life, letting go, and being understood. Parents in this research project thought they had received enough support from the diabetes team and did not think they required a parenting intervention. Parents did however, indicate that contact with other parents who had a child with type 1 diabetes soon after diagnosis was invaluable.

Conclusions: For parents to participate in a parenting intervention it is important to ensure that the intervention meets parental needs and preference. Parents in this study indicated that they found diabetes teams to be supportive and would continue to ask them any medical orientated questions but prefer to ask other parents' advice about subjects they do not consider to be medically orientated. In particular, parents noted that they would be interested in hearing from other parents about useful parenting strategies and how they dealt with various parenting challenges, but did not generally feel that they needed to participate in a parenting intervention.

P221
Attention deficit hyperactivity disorder and metabolic control in adolescents with type 1 diabetes

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Background: Type 1 diabetes mellitus (T1DM) is the most common form of diabetes in childhood. Good metabolic control is crucial for preventing late chronic complications. Attention deficit hyperactivity disorder (ADHD) is one of the most common psychiatric diagnoses in childhood and can affect daily functioning on many levels. We aimed to identify adolescents with T1DM and ADHD and assess the effect of ADHD on metabolic control.

Materials and methods: A cross-sectional case-control study included 101 patients (11–17 years) with T1DM. Development and Well-Being Assessment (DAWBA) questionnaire and psychiatric clinical examination were used to identify a group with T1DM and ADHD. Indicators of metabolic control were collected from available medical documentation for the last 12 months and compared between cases (patients with T1DM and ADHD) and controls (T1DM patients without ADHD).

Results: 12 of 101 adolescents with T1DM were diagnosed with ADHD according to DAWBA questionnaire and psychiatric examination. We found a statistically significant difference ($p = 0.04$) in glycated haemoglobin (HbA1c) between the two groups. HbA1c was higher in the group with T1DM and ADHD compared to the control group ($8.6 \pm 0.8\%$ or 70.5 ± 6.5 mmol/mol compared to $8.0 \pm 1.1\%$ or 65 ± 9.7 mmol/mol; $p > 0.05$).

Conclusion: It is known that ADHD significantly affects daily functioning in a child or adolescent. In this study it was confirmed that adolescents with T1DM and ADHD had worse metabolic control than the control group. Managing T1DM in pediatric patients with ADHD needs more attention and parent suppervision. DAWBA can be used as a screening diagnostic screening tool, but additional psychiatric examination and therapeutical support are needed as well.

P222
The teenage brain: executive functions and diabetes management

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Objective: Diabetes adherence typically declines in adolescence. Major development of executive functions (EF) such as inhibition, planning, and problem-solving occurs during adolescence, at the same time that teens take on more responsibility for diabetes tasks. Understanding the relation between EF and diabetes management is important for optimizing adolescent adherence. We aim to draw on recent neurobiological findings and current theories to propose a model for how adolescent EF may impact diabetes care.

Table 1 Examples of hot and cool EF in T1D care

Cool EF	Hot EF
Plan and execute T1D care (e.g., check blood glucose)	Manage frustration with out of range blood glucose values
Problem-solve diabetes management in new situations (e.g., vacations)	Engage motivation to stop pleasurable activity (e.g., basketball) to conduct diabetes care
Keep supplies available and organized	Negotiate conflicting goals of fitting in with peers and conducting diabetes care tasks

Method: Synthesize research on EF in adolescence and the relation between EF and chronic illness management, drawing on the theoretical constructs of "hot" and "cool" cognition. Apply concepts of EF to diabetes management behaviors. Critically review current EF measures for clinical use.
Result: Adolescents show competence in "cool EF" earlier than "hot EF." Thus, teens may show greater difficulty managing diabetes in socially and emotionally engaging environments despite competence in cool EF skills related to planning and conducting diabetes tasks.

Most measures of EF in T1D research are questionnaires and have yielded inconsistent findings. Measures assessing both 'hot' and "cool" aspects of EF, in conjunction with measures of self-control and problem-solving, may provide more ecologically-valid assessments of EF in diabetes care. We provide a discussion of this new assessment approach.
Conclusion: EF is important to consider in understanding adolescent adherence to diabetes care. EF may have implications for identifying readiness to shift diabetes responsibilities to teen. Future research should focus on understanding which aspects of EF are important for diabetes care in adolescence; validating clinically-useful measures of EF for adolescents with T1D; and testing intervention and treatment options (e.g., behavioral, pharmaceutical) that take EF into account.

P222bis

A service model for the prevention and management of disordered eating and clinical eating disorders in adolescents with type 1 diabetes

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Objectives: To outline a service model for the prevention and management of disordered eating and clinical eating disorders in adolescents with type 1 diabetes.
Methods: Diabetes clinicians and eating disorder specialists developed management pathways for three groups of high risk patients.

1. Newly diagnosed patients with pre-existing weight/shape concerns, low self-esteem and/or inadequate family and social support
2. Those suspected or identified as having disordered eating
3. Those with established clinical eating disorders.

Results: Psychosocial screening for all patients is recommended to identify high risk patients. Resilience, comprehensive education and social support programs should be implemented to prevent disordered eating occurring. For patients with disordered eating, a three session intervention is proposed encompassing psychoeducation, general coping and tailored coping skills. Referral to eating disorder specialists and dual care pathways with both teams is recommended for those with established clinical eating disorders.
Conclusions: The expertise of two highly skilled medical teams was utilised to develop a model that could be adapted for other diabetes services.

Poster Tour 23: Psychosocial Issues in Diabetes III

P223

Prevalence of disordered eating behaviours and body dissatisfaction in adolescents with type 1 diabetes: results from diabetes MILES Youth - Australia

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Objectives: To assess prevalence of self-reported disordered eating behaviours (DEB) and body dissatisfaction (BD) in adolescents with type 1 diabetes (T1D).

Methods: In a national online survey, adolescents (13–19 years) with T1D for ≥1 year, completed the Diabetes Eating Problem Survey-Revised (DEPS-R), a measure of disordered eating and the BMI-SMT, a scale consisting of 4 BMI-level matched gender-specific silhouettes. Magnitude of BD was calculated by subtracting perceived current from ideal body image scores. Binge frequency (i.e. days in past 2 weeks) was recorded.

Results: Of 515 adolescents fulfilling the inclusion criteria, 477 (93%) completed the DEPS-R (age 16 ± 2 years; 62% girls; diabetes duration 7 ± 4 years; HbA1c 66 ± 17 mmol/mol; 53% insulin pump). DEPS-R mean total score (max 80) was significantly higher for girls than boys (22.2 ± 15.2 vs 11.4 ± 10.0, $p < 0.001$); gender differences were more pronounced with increasing age. 25% girls and 16% boys reported bingeing ≥4 days in the past 2 weeks. BMI (controlled for age/sex), HbA1c and binging frequency were positively associated with DEPS-R for both sexes. On the BMI-SMT, 88% of girls wanted to be thinner with 8% reporting an extreme desire to be thinner (diff >10 [max diff = 26]). 43% boys wanted to be thinner and 33% larger. DEPS-R was positively associated with current body image and the discrepancy between current and ideal for both sexes, and was negatively associated with ideal body image for girls (all $p < 0.001$).

Conclusions: A large proportion of girls reported DEB, frequent binge eating and BD, some expressing extreme dissatisfaction and a strong preference to be thinner. Boys reporting BD were split between wanting to be thin or large; but DEB and binge eating were less prevalent. Differences in BD between sexes highlights the need for gender-specific screening tools. Also, frequent screening for DEB in T1D is prudent, given the high levels of self-reported DEB and binge eating within the sample.

