Glasgow Paediatric Research Day
Session on Anaesthesia, Respiratory Medicine and Neonatology
11th November 2016
Queen Elizabeth University Hospital Campus, Teaching and Learning Centre

Abstracts

Oral Communications

O1 Understanding the utility of performing endocrine & genetic investigations in boys with a suspected disorder of sex development
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Introduction: Evaluation of XY DSD requires a combination of endocrine and genetic tests. It is unclear whether these investigations should be performed stepwise or in parallel. Aims: The aim was to document the range of endocrine and genetic abnormalities identified in XY boys who were investigated at one specialist multidisciplinary service. Methods: Case records were reviewed to collect information from all 46,XY boys who presented for evaluation of atypical genitalia in Glasgow between 2010-2015. Phenotypic information including external masculinisation score (EMS), biochemical and genetic diagnosis was studied.

Results: 122 boys with median EMS of 9 (range 1,11) were included. Associated malformations (AM) were present in 39 (32%), 14 (11%) having a recognisable syndrome. Family history of DSD was present in 16 (13%) and consanguinity in 3(2%). An endocrine abnormality of gonadal function was present in 28 (23%) with median EMS of 8.3 (1,10.5) and included a disorder of gonadal development (DGD) in 19(15%), LH deficiency (LHD) in 5 (4%) and disorder of androgen synthesis (DAS) in 4 (3%). There were 91 (75%) cases of non-specific disorder of undermasculinisation (NSDUM), 2 (2%) cases of disorder of müllerian development (DMD) and one case (1%) of cloacal anomaly. 43 cases (NSDUM, 30; DGD, 10; LHD, 3) had an array-CGH, CNVs were identified in 13 (30%) (NSDUM,9; DGD, 4) with median EMS of 8.5 (1.5,11). Limited gene panel analysis in 61 (NSDUM,41; DGD,15; DAS,2; DMD,2; Cloacal Anomaly,1) identified variants in 6 (10%) (NSDUM,3; DGD,1; DAS,2) with median EMS of 6 (3,9). CNVs were detected more frequently in cases with AM (p=0.03). Conclusions: In boys with suspected XY DSD, likelihood of abnormal diagnostic tests seems to be unrelated to the appearance of the external genitalia. There is no association between genetic and endocrine abnormalities. Parallel genetic and endocrine approaches for evaluating DSD needs further consideration.

O2 Anaesthetic chart documentation at the Royal Hospital for Children. How good are we really?
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RHC ANAESTHETICS DEPT

Background In clinical medicine it is apparent that formal documentation of events is variable across a wide range of specialities. There are medico-legal implications as an event not documented it can be said not to have occurred. The GMC can use anaesthetic charts as evidence in a fitness to practice hearing. Poor performance could be inferred from sloppy documentation. The Royal College of Anaesthetists (RCoA) highlighted suggested variables to be recorded in 1996. There is no standardised anaesthetic chart throughout the UK. More recently the “RCoA/AAGBI Good Practice Guide 2006” have instructed anaesthetists which variables should be documented Aims The aims were: - to provide a baseline for documentation standards across several variables - to highlight areas for documentation quality improvement - to aid design of a new anaesthetic chart at our institution Methods Over one week in February 2016, anaesthetic charts were retrospectively reviewed by accessing the theatre schedule and electronic patient record. One hundred charts (n= 100) were reviewed and scored for the presence of completed fields. Results The anaesthetic records came from sixteen subspecialties with dental (18%),
general (16%) and ENT (11%) being the most common. All anaesthetic records had CHI label at the top of the record but only 16 records had unique ID on each consecutive sheet. Allergy status was recorded in 94% of charts. Other well recorded fields included proposed surgical procedure (90%) and fasting times (78%). The airway device used was noted in 100% of cases but 54% of endotracheal tubes had no record of the level at which it was secured. ASA status (27%), pre-op airway assessment (4%) and reflux history (7%) were the poorest recorded. The surgeon performing procedure was present in 27% of charts. None of the charts met all five criteria for chart signature (name, date, signature, grade and GMC number). Conclusions: There are areas for ongoing quality improvement and a rubber stamp may allow the anaesthetist to sign and enter the appropriate information rapidly. There are many factors contributing to poor completion of the anaesthetic chart; rapid theatre list turnover, solo practice and emergency versus elective patient.