P224

Confirmatory factor analysis of the hypoglycemia fear survey for parents of young children (HFS-PYC) in a sample of intensively managed kids

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Objective: To evaluate the psychometric properties of the HFS-PYC, a measure of parent's hypoglycemia fear, in a sample of young children on intensive insulin therapy (IT).

Methods: Parents completed the HFS-PYC, a 26-item questionnaire. Parents rated the frequency of occurrence of each item on a 5-point Likert scale anchored from "never" to "very often." We assessed family demographics, item descriptives, and used confirmatory factor analysis (CFA) to exam the two factor structure, Worry and Behavior, previously described for the HFS-PYC in a mixed sample of young children on IT or conventional therapy (CT).

Results: Parents of 117 young children participated. Mean child age and HbA1c were 5.2 ± 1.3 years and 8.2 ± 1.1% (66.1 mmol/mol), respectively. Parents' mean item response was 3 ± 1.2, suggesting a tendency to rate items occurring at least "Sometimes." The predicted two factor structure is shown in Figure 1 and accounted for 40% of item variance (KMO = 0.81, Bartlett's $p < 0.001$). Three original questions did not load on either factor, suggesting these items may not be relevant for parents of children on IT.

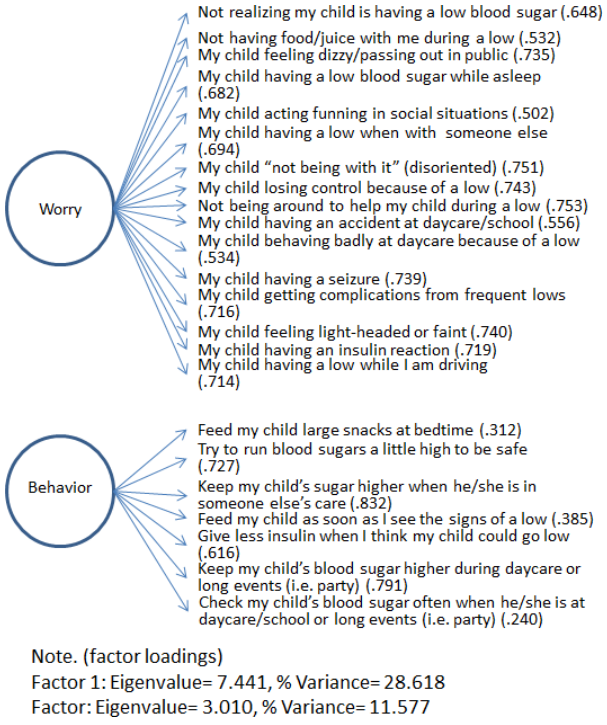

Figure 1 HFS-PYC factor structure.

Conclusions: Although originally used in a mixed sample of young children on IT or CT, the expected two factor structure of the HFS-PYC also fit adequately for our sample of IT-only young children and CFA reduced the HFS-PYC from 26 to 23 items. The HFS-PYC appears initially valid for use in families of young children on IT and to be a useful clinical and research tool.

P225

Glycemic control and quality of life in type 1 diabetes children: crucial role of parental bonding and family involvement, despite poverty

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Objectives: To understand the roles of psychosocial factors like family involvement (parental bonding) and coping strategies (resilience), on glycemic control and quality of life, in adolescents with type 1 diabetes in India.
Methods: 55 adolescents (Type 1 Diabetes >6 m; Age 10–18 years; DISHA Free Diabetes Clinic, India) and their parents. Questionnaires: Administered to adolescents and parents. Quality of Life: PedsQL 3.0 Diabetes - Adolescent and Parent; Upper limit 112 = worst quality of life. Parental Bonding [PB]: Mother and Father - by adolescent; Higher score greater bonding. Resilience: The Child Youth Resilience Measure.
Results: Stronger parental bonding [both mother and father] was associated with progressively step wise better glycemic control; this association was relatively stronger for "care," than "protection" scores. Stronger family involvement and better glycemic control, translated to higher quality of life, especially as self-reported by the adolescents [than by parents]. There was a negative correlation [trend] between HbA1c values and total resilience ($p = 0.06$); as reported by parents, than the adolescents. There was no gender difference between girls and boys in terms of resilience.
Conclusions: Family functioning and dynamics ("optimal parenting," "affectionate constraint," "affectionless control" and "neglectful parenting") are intimately related to adaptation to chronic illnesses like diabetes, highlighting their importance in holistic type 1 diabetes therapy - short and long term ("Insulin, love and care: Prof J Ludviggson"). Likely the health benefits of parental bonding, family involvement, coping and resilience are *universal* across all socioeconomic groups (poor and rich - studies in progress), and in all societies.

Glycemic control quality of life parental bonding

HbA1c % groups	PedSQL3 - child	PedSQL3 - parent	PB - father	PB - mother	HbA1c %mean
7–9	27	29	37	39	8.0
9–12	32	38	33	33	10.4
>12	38	38	29	29	13.6

P226

The role of parenting interventions in the management of children with type 1 diabetes

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Background and objectives: Type 1 diabetes is a serious, life-long disease which results in significant health, social and economic burden for affected children, their families, and the community. Poor management and non-adherence to management plans is a persistent problem, leading to serious short-term and long-term complications. Importantly, parenting and family factors are associated with variations in child wellbeing, child behavior problems, treatment adherence, and glycaemic control. Parent-child interactions and parenting have been identified as promising points of intervention for a number of childhood chronic health conditions. The purpose of this review was to evaluate the efficacy of parenting interventions for parents of young children (2–10 years) with type 1 diabetes.
Methods: We undertook a systematic review of randomised controlled trials of interventions for parents of children with type 1 diabetes, examining the effectiveness of interventions in improving a range of child, parent, and family outcomes. Electronic searches were conducted for seven databases (CENTRAL, CINAHL, MEDLINE, PubMed, PsycINFO, Scopus, and Web of Science) from their start dates until November 2013.
Results: Seven articles, representing five studies, met the inclusion criteria. Study findings suggest that parenting interventions may help to improve child health outcomes, child behaviour difficulties, parental behaviour, parents' psychological distress, and parental involvement in diabetes management. The intervention programs described in the included studies comprise multiple components; thus, it is difficult to establish the contribution of the parenting components to improving outcomes.
Conclusions: This review suggests the need for further well-designed trials of parenting interventions to determine their specific contribution to improving outcomes for this clinical population.

P227

Psychological distress in parents of children and adolescents with T1D

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Objectives: Parents of children with type 1 diabetes (T1D) have the most important role in daily diabetes management therefore they often experience diabetes related distres. The association between parental psychological well-being, diabetes-related distress and child's glycemic control is well known, however, the differences between mothers and fathers of children with T1D in experiencing diabetes-related distress, fear of hypoglycemia, anxiety and psychological well-being are still limited in research.
Methods: Parents of children aged 2–17 years and with minimal 1 year duration of T1D completed the Problem areas in diabetes - parent version, the Hypoglycemia Fear Survey - parent version, the State Trait Anxiety Inventory, the Satisfaction with life scale and the Positive and negative affect schedule.
Results: Study included 237 parents (143 mothers and 94 fathers) of 150 children with T1D and 204 parents (153 mothers and 51 fathers) of children without diabetes mellitus or any other chronic illness. Mothers of children with T1D reported higher diabetes related distress ($p = 0.002$), had significantly higher fear of hypoglycemia

($p = 0.024$), reported higher anxiety ($p = 0.017$) and higher negative affect ($p = 0.045$) comparing to fathers. Parents of children with higher HbA_1c reported higher levels of diabetes related distress, fear of hypoglycemia, lower satisfaction with life and less positive affect. Parents of children with T1D reported more positive affects ($p = 0.008$) and were less satisfied with their life ($p = 0.003$) than parents of control subjects.

Conclusions: The results of the study indicated the association between higher parental diabetes related distress with higher psychological distress and worse well-being as well as child's higher HbA_1c. Psychological interventions could help to recognize potential risk patterns of parental distress which could have important impact on child's glycemic control as well as parental well-being.

P228

Standardised analysis of psychosocial and disease-specific risk factors of patients and parents attending the clinic for adolescents with type 1 diabetes at Princess Margaret Hospital, Western Australia

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Introduction: T1DM has significant psychosocial impact on patients and their families. Adolescence is a particularly challenging period: glycaemic control deteriorates frequently, patients experience life-threatening situations (diabetic ketoacidosis) and require assistance from social workers and psychologists. In 2012 we administered an in-house 35 item questionnaire based on the HEADSS-scheme to 64 adolescents with T1DM and 61 parents. Results highlighted specific problem areas enabling focused care.

Objective: To further explore adolescent diabetes-related problems. To ascertain the themes of difficulty both parents and adolescents with T1DM face with their day-to-day routine. To compare the psychosocial challenges experienced by patients and parents.

Methods: In cooperation with Northwestern University and the Feinberg School of Medicine in Chicago, we used the Problem Areas in Diabetes-Teen (PAID-T) and Teen-Parents (PAID-TP). These questionnaires are validated and evidence-based assessment tools to identify psychosocial issues in diabetic adolescents and their parents. This 26-item questionnaire was implemented in our clinics.

Results: 169 questionnaires were completed. BGL, insulin dosing and emotional stressors were identified as the most difficult aspects of diabetes management. 95% of patients thought they had sufficient information and education about diabetes. 77% of parents and 65% of adolescents thought it was harder to manage diabetes in adolescence. Adolescents think their "parents worry too much about diabetes." Both groups agreed that they are more concerned about diabetes management than common adolescent issues.

Conclusion: PAID was useful in engaging patients, identifying problem areas and emotional distress, created team discussion and confirmed the high burden of diabetes management on teen and parents.

P229

Validation of the DAWN mind youth questionnaire (MY-Q) in Australian youth with type 1 diabetes

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Assessing quality of life (QoL) and tailoring interventions specific to how adolescents have responded can lead to better glycaemic control and improved QoL in a number of areas. DAWN Youth developed the MY-Q, a comprehensive, holistic assessment tool specific for youth living with the burden of type 1 diabetes which was validated in Dutch youth during 2011. A feasibility study using the MY-Q, conducted at the Queensland Diabetes & Endocrine Centre and the Royal Children's Hospital in 2012–2013, demonstrated that psychosocial assessment during routine diabetes care was well received by the majority of youth and diabetes clinicians. Findings from this study indicated that emotional well-being could not be assumed without asking the relevant questions. The diabetes team at the Queensland Diabetes and Endocrine Centre have adapted the Monitoring Individual Needs in Diabetes Youth Questionnaire (MY-Q) to suit Australian adolescents.

Objectives: Our aim is to validate the MY-Q for Australian adolescents and explore trends of health related QoL for adolescents living with type 1 diabetes.

Methods: Adolescents aged 13–18 years were invited to complete the MY-Q questionnaire during their routine diabetes outpatient appointment. Participants were also asked to complete a series of validated questionnaires, which were used to assess validity and reliability of the MY-Q. These include the Children's Depression Inventory Version 2 (CDI-2), the Eating Disorder Inventory Risk Composite (EDI-3RC) and the PedsQL generic and diabetes modules. Questionnaires were scored and the outcomes discussed with participants and their diabetes clinician.

Results: Correlations between participants' scores on the MY-Q and scores on the CDI 2, EDI-3RC and PedsQL were analysed to determine the validity of the MY-Q. Correlations between demographics, clinical characteristics and QoL were also investigated to determine the relationships between specific variables.

P230

Experience in correction of psychasthenic states in families with newly diagnosed diabetes in children

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Objective: Evaluate the experience of correction psychasthenic states in families with newly diagnosed diabetes in children in terms of children's hospital.

Materials and methods: Analyzed psychological status of 20 parents of children with newly diagnosed diabetes, who was hospitalized to the endocrinology Department of Samara city children's clinical hospital №1. The evaluation was conducted in the first days after admission and at discharge of patients after a course of individual and group psychological correction, and training in school of self-control. In the control group analyzed the results of testing 5 parents that have passed the course of study in the school of self-control without psychological correction. The techniques used for diagnostics of attitude to the disease of the child was Luscher Color test. We

also used the test study of anxiety method of differential diagnosis of depressive States of dung, etc.

Discussion: The evaluation of the intensity level of anxiety and stress revealed a significant increase, the ability of affective action, irritability, anxiety, uncertainty at 98.6% of the respondents obtained a reduction in the coefficient of subjective well-being in parents of patients with diabetes to 1.66%. After the course correction and learning expressed a negative attitude to the child's illness has decreased to 42.3%, and changed the nature of the experiences, efforts to get out of an unfavorable situation, hope for good prospects in the future. In the control group, the decrease in the negativity expressed to a lesser extent, to 56%.

Conclusions: The introduction of psychological care for patients with diabetes and their families, especially when first identified the disease, improves the efficiency of communications between physician and patient and family to set for further interactio, thereby improving the compensation of the disease.

P231

To evaluate potential moderators of the relationship between adolescent 'perceptions of competence' and HbA1c in T1DM: the ASSIST study

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Objectives: Studies have found higher levels of perceived competence (the degree to which patients feel they can manage daily aspects of diabetes care) to be associated with lower levels of HbA1c. This study aimed to look at whether this relationship is moderated by (a) perceptions of responsibility for diabetes management tasks and (b) perceptions of the degree to which the diabetes team are autonomy supportive (versus controlling) in consulting with them.

Methods: Adolescents ($N = 66$) and their parents attending regular diabetes clinic visits completed a battery of self-report questionnaires aimed at assessing perceived competence (Perceived Competency for Diabetes Scale), perception of autonomy support from their diabetes team (Healthcare Climate Questionnaire) and degree of responsibility for their diabetes management (Diabetes Family Responsibility Questionnaire). In addition, HbA1c was recorded at each clinic visit.

Results: HBA1c levels were significantly associated with perceived competence ($r = -0.34$, $p < 0.05$). Regression analysis revealed that over one third (39%) of the variance in perceived competence was significantly associated with the adolescent having a higher level of perceived autonomy support from their diabetes team ($\beta = 0.41$, $p < 0.001$) and having more diabetes management responsibility ($\beta = 0.41$, $p < 0.001$). Parent ratings of both autonomy support from the diabetes team and adolescent diabetes management responsibility were not found to account for any of the variance in the adolescents' perceived competence.

Conclusions: Adolescent perceptions of both autonomy support from the diabetes team and the degree of responsibility for diabetes management appear to moderate the relationship between perceived competence and HbA1c. Increasing perceptions of both autonomy support and diabetes management responsibility should be included in psychological interventions aimed at improving perceived competence and HbA1c in adolescents.