O3 How commonly are children of opioid-dependent mothers accommodated?
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Princess Royal Maternity

Children born to opioid-dependent mothers are vulnerable and may need to be accommodated, either on a temporary basis or permanently. There are few data describing how often this occurs. Objectives: To describe outcomes in terms of accommodation for children born to methadone maintained opioid-dependent (MMOD) mothers. Methods: Data previously obtained from a cohort of 450 babies born to MMOD mothers between 1/1/04 and 31/12/06 were linked anonymously to Glasgow social work (SW) records using NHS GG&C Safehaven. The study was approved by GG&C REC and Glasgow SW department. Results: Data were linked for 133 children known to Glasgow SW services in 2015 (30% of the original cohort). Reasons for non-linkage included children no longer resident in Glasgow and inability to match CHI number. 291 placements were recorded for 133 children (median 2; range 1-6). Only 27% of these placements were with parents. 57% of children had multiple placements. 76% of these children are currently living in Scotland’s top 20% most deprived areas (quintile 1). 55% of the 133 children remain under SW review. 13% have a known disability and 65% have no disability; no disability data were recorded for 29 (22%) children. 45% children have been discharged from social work review, of whom 66% are in the care of their parents. Overall, 30% of the 133 children are currently in the care of their parents. Forty-two (9.5%) infants of the original 450 were discharged to foster care, and a further 15 to the care of family members on a voluntary basis. Only 42 (39.6%) of those 106 infants originally discharged into their parents’ care for whom longer term data are available are currently in the care of their parents. Conclusions: Children born to MMOD mothers represent a vulnerable cohort and are likely to require a period of accommodation and ongoing SW support.

O4 Bio-engineering a 3-D nerve conduit to enhance nerve regeneration
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BACKGROUND: Peripheral nerve injury is common and can be functionally devastating, conferring significant cost to children, their family and society. Current clinical gold standard for a nerve gap injury is autologous nerve graft, necessitating a second surgical site. Healing remains frustratingly slow and incomplete. Significant developments have been made in vitro/vivo demonstrating the importance of topographical cues, and provision of neurotrophic factors by supplementing support cells at the injury site. This study investigates the mechanism of action of these external cues and incorporates them into a bioengineered nerve construct to currently being tested in vivo.
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METHODS: Biodegradable scaffolds with refined topographical features were fabricated and their biocompatibility assessed in 2 and 3D in vitro culture models. Adipose Derived Stem Cells (ADSC) and dorsal root ganglia were isolated and cultured on the material. The impact of topography and co-culture on nerve regeneration were evaluated using immunohistochemistry to measure outgrowth, qRT-PCR and protein quantification confirmed using ELISA/In Cell Western. In vivo analysis utilises the Sprague Dawley sciatic nerve model, with comprehensive outcome measures, comprising of functional and electrophysiological analysis, gene and protein quantification and immunohistochemistry and high-res 3D microCT imaging. Statistical analysis was performed on GraphPadPrism.

RESULTS: In vitro work demonstrated that topographical cues result in highly directed outgrowth and potentiate neurite extension (n = 5, p <0.01). Specific pathways important in this response were identified and include mTOR, MAPK and CrAT. ADSCs were characterised and differentiated to secrete neurotrophic factors (NGF, VEGFA,BDNF) and demonstrated to support neurite growth. A 3D nerve conduit has been fabricated and seeded with ADSC. In vivo assessment to date is presented.

CONCLUSION: This combinational approach demonstrates the potential of tissue engineered nerve conduits to improve outcomes following nerve injury. Further work is ongoing, as is required for safe clinical translation.