P232

Quality of life in children with type I diabetes mellitus in Minia governorate, Egypt: relationship with mood and family attitudes

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Introduction: Health-related quality of life indicates the extent to which a disease or medical condition impacts upon the daily physical, emotional, mental and contextual well-being of an individual. It is widely assumed that DM can result in psychological, social and physical problems. Furthermore, quality of life is considered to be a significant indicator of disease prognosis.

Aim of the study: To evaluate the health related quality of life of children with type 1 diabetes, as well as the impact of mood and family attitudes on their quality of life. In addition the relationship between these variables and the metabolic control of these children will be studied.

Subjects and methods: This study was carried upon 72 children with type 1 diabetes according to the criteria of ADA, 2010. They will be subjected to; history taking, clinical examination, application of Peds QL (Diabetes ModULE, Version 3), childhood Depression Rating Scale (CDR), family Attitudes Questionnre and laboratory investigations including: HbA1c%, lipid profile.

Results: This study found that diabetic patients espeicially poorly controlled had significant higher CDI Score and Total parenting stress index than the control group. There were significant positive fair correlations between the age, weight and BMI, with the child PedsQL, the parent PedsQL and CDI Total Scores. CDI total score was significant higher in patients with longer duration of DM. Concerning the glycemic control, there were significant positive fair correlations between CDI Total Score with frequency of DKA attacks and HbA1c%.Finally, there were significant positive relationship between CDI total score and PSI score and a significant negative relationships between PSI score and Peds QL (child and parental).

Conclusion: Diabetic patients especially poor controlled had significant higher CDI Score and Total parenting stress index which had significant impact on their quality of life and glycemic control.

Poster Tour 24: Thyroid

P233

Grave's disease presenting as life threatening thyrotoxic hypokalaemic periodic paralysis in a Caucasian boy

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Objective: Thyrotoxic hypokalaemic periodic paralysis is reported commonly in young adult males of Oriental Asian origin, occurring in 1.9% and 1.8% of cases of hyperthyroidism in Chinese and Japanese populations respectively. It is rare in Caucasian ethnicities, especially in paediatrics. We describe a case of an adolescent Caucasian male who presented with life-threatening hypokalaemic periodic paralysis as his first manifestation of Grave's disease.
Case: A previously well 15 years old Caucasian boy presented with acute onset of lower limb paralysis and weakness of upper limbs. He had grade 1/5 power in lower limbs and grade 3/5 power in upper limbs. He was fully conscious and had no sensory deficit. He was tachycardic (HR 120/m) and hypertensive (BP 150/85 mmHg). His initial blood gas showed hypokalaemia (K^+ 1.5 mmol/l). During assessment, there was a brief period of asystole that required external cardiac massage. He was commenced on potassium infusion. Examination revealed a diffusely enlarged thyroid gland with bruit. Laboratory results showed hyperthyroidism with f T4 of 50 (11–19 pmol/l), f T3 of 32 (3.0–6.0 pmol/l) and suppressed TSH of <0.01 (0.4–4.0 mU/l). A diagnosis of Thyrotoxic Hypokalaemic Periodic Paralysis was made and he was commenced on propranolol and carbimazole. His TSH receptor antibodies were positive. He subsequently underwent total thyroidectomy as definitive treatment.
Discussion: Thyrotoxic Periodic Paralysis (TPP) is characterised by the triad of acute onset of hypokalaemia, periodic paralysis mainly affecting the lower limbs and thyrotoxicosis. It can be misdiagnosed as familial hypokalaemic periodic paralysis. The differentiating features being the absence of a family history of periodic paralysis, and an association of tachycardia and hypertension with hypokalaemia. Early diagnosis aids in definitive management and prevention of rebound hyperkalaemia due to excessive potassium replacement.

P234

Neonatal Graves' disease with sustained hypothyroxinaemia post cessation of antithyroid medication

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Objective: This is a case series of two infants with neonatal Graves' disease with prolonged hypothyroxinaemia unrelated to initial treatment for neonatal hyperthyroidism. The mothers of both infants had Graves' disease with previous thyroidectomy and high circulating thyroid stimulating hormone receptor (TSHR) antibodies during the pregnancy.
Methods: Neonatal Graves' disease was diagnosed based on significant elevation of free thyroxine (FT4) on screening thyroid function tests and strongly positive TSH receptor antibodies. In one patient, intermittent tachycardia was noted on cardiac monitoring but otherwise no other overt symptoms of hyperthyroidism were noted.
Results: After initial treatment with carbimazole, monitoring of thyroid function tests revealed ongoing suppression of TSH and sustained low FT4 levels more than 1-month post carbimazole cessation. This prompted commencement of thyroxine replacement with subsequent normalisation of FT4 levels.
Conclusion: In neonatal Graves', delayed recovery of TSH is postulated to be due to suppression of the pituitary-thyroid axis by fetal hyperthyroxinaemia. Possible mechanisms to explain ongoing hypothyroidism without recovery after cessation of carbimazole could include the concept of 'switching' between hyperthyroidism and hypothyroidism in the setting of persistently suppressed TSH. The use of antithyroid medication in reducing thyroid stimulating antibodies along with disappearance of transplacentally transferred maternal antibodies over time may result in the increased synthesis of thyroid blocking antibodies. However persistently suppressed TSH may also be explained by the lack of normal feedback regulation, hence the subsequent development of hypothyroidism in both of these patients. This case series highlights the importance of ongoing screening thyroid function monitoring in infants with neonatal Graves' disease.

P235

Serum free thyroxine distribution in euthyroid thyroxine treated children with primary hypothyroidism

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Objective: Retrospective study of FT4 & FT3 distribution in children on thyroxine therapy to guide optimal monitoring for all children on thyroxine, including those with central hypothyroidism.
Methods: FT4 & FT3 results (Beckman Coulter DxI 800) over a 9-year period from patients aged 30 days to 19 years with TSH in the normal range (0.4–4.0 mU/l) were extracted from the Monash Pathology database. Patients with primary hypothyroidism were identified by treating physicians or medical records (thyroxine-treated group). Patients with a single record of thyroid function testing, not known to have thyroid disease or thyroxine therapy were analysed separately (control group). The FT4 & FT3 ranges (median, 2.5th–97.5th) were calculated. Results of thyroxine-treated group were compared to the manufacturer's reference intervals (RI) (FT4: 7.9–14.4 pmol/l; FT3: 3.8–6.0 pmol/l) & the control group.
Results: In the control group, FT4 (n = 3128) was 11.1 pmol/l (7.9–16.4) & FT3 (n = 660) was 5.6 pmol/l (3.7–7.3). In the thyroxine-treated group (congenital hypothyroidism (n = 89) & autoimmune hypothyroidism (n = 33)), FT4 (n = 747) was 14.5 pmol/l (9.2–22.6) & FT3 (n = 146) was 5.6 pmol/l (4.3–7.6) respectively.
Conclusion: In thyroxine-treated hypothyroidism with normal TSH, FT4 upper limit was 38% higher than the control group & 57% higher than the RI. The corresponding FT3 limit was no different compared to the control group but were 27% higher than the RI.

This study suggests target FT4 in children on thyroxine should be set well above the Beckman's RI & our in-house control interval. In addition, FT3 intervals for both thyroxine-treated & untreated should be higher than the RI. Further studies are required to establish similar ranges for other methods. These results reflect the understanding that higher FT4 level is required when FT3 is entirely dependent on peripheral conversion of administered T4.

P236
Variable neonatal impact of maternal hyperthyroidism in pregnancy

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Graves' disease occurs in 1.1% of the population but often remits during pregnancy [1], affecting only 0.25% of pregnancies [2]. Of these, only 1–5% of neonates become clinically hyperthyroid, a 1 in 50,000 incidence [2]. Mortality is up to 25%, primarily due to heart failure.

Over the last 20 years, our service has reviewed 17 infants born to mothers with Graves' disease (n = 15) or thyrotoxic in pregnancy secondary to thyroid nodules (n = 2), with 12 cases since 2010. Fourteen infants were biochemically hyperthyroid after birth (13 of mothers with Graves'); with 9 symptomatic. Three infants were biochemically hypothyroid, 2 were born to mothers with autonomous nodules.

Presenting features included tachycardia (n = 5), poor growth (4), jitteriness (4), respiratory distress (3), hypertension (3), goitre (3) and diarrhoea (1). Six infants were delivered prematurely due to poor growth.

Of women with Graves', 8 had antenatal TSH receptor antibody (TRAb) titres more than 10 times normal (<1 U/l), 6 had lower level elevation. Five infants with higher maternal titres were symptomatic. In 7 infants with TRAb measured, 6 had elevated titres, 3 were symptomatic.

Eight of 11 infants with suppressed TSH were symptomatic, and 1 of 6 with normal TSH. Free T4 was elevated in 13 infants. Eight infants required treatment, 7 with carbimazole, 1 with propylthiouracil and 2 with propranolol due to tachycardia, with all off treatment by 14 weeks of age. Only 2 infants had repeat TRAb titres performed, both undetectable by 8 weeks of age.

The cohort highlights the variable neonatal impact of maternal hyperthyroidism and confirms its' transiency, with resolution by 3 months of age. Previous studies have attempted to associate maternal TRAb titre with neonatal thyrotoxicosis risk [3] but this association was poor in our cohort.

References:

1. Gonzalez-Jimanez A, et al. 1993 Thyroidology; 5(1): 13–20.
2. Levy-Shagra Y, et al. 2014 Thyroid; 24(6): 1032–1039.
3. Skuza KA, et al. 1996 J Pediatr; 128(2): 264–8.

P237
The tale of two sisters: raised thyroglobulin with isolated hypothyroxinaemia - a potential sign of underlying genetic abnormality

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Objective: This is a case series of two sisters aged 6-years (patient A) and 4-years (patient B) with incidental finding of markedly raised thyroglobulin (TG) and low FT4 identified on screening investigations for multiple food intolerances and behavioural concerns. Both siblings were otherwise well with no significant past medical or family history.

Methods: Initial test for pt A: TSH 5.9 mU/l (reference interval (RI): 0.3–5), FT4 7.1 pmol/l (RI: 7.5–21.0) and pt B: TSH 3.96 mU/l, FT4 9.3 pmol/l prompted further testing given incongruity of TSH response to low FT4. Nutritional assessment included low spot urinary iodine (UI), 2 and 12 μg/l for patient A and B respectively.

Results: Both patients had negative anti-thyroid peroxidase and anti-TG antibodies. Further tests of pituitary function of IGF-1, IGFBP3, LH, FSH, ACTH, cortisol & prolactin were unremarkable for both siblings. TG was significantly elevated in both - patient A: 390.3 μg/l (RI: 1.1–35.0) and patient B: 484.5 μg/l. Repeated TSH levels in 2 weeks were in the normal range, however low FT4 persisted prompting TRH stimulation test, which showed normal response of TSH peak of >30 mU/l at 20–30 min post-stimulation. Parents and eldest brother had normal TG and thyroid function tests.

Conclusion: The potential mechanism for raised TG in these sisters remains unclear. Although iodine deficiency may explain raised TG level and low T4, TSH levels were within normal limits. TG gene mutations have been identified in congenital hypothyroidism with associated low TG levels, however there is limited literature on mutations associated with elevated TG levels. Further investigations including thyroid ultrasound, following trend of TG and thyroid function tests and eventually targeted genetic testing may help provide a diagnosis for the sisters.

P238
Neuropsychological outcomes in children with subclinical congenital hypothyroidism

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Background: Untreated severe congenital hypothyroidism (CH) results in intellectual retardation, but there is debate whether mild abnormalities in thyroid function pose any risk to childhood development. In New Zealand newborn screening levels <15 IU/l (termed subclinical congenital hypothyroidism; SCH) are not investigated further. Other countries use lower TSH cut-offs for CH diagnosis, but it is unclear whether SCH has long-term impacts on neurocognitive development. We hypothesised that children with SCH at birth would display no adverse cognitive outcomes.

Methods: Participants were healthy children aged 6–11 years with SCH at birth (n = 53) and mostly sibling controls aged 6–16 years (n = 50). Screening TSH values were 9–14 mIU/l. Cognitive assessments included WISC, Beery VMI, MABC-2, BRIEF, and SDQ.

Results: At assessments, TSH levels in SCH children were within normal range (TSH 2.31 mIU/l). Overall scores on all test measures

were similar between subject and control groups. Surprisingly, in the SCH group increasing newborn TSH was associated with decreasing scores of verbal ($\beta = -4.15$), non-verbal ($\beta = -2.29$), and full-scale ($\beta = -2.89$) IQ. Female SCH performed more poorly than female controls on behaviour and executive functioning measures ($p < 0.05$), whereas male CHT performed better than male controls on movement, behaviour, and executive functioning measures ($p < 0.05$). However, gender differences were only observed on an unblinded parental questionnaire.

Discussion: TSH levels at birth were associated with reductions in IQ in later childhood. We speculate that mild elevations in newborn TSH reflect an environment that predisposes to lower IQ rather a direct effect of SCH on neurodevelopment.

P239

Subtle reduction in TSH following structural traumatic brain injury in early childhood

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Objective: We aimed to assess whether the severity of traumatic brain injury (TBI) was associated with changes in circulating thyroid hormone concentrations in childhood.

Methods: A total of 198 survivors of structural TBI sustained in early childhood were studied 6.5 ± 3.2 years after injury. Structural TBI was graded according to the Abbreviated Injury Scale for the Head Region (AIS-HR). All participants had a structural TBI with AIS-HR ≥2, essentially a skull fracture, intracranial hemorrhage, or cerebral injury. Baseline fasting serum samples were taken for thyrotropin (TSH), free thyroxine (fT4), and free triiodothyronine (fT3).

Results: Increasing TBI severity (i.e. greater AIS-HR scores) was associated with a progressive reduction in serum TSH concentrations ($p = 0.0007$). Thus, children with an AIS-HR score of 2 (mildest) had a mean TSH concentration of 2.31 mIU/l compared to 1.40 mIU/l for those with an AIS-HR of 5 (40% difference; $p = 0.0004$). Overall, increasing TBI severity was not associated with changes in fT3 ($p = 0.18$) or fT4 ($p = 0.78$) concentrations. However, the most severe TBI cases (AIS-HR = 5) had lower fT3 concentrations than the rest of the cohort: 6.28 vs 6.64 pmol/l ($p = 0.044$).

Conclusions: Increasing TBI severity is associated with a progressive but subtle reduction in serum TSH concentrations in childhood in the long-term. However, thyroxine levels remained in the normal range. Follow-up of these children will be important to exclude later central hypothyroidism.