O5 Neonatal jaundice screens - more thought less action  
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Introduction Neonatal jaundice (NNJ) affects up to 60% of term and 80% of preterm infants and is usually a benign phenomenon. Profound early NNJ is a cause of kernicterus and prolonged NNJ can be a sign of life-threatening conditions, the most common of which is extrahepatic biliary atresia (EBA). Our hypothesis was that the number of referrals for NNJ has risen nationally and that the incidence of kernicterus and EBA have remained constant. Methods All admissions to hospitals in Scotland between 2000 and 2013 for individual aged <16 years were analysed. Admissions with NNJ, kernicterus and EBA were identified from coding. Individuals born before 2000 were not included in the analysis. The incidence of NNJ admissions and incident cases of EBA were standardised to number of deliveries per annum. Only the first NNJ admission for an individual was included in the analysis. Results There were 830,401 paediatric admissions of which 3147 (0.38%) were for NNJ and 43 (0.005%) for EBA (including 10 cases born before 2000). There was one case of kernicterus. The incidence of NNJ admission was 2.2/1000 live births in 2000 and this rose to 7.0/1000 in 2013. The incidence of EBA was 0.42/10000 live births (or 1 case for each 23,687 live births) between 2000 and 2013, and did not increase during this period. The ratio of NNJ admissions: incident EBA cases rose from 25:1 to 164:1 between 2000 and 2012. Conclusions This whole-population study demonstrates that there has been a threefold rise in admissions with NNJ but no rise in the incidence of EBA. Kernicterus remains very rare. The rise in NNJ admissions most likely reflects a change in the threshold for admission with NNJ. Given the continuing rise in NNJ referrals, guidelines for referral may require amendment.

O6 Human placental and fetal liver molecular transporters are affected by maternal smoking  
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BACKGROUND: The placenta interchanges nutrients, oxygen and waste between mother and fetus, acts as a gate-keeper to protect the fetus and creates an optimal endocrine environment to maintain the pregnancy. Placental insufficiency underpins common pregnancy complications (e.g. intrauterine growth
restriction, preterm birth). Perturbed expression of molecular transporters in the placental syncytiotrophoblast will affect fetal exposure to harmful drugs/xenobiotics, such as those in cigarette smoke. **OBJECTIVE:** We aimed to investigate the effect of maternal smoking on molecular transporters involved in trans-placental and fetal hepatic transport. **METHODS:** Placenta and fetal liver (same pregnancies) were extracted and sexed (8-18 weeks of gestation, MRC/Wellcome Trust Human Developmental Biology Resource [www.hdbr.org]) from electively-terminated normal pregnancies. 49 transporter transcripts were quantified by real-time qPCR using a stable combination of house-keeping genes. Linear models were used to determine (1) sex and/or age-specific changes to transporter expression and (2) whether maternal smoking (confirmed using the nicotine metabolite, cotinine), perturbed these patterns. **RESULTS & CONCLUSIONS:** 27/49 transporter transcript levels changed with gestational age in the liver and placenta (e.g. thyroid hormone transporter) and some were organ-specific (2 changed in the placenta but 13 in the liver). Key transporters were affected by smoking (11, e.g. folate transporter) and/or fetal sex (9, e.g. drug resistance transporter). The fetal liver was more sexually dimorphic and more perturbed by smoke exposure (9 transcripts affected compared to 2 in the placenta). SLC22A2, a cationic drug eliminator, increased with age in placenta of smoke-exposed fetuses. SLC22A18, a candidate tumour suppressor (substrate unknown), was decreased in smoke-exposed female placenta suggesting sex-specific responses to stress. A better understanding of these expression profiles and how they are translated into transporter dynamics is vital to recognise periods of increased placental and fetal hepatic permeability to maternally-derived chemicals, such as medications, pollutants or cigarette smoke.