P240

Audit of thyroid carcinoma in children, adolescents and adults

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Background: Thyroid carcinoma is the most common endocrine malignancy and secondary malignancy for childhood cancer survivors. Radiation exposure has been clearly linked to risk. Thyroid nodules in children have a high risk for malignancy. Reported incidence of thyroid carcinoma after radiation is 20 times population risk, due to improved long term childhood cancer survival and more active surveillance. Despite metastatic disease being common, survival rate is high.

Objectives: To review a series of patients with thyroid carcinoma seen over 25 years.

Method: Retrospective case note review of all thyroid carcinoma diagnosed from 1989 to 2014 in children, adolescents and those adults who had a history of childhood radiation exposure.

Results: Forty-six patients were identified. Thirty nine (84.8%) had papillary thyroid carcinoma, five (10.9%) follicular carcinoma and two (4.3%) medullary thyroid carcinoma (MEN2B). Thirty three had childhood radiation exposure (17 females) with thyroid malignancy occurring 6–37 years later. Thyroid cancer in patients 16 years and under was seen in twenty-two patients (47.8%). Smallest nodule size was 4 mm. Total thyroidectomy was performed for all. Central node clearance with first surgery commenced in 2005, after several late metastases occurred. Diagnostic rTSH stimulated I^{123} scan was performed for all, with ablative I^{131} if any uptake was seen. Sixteen patients (32.6%) had metastases: to lymph nodes (16), lungs (5), skeletal muscle (2) and bone (1). Twenty four (52.2%) had I^{131}, four requiring multiple courses. Forty two patients with papillary and follicular carcinoma are alive and tumour free. For medullary carcinoma, one continues treatment and one died.

Conclusions: Ultrasound screening is required for early diagnosis as small nodule size is not predictive of benign histology or absence of metastases. Central node clearance provides better outcome. Despite metastatic disease at presentation in some, prognosis is favourable.

P241

A tale of two syndromes: an instructive case of two synchronous variants in *ABCC8* and *DICER1*

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Aim: To determine the genetic aetiology for an ovarian tumour and a multinodular goitre (MNG) in an adolescent with a past history of congenital hyperinsulinism (CH).

Patient details: The proband presented at 11 years with a sertoli-leydig cell tumour (SLCT). At 13 years, thyroidectomy was undertaken due to painful, tender and enlarging nodules of a MNG.

She developed CH shortly after birth, requiring diazoxide until 24 months. She had infantile eczema and failure to thrive. A small bowel biopsy at 6 months showed partial-subtotal villous atrophy. A low allergen diet was commenced and gastrointestinal symptoms resolved by 22 months. Repeat biopsy had minimal inflammatory features. Developmental delay was noted during childhood.

Her parents were not related. They reported maternal secondary degree relatives with papillary thyroid ($n = 1$), breast ($n = 1$) and ovarian cancer ($n = 2$); and cervical cancer in a paternal second degree relative.

Genetic studies: Sequence analysis of genomic DNA for *ABCC8* and *KCNJ11* genes, identified an *ABCC8* heterozygous missense mutation p.G316R (identified previously in patients with CH). Genetic analysis of parental DNA is pending.

Sequence analysis of genomic DNA identified a germline *DICER1* mutation c.5441C>T. Somatic *DICER1* mutations c.5125G>A (p.D1709N) and c. 5425G>T were found in the SLCT and MNG respectively. Functional studies suggest these somatic mutants abrogate 5p miRNA generation.

Conclusion: The *ABCC8* and *DICER1* variants are likely pathogenic accounting respectively for the CH and multiple endocrine neoplasia phenotype in this case. The aetiology of the autoimmune phenotype and developmental delay is not yet clear. The finding of genomic and somatic *DICER1* variants in affected tissue is helpful toward accurate histopathological diagnoses of ovarian and thyroid conditions. Functional studies suggest that a critical amount of 5p miRNAs during organogenesis of susceptible tissues may be required for normal development.

P242

A case of transient hyperthyroidism in a child with congenital hypothyroidism due to dyshormonogenesis

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A 10 year old girl with thyroxine treated congenital hypothyroidism presented with transient clinical & biochemical hyperthyroidism. She is the one of four children in the family with congenital hypothyroidism. Routine testing showed TSH <0.01 mU/l (reference interval (RI):0.6–5.0), FT4 41.0 pmol/l (RI: 12.5–21.5), FT3 17.5 pmol/l (RI: 3.2–8.0). She had a history of recent hyperactivity & heat intolerance and examination showed a palpable thyroid with thrill & bruit, hyperdynamic circulation, tachycardia and tremor. Following cessation of thyroxine, her TFT and symptoms improved over 17 days leading to hypothyroid TFT of 10.2 mU/l, FT4 6.9 pmol/l. Antithyroid antibodies were undetectable (anti-thyroglobulin <1.0 IU/ml, anti-thyroid peroxidase <5 IU/l, anti-TSH receptor <0.030 IU/l), urine iodine concentration was 268 μg/l, and the ultrasound scan showed a thyroid gland of normal appearance. The mechanism of this case of transient hyperthyroidism remains unclear. Whilst the possible explanation of excessive self-administration, either accidental or deliberate, was considered, it was felt to be less likely given denials from the patient and her family and calculations of the remaining thyroxine medication in the patient's home. Very transient nature and absence of auto-antibodies is against auto-immune disease, but the presence of thyroid signs of thrill and bruit suggest some thyroiditis. Ongoing review and investigations are ongoing.

Poster Tour 25: Developmental Origins of Disease/Type 2 Diabetes

P243
Complementary and alternative medicine therapy on diabetes: aberrant angiogenesis and cytokines in diabetic complications

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Diabetes mellitus (DM) is a chronic metabolic disorder that is characterized by hyperglycemia due to lack of or resistance to insulin. Patients with DM are frequently afflicted with ischemic vascular disease or impaired wound healing. Type 2DM is well-known to accelerate the atherosclerotic process, endothelial cell dysfunction, glycosylation of extracellular matrix proteins, and vascular denervation. Herbal medicines and naturally occurring products play an essential role in treating and managing diabetes, especially in developing countries, due to healthcare costs. Therefore, for a long time, natural treatments have been used worldwide to treat DM. Among many medications and alternative medicines, several herbs and natural medicinal plants have been recognized to cure and control diabetes with no side effects. The present review shows the perplexing features of aberrant angiogenesis, abnormalities in growth factors, cytokines, oxidative stress and metabolic derangements relevant to diabetes. Moreover, the review exhibit some of these herbal plants and their active chemical constituents which have a role in the management of diabetes mellitus. Additional details and impact of cytokine and nitric oxide in diabetes are compiled here and discussed in this review.

P244
Audit of type 2 diabetes in youth in Wellington, New Zealand 2001–2013

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Objectives: Type 2 diabetes (T2D) is increasingly prevalent in youth in New Zealand[1], particularly in ethnic minorities, and represents an increasing proportion of patients in adolescent diabetes clinics. We aimed to assess its prevalence and audit outcomes in this population in our region.

Methods: Retrospective analysis of prospectively collected data from a population based cohort in Wellington from 2001 to 2013. Data collected included age, ethnicity, socioeconomic status (NZDep Index), reason for referral, presenting signs and symptoms, weight, height, BMI, HbA1c, pH, microalbumin, ALT, and treatment, both at diagnosis and during follow up.

Results: 23 youth were identified over the 13 year audit period. There were 6 Samoan, 4 Maori, 4 Tokelauan, 2 Cook Island Maori, 2 Tongan, 2 Chinese, 1 Fijian, 1 Indian and 1 NZ European youth. The youngest diagnosis occurred at age 6.5 years in a child with Prader Willi Syndrome. BMI (range 28.3–49.5) was >+2 SDs for age and sex (CDC reference data) in all but one affected person. Median NZDep index was 9, with 12/23 subjects in the most deprived 20% of the population. Six of the 11 subjects with a microalbumin test at diagnosis had established microalbuminuria, with a further 3 having borderline elevations in microalbumin. One youth had retinopathy at diagnosis. 5 youth (21.7%) had serious mental health, behavioural or developmental disorders, with a further subject having a significant disability (hearing loss).

Conclusions: T2D in youth under 17 is uncommon in our region but affected individuals have a high burden of disease, even at diagnosis, both from diabetes and other conditions. The potentially high prevalence of serious mental health disorders is of major concern. T2D in our region occurs almost exclusively in high risk ethnic groups and is universally associated with obesity. This high burden of disease emphasizes the importance of prevention of obesity.

Reference:

1. Jeffries et al. Paediatrics 2012; 13: 294–300.

P245
Hemoglobin A1c measurement for the diagnosis of type 2 diabetes in Korean children

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Background: Recently revised American Diabetes Association criteria allowed utilization of hemoglobin A1c (HbA1c) ≥6.5% for diagnosis of diabetes. The aim of this study was to evaluate the correlation between plasma glucose levels (fasting and 2-hr OGTT) and HbA1c as screening tool for identifying cases of asymptomatic diabetes in Korean children and adolescents.

Methods: A total of 190 children without known diabetes (DM) completed an OGTT and HbA1c measurements. The study subjects were categorized into normal glucose tolerance (NGT) and glucose intolerance groups according to 2-h OGTT results. DM was defined as a 2-h OGTT ≥200 mg/dl, FPG ≥126 mg/dl or HbA1c ≥6.5%.

Results: Of 47 children and adolescents with DM, 42 subjects were diagnosis by HbA1c, 40 subjects by 2-h OGTT, and 30 subjects by FPG. Of forty subjects with DM according to 2-h OGTT criterion, 35 subjects had HbA1c ≥6.5%. There were no significant demographic and clinical differences between subjects with an HbA1c ≥6.5% with DM (n = 35) and subjects without DM (n = 7) according to FPG or 2-h OGTT criteria except FPG and 2-h OGTT. Diagnostic sensitivity and κ coefficient of each diabetic criterion were higher in HbA1c (89.4%, 0.927) and 2-h OGTT (85.1%, 0.977) criteria than FPG (63.8%, 0.727) criterion. The AUC of HbA1c for identifying diabetic subjects according to FPG or 2-h OGTT criteria was 0.980 and 0.949, respectively. In addition, male and non-obese subjects had lower AUC and sensitivity than female and obese groups. Furthermore, HbA1c level of 6.15% have higher sensitivity and specificity, and an improved positive predictive value and negative predictive value than 6.5%, especially in male and non-obese children and adolescents.

Conclusion: The ADA and WHO proposed diagnostic HbA1c criterion ≥6.5% was adequate to detect asymptomatic DM among the Korean children and adolescent. High efficacy of HbA1c may contribute to early detection of asymptomatic children with DM.

P246
The metabolic symphony program

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Background: The Metabolic Symphony Program is a unique, interactive lifestyle disease prevention program that educates children about their metabolism using the principle of energy balance to promote a healthy lifestyle. It was developed in partnership with health and education specialists in response to increasing childhood obesity and type 2 diabetes, particularly Aboriginal children.
Aim: To deliver the program at a mainstream and an Indigenous primary school to evaluate student/teacher response. A secondary aim was to verify alignment with student abilities and the Australian national curriculum. Adaptations for Indigenous children, following earlier remote area school trials, were also being tested.
Method: 10 × 1 h lessons were delivered, once per week, over one school term with content tailored for 3 age ranges (6–7, 8–9, 10–11 years). Student engagement was observed to see if the delivery method was appropriate for their age and academic abilities. Teachers provided written and oral feedback, while students were interviewed on camera to assess their comprehension of key messages. Knowledge retention was also tested with regular oral and written quizzes.
Results: 150 students participated (50 Aboriginal). Teachers confirmed that 90% of the materials were on target and areas where the content needed adjustment, such as simplification or changes in delivery method, were clearly identified. As anticipated, younger students absorbed the concepts through drawing, games and music, while older students engaged with quizzes and discussion. Positive changes in lunchboxes and hydration habits were also observed.
Conclusion: Evaluation demonstrated that delivery methods, at various age and academic levels, were largely appropriate and that the content aligned with the national curriculum. Additionally, the children were genuinely interested in the topic and, with appropriate delivery, were capable of understanding energy balance and its relevance to their future health.

P247
Sex of the fetus affects maternal blood glucose concentrations in late gestation

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Objective: It has been previously shown that carrying a male fetus increases the mother's chances of developing gestational diabetes. Following a randomized controlled trial of exercise in overweight and obese pregnant women, we aimed to assess whether the sex of the fetus would affect maternal metabolism.
Methods: Blood samples were collected from 75 mothers at 20 weeks of gestation (baseline) and at 36 weeks (post-intervention). Cord blood samples were also collected at birth. A number of metabolic markers were subsequently assessed, including glucose, insulin, HbA1c, and inflammatory markers.
Results: At 20 weeks of gestation, mothers carrying female fetuses tended to have higher blood glucose concentrations than those carrying males (5.30 vs 4.89 mmol/l; p = 0.069). At 36 weeks of gestation, differences were more marked, with blood glucose concentrations being 15% higher in mothers of female foetuses (5.66 vs 4.91 mmol/l; p = 0.007). There were however no differences in insulin, HbA1c, or inflammatory markers. In addition, there were also no significant differences in cord blood according to fetal sex.
Conclusions: Contrary to previous findings, we observed that in overweight or obese mothers, women carrying female foetuses had higher blood glucose concentrations, particularly in late gestation. These finding suggest the sex of the fetus may influence maternal metabolism and potentially neonatal outcome.

P248
Nulliparity in overweight/obese women is associated with subtle but adverse metabolic outcomes in the offspring at birth

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Objective: We have recently shown that first-born children have lower insulin sensitivity than later-borns. In this study, we have retrospectively evaluated whether there were differences in metabolic outcomes in the offspring of overweight or obese nulliparous mothers at birth.
Methods: Blood samples were collected at 20 and 36 weeks gestation from 19 parous and 56 nulliparous overweight or obese women, who were enrolled into a randomized controlled trial. Subsequently, cord blood samples were collected from 56 neonates born of 13 nulliparous (54% boys) and 43 parous (55% boys) women. A number of metabolic parameters were assessed.
Results: Nulliparous women had higher HbA1c at 20 (5.32 vs 5.15%; p = 0.009) and 36 (5.75 vs 5.47%; p = 0.0004) weeks of gestation in comparison to parous women. Nulliparous women also displayed higher levels of inflammatory markers at 20 weeks (interleukin-6: 3.49 vs 1.88 pg/ml; p = 0.056) and 36 weeks (TNF-α 5.71 vs 4.20 pg/ml; p = 0.009). At birth, the offspring of nulliparous women tended to be lighter (0.16 vs 0.67 SDS; p = 0.068), and had a less favourable lipid profile with higher triglyceride (0.65 vs 0.44 mmol/l; p = 0.010) and lower HDL-C (0.59 vs 0.76 mmol/l; p = 0.043) concentrations. In addition, the offspring of nulliparous women had lower IGF-II (245 vs 325 ng/ml; p = 0.049) and higher IGFBP-1 (60.8 vs 23.1 ng/ml; p = 0.007) levels, and tended to have higher levels of interleukin-6 (9.23 vs 4.38 pg/ml; p = 0.064).
Conclusions: First-born children born to overweight/ obese mothers are exposed to a less favourable metabolic environment *in utero*, and have evidence of subtle adverse metabolic programming at birth. Further elucidation of the *in utero* mechanisms of metabolic programming is required.