**O7 Current trends in the investigation and management of paediatric community acquired pneumonia – Dr Waison Wong / Dr Liam Reilly**

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**Background:** Paediatric community acquired pneumonia (CAP) is a common presentation to the Emergency Department (ED). It is a leading cause of mortality in children aged less than 5 years and has an incidence of 0.05 episodes per child-year in developed nations (1). Appropriate use of empirical antibiotics is essential in limiting antimicrobial resistance. **Aims:** To understand the current trends in the investigation and management of CAP in children who present to ED. **Methods:** This was a retrospective study that included all children aged between 1 and 6 years (non-inclusive) who presented to ED and treated for CAP, between 22nd February and 20th March 2016. **Results:** Our study identified 53 patients who were diagnosed with and treated for CAP. 47% of patients were discharged from ED and 53% admitted. In the discharged group, 40% were investigated with a CXR, 4% had bloods taken and 8% had viral throat swabs. In terms of oral antibiotics used in this group, 72% had Amoxicillin (55% 7 day course, 45% 5 day course) and 28% had Azithromycin. In the admitted patient group, 96% had a CXR, 54% had bloods taken (87% of these included blood cultures), 68% had viral throat swabs taken (47% positive, 1 M. pneumoniae). 40% required oxygen therapy, 43% had intravenous antibiotics. In those who were admitted and had oral antibiotics only, 31% had Amoxicillin (80% 7 day course, 20% 5 day course), 44% had Azithromycin and 12% had Co-amoxiclav. **Discussion:** National guidelines advise that CXR for mild CAP should not be routinely carried out (2). We identified a high rate of CXR use in children who were deemed well for discharge from ED. Furthermore, in 40% of cases, a normal CXR did not influence the clinicians’ decision to avoid antibiotics. The majority of antibiotics used followed local and national guidelines; however there was a large variation in duration of treatment. These are key areas to improve upon. **References:** 1 Lodha R, Kabra SK & Pandey RM. Antibiotics for community-acquired pneumonia in children. Cochrane Database of Systematic Reviews 2013, Issue 6. Art. No.: CD004874. 2 Harris M, Clark J, Coote Nicky, et al. Guidelines for the management of community acquired pneumonia in children: update 2011. British Thoracic Society Community Acquired Pneumonia in Children Guideline Group. Thorax 2011. Vol 66. Suppl 2.
08 Growth patterns and fractures in boys with Duchenne Muscular Dystrophy: Insights from over 800 boys in the UK North Star Cohort
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Background: There is little information on growth and fractures in boys with Duchenne Muscular Dystrophy (DMD). Objective & hypotheses: To determine the extent of growth & skeletal morbidity in a contemporary cohort of DMD in the UK. Method: Clinical details of 832 boys with DMD in the North Star database (2006-2015) from 23 centres were analysed following categorisation into five age groups: A:<5yrs (n,113), B:5-7.9yrs (384), C:8-10.9yrs (421), D:11-13.9yrs (299) and E:>14yrs (160). Results: Proportion of boys on glucocorticoids (GC) ranged from 36% in GrpA to 88% in GrpC. Proportion of non-ambulant boys was 26% in GrpD to 56% in GrpE. Of the 46 GC-naïve boys in GrpA, 10/46 (22%) had height standard deviation score (HtSDS)<-2.0. Median HtSDS in GrpE was -1.8 (- 4.9,1.0) with 48% <-2.0SD. The difference between the HtSDS of boys on GC and not on GC was only significant in Grp B, D and E (p<0.05). The number of boys with new reports of all fractures in the five groups were 7(6%), 23(7%), 51(12%), 52(17%), 31(19%), respectively. New symptomatic vertebral fractures (VF) were reported in Grps B-E: 2/384 (0.5%), 7/421 (1.7%), 42/299 (14%) and 29/160 (18%), respectively. Conclusion: In the largest cohort of boys with DMD to date with height and fracture data, short stature was already evident in 22% of young GC-naïve boys and its pathophysiology needs further investigation. VF are present across the age spectrum and the relationship between back pain and VF in this age group requires further exploration.

09 Opiate exposure during early postnatal life has long term effects on breathing
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Background: Breathing patterns during early postnatal life in mammals are fragile and highly susceptible to external influence. In newborn mice (postnatal days (P) 1-3) breathing frequency is variable and interspersed with apnoea, until P3-P4 when the system matures. The neural mechanisms underlying this maturation step are unknown; however in vitro studies have shown that two distinct medullary neuronal clusters, the opiate sensitive preBötzinger Complex and the opiate-insensitive RTN/pFRG, play a critical role in postnatal respiratory control. Aims & Methods: To pharmacologically tease apart the function of these neuronal clusters during postnatal maturation and to investigate the long term effects of opiates on breathing, neonatal mice were exposed to the µ-opioid receptor agonist fentanyl (0.08mg/kg i.p.) or saline as a control, from P1-5 (n=16) or P9-13 (n=16). At 6 weeks of age, all saline and fentanyl exposed mice were exposed to a single dose of fentanyl (0.04 – 1.0mg/kg i.p.). Mice were continuously monitored and breathing recorded by closed plethysmography at regular intervals from 5 minutes to 2 hours post-injection. Results: Fentanyl had a modest effect on breathing at all postnatal days by decreasing frequency (250±20 vs 150±30bpm) and increasing the number of apnoeas compared to saline-exposed mice (2±1 vs 5±2/min respectively). At 6 weeks of age, fentanyl significantly decreased frequency (190±10 vs 120±15bpm, p<0.05) in all mice previously exposed to saline (P1-5 and P9-13); however, in mice previously exposed to fentanyl (P1-5 and P9-13), fentanyl exposure in adulthood had no effect on frequency (180±8 vs 150±10bpm, p>0.05). Tidal volume increased slightly in all mice post fentanyl.
regardless of whether they had previous exposure of fentanyl or saline. Discussion: These data suggest that the respiratory system in younger animals is less susceptible to fentanyl compared to adults, and that pre-exposure to fentanyl during early postnatal life results in a long-term desensitization to further fentanyl insults in adulthood.

O10 A local review of neonatal hyponatraemia
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Background: Iatrogenic hyponatraemia, following the administration of hypotonic saline solutions, has led to an NPSA alert and the development of NICE guidance recommending isotonic saline as maintenance fluid for term neonates out with the postnatal adaptive phase. Prior to any changes in practice we reviewed neonates with hyponatraemia in our unit to identify what proportion might be due to inadequate sodium administration. Methods: Our unit is a large perinatal and neonatal surgical centre. Over a one month period we identified all serum sodium (Na) levels <130 mmol/l. We then reviewed medical records to identify fluid type and sodium intake at the onset of hyponatraemia, the likely aetiology and the action taken in each instance. Results: 39 values of Na <130 occurred, forming 20 discrete patient episodes. At the onset of hyponatraemia 5 babies were receiving hypotonic crystalloids and 15 were on alternative fluids. In 5 babies this equated to a sodium intake of 0 mmol/kg/day, whilst the range in the remaining 15 was 1.0-15.0 mmol/kg/day (median 2.4 mmol/kg/day). Eight episodes of hyponatraemia occurred within 48 hours of birth. All recipients of hypotonic solutions were in this group. The remaining 12 episodes occurred between postnatal day 6 and 52. This later onset group included babies with potentially high sodium losses from their kidneys (immaturity, diuretics), gut (stomas) or CSF (subgaleal shunt), reflecting the heterogeneity of our patient population. Management in the majority of babies involved manipulating fluids to increase sodium intake. In two cases fluid intake was also restricted. Conclusions: These results confirm that hyponatraemia is common and multifactorial in our population. The majority of babies developed hyponatraemia out with the immediate postnatal adaptive phase and unrelated to hypotonic saline administration. However, identification of babies at increased risk of hyponatraemia, and remaining vigilant to sodium balance is essential in our practice.