P249
Early-life risk factors associated with Body Mass Index (BMI) in adulthood: a longitudinal study of the Western Australian pregnancy (Raine) cohort

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Objective: To determine the relative importance of parental and early-life variables as risk factors for adulthood overweight and obesity in offspring.
Methods: Data were analysed on 1,355 participants from the Western Australian Pregnancy Cohort (Raine) Study who were born between 1989 and 1991 and followed until 22 years of age. Anthropometry were collected during pregnancy, at birth, 1 year and at approximately three yearly intervals thereafter. BMI was standardised producing z-scores, using the 2000 Center for Disease Control and Prevention (CDC) growth charts. Multivariate analyses and cross-sectional logistic regression quantified the timing and contribution of early-life risk factors for overweight and obesity in young-adulthood.
Results: At 5 years of age 12.6% of children were overweight and 5.2% were obese. By early adulthood, the prevalence of obesity had increased to 12.8%, whilst overweight remained relatively stable at 14.2% (range from early childhood to adulthood 11–16%). Parental pre-pregnancy BMI was the strongest determinant of adult offspring BMI. Although rapid first year weight-gain was associated with increased offspring BMI, the impact of first year weight-gain diminished over childhood, whilst the impact of parental BMI increased over time.
Conclusions: Preconception and early-life family based interventions targeting parental obesity and life-style choices are likely to result a greater reduction in adult offspring obesity rates than school-based interventions later in childhood.

P250
The validity of 50 g-oral glucose challenge tolerance test for gestational diabetes mellitus screening

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Background: The aim of this study was to evaluate the screening for gestational diabetes identify the validation of 50 g-Oral glucose challenge test, a cutoff of >130 mg/dl is better for GDM screening.
Methods: A total 813 pregnant woman entry this study, 249 case were excluded. Finally, a total of 564 pregnant women underwent 50-g oral glucose-tolerance testing for gestational diabetes mellitus at 18–24 weeks of gestation. Gestational diabetes mellitus (GDM) diagnosed on the new International Diabetes in Pregnancy Consensus Group (IADPSG) criteria. The screening glucose challenge test for gestational diabetes mellitus involves drinking a solution containing 50 g of glucose, and measuring blood levels 1 h later. Most of institutes accept the cut-off point >140 mg/dl. We set the cut-off point at 130 mg/dl for strictly screening.
Results: A casual blood glucose test (>100 mg/dl) is insufficient screening for GDM. Only 70% is detectable in this study. 50 g-Oral glucose challenge test, detection rate of cutoff of >140 mg/dl is 80%.
Conclusion: 50 g-Oral glucose challenge test, a cutoff of >130 mg/dl is better for GDM screening. We propose GDM screening should be more strictly in accordance with changes of diagnostic criteria.

P251
Aortic intima media thickness and lipid profile in infants of diabetic mothers

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Objectives: Maternal diabetes mellitus may lead to altered fetal serum lipoprotein composition consistent with high atherogenic risk. The measurement of the aortic intima-media thickness (aIMT) in newborns is a sensitive marker of atherosclerosis risk which was not extensively studied in infants of diabetic mothers (IDM). We aimed to investigate the relationship between abdominal aIMT, left ventricular mass index (LVMI) and lipid profile in IDM.
Methods: This study was conducted on 60 neonates delivered in Obstetrics and Gynecology Hospital, Ain Shams University; group 1 (20 macrosomic IDM), group 2 (20 non macrosomic IDM) that were compared to 20 age and sex matched neonates as controls. All neonates were subjected to clinical evaluation and laboratory investigations including maternal HbA1C, maternal and neonatal HDL, LDL, triglycerides (TG) and total cholesterol). 2D, M mode, pulsed and continuous wave, color Doppler echocardiography for assessment of interventricular and posterior wall thickness, LVMI and aIMT (7.5 pediatric phase array transducer).
Results: aIMT and LVMI were significantly the highest among the macrosomic IDM group and the lowest among the control group. A highly significant increase in serum cholesterol, HDL, LDL was found in non macrosomic than macrosomic IDM ($p = 0.008$, 0.001 and 0.001 respectively). A highly significant positive correlation was found between aIMT and maternal serum TG, cholesterol, HbA1C ($p = 0.001$, 0.001, 0.029 respectively), neonatal serum cholesterol and TG ($p = 0.003$, 0.01) in macrosomic IDM. A positive correlation was found between LVMI and aIMT of all IDM ($p = 0.001$).
Conclusions: Non macrosomic IDM have disturbed lipid profile in the form of elevated lserum cholesterol and LDL levels. Both macrosomic and non macrosomic IDM have higher values of aIMT and LVMI than controls concluding that IDM may have an evidence of increased risk of hypertrophic cardiomyopathy and atherosclerosis since birth.

P252
Body composition in term breastfed Indian newborns by isotope dilution method

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Introduction: Assessment of body composition (BC) in newborns provides an insight into effect of various antenatal, maternal and fetal factors on the differential gain in fat and fat free mass (FM & FFM). Previous anthropometry based studies in Indian newborns have suggested that FM is conserved at expense of FFM, predisposing them to higher risk of adulthood cardiometabolic disorders. We undertook this study to assess BC of Indian newborns using Deuterium (^2H_2O) dilution method.
Methods: We enrolled 150 healthy term singleton newborns, without history of maternal diabetes. BC was assessed in 2nd week to avoid early fluctuations in body water. Anthropometry was done at birth and on day of study. ^2H_2O dose of 0.15 g was given, urine samples collected pre- and 4 and 5 h post-dose, and enrichment measured by isotope ratio mass spectrometry. Hydration factor of FFM was taken as 0.809.
Results: Data from 127 babies (77 boys) was analysed. Maternal BMI was 22.5 ± 3.7, and gestational weight gain (GWG) was 9.8 ± 4.5 kg. Birth weight was 2968.7 ± 382.7 g (range 2,198–

3,943 g). BC was assessed at a mean age of 12.7 ± 3.1 days. FM and FFM were 354.5 ± 245.6 g and 2,762.6 ± 401.6 g, respectively, and FM% was 11.3 ± 7.3%. Birth weight and FFM were higher among boys but no gender difference was noted in FM%. Birth weight was positively correlated with FFM and FM, but not FM%. FFM, FM as well as FM% showed positive correlation with difference in weight between day of assessment and birth. FFM was positively correlated with gestational age, GWG and fathers' BMI.

Discussion: This is the first study from India to report BC in newborns using $^{2}H_2O$ dilution. FM% was slightly lower than that reported for Western populations for babies of similar age. Our results suggest that percentage of FM and FFM is relatively constant over the range of birth weights included in this study, and greater weight gain during early postnatal period results in greater increase in FM%.