O11 Long-term spatial memory is irreversibly impaired when delaying pubertal onset with GnRHa: Studies using a sheep model
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Background. Chronic gonadotrophin-releasing hormone agonists (GnRHa) are prescribed to children and adolescents to suppress the hypothalamic-pituitary-gonadal axis, e.g. central precocious puberty and gender dysphoria. However, GnRHa may have direct effects outside the reproductive axis, where GnRH receptors are also expressed, including the limbic system. Previous work, using a sheep model, demonstrated that peripubertal GnRHa-treatment alters emotional reactivity, risk-taking behaviour, amygdala volume and hippocampal gene expression involved in synaptic plasticity and endocrine signaling. Aims: To investigate whether peripubertal GnRHa-treatment affects long-term spatial memory (hippocampus-controlled function), independently from gonadal steroid suppression, and whether these effects are reversible after GnRHa-discontinuation. Methods: A sheep model was used, with 3 male groups: A) Controls (n=25); B) GnRHa-treated from prior to puberty to early adulthood (8-44weeks, n=25); and C) GnRHa-treated with testosterone supplementation (10-44weeks, n=25). Long-term spatial memory was tested in a familiar spatial maze (4weeks > training), and spatial working memory was tested in a novel...
spatial maze, at the end of GnRHa-treatment (45 weeks) and 1 year after GnRHa-discontinuation (99 weeks).

Results. At 45 weeks of age, long-term spatial memory was impaired (P<0.05) in GnRHa-treated rams, compared to Controls. A similar sized impairment (P<0.05) was seen at 99 weeks of age, when GnRHa-treatment had been discontinued for a year. At 45 weeks of age, working spatial memory was also impaired by GnRHa (P<0.05), but testosterone replacement counteracted this effect. At 99 weeks of age, there was no difference (P>0.05) in working spatial memory between Controls and GnRHa-treated rams.

Discussion. Spatial working memory was temporarily impaired via the suppression of gonadal steroid signalling, whereas alterations in GnRH signalling irreversibly impaired long-term spatial reference memory.

Conclusion. Perturbing normal hippocampal formation, via alterations in peripubertal GnRH signalling during a critical window of development, has long lasting effects on long-term spatial memory. [BBSRC funded: BB/K002821/1]

**SO1** Maternal smoking disrupts adrenal steroid production in the human fetus

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Introduction: The adrenal gland dominates in human fetal steroid endocrinology and produces large amounts of Δ5 androgens. Adrenal development in the human is poorly understood, and species differences make animal models only partially relevant. Aim: In this study we measured the steroid content of the human adrenal during fetal development and determined whether maternal smoking affects adrenal steroid concentrations or associated steroidogenic enzymes. Methods: 109 human fetal adrenals were obtained from elective terminations (REC 04/S0802/21) of second trimester fetuses between 11-21 weeks of gestation. Fetuses were grouped according to sex, gestational age and maternal smoking. Steroids extracted from these adrenals were quantified by LC-MS and enzyme expression analysed by RT-qPCR, Western blot and immunohistochemistry. Results: The most abundant steroid (ng/mg of tissue) in the human fetal adrenal was pregnenolone, followed by dehydroepiandrosterone-sulphate and 17-hydroxyprogesterone (17OHP). Most steroids were unchanged during the second trimester although relative production of pregnenolone and corticosterone decreased between weeks 12 and 19 (P=0.002 and P=0.06, respectively). While steroid levels were similar between male and female fetuses, maternal smoking increased 16-hydroxyprogesterone (P=0.04) and deoxycorticosterone (P=0.003) levels in male fetuses only. Protein expression of steroidogenic enzymes CYP17A1 and CYP21A2 increased throughout the second trimester but were unaffected by sex or maternal smoking. Transient protein expression of HSD3B in the adrenal fetal zone was observed at 12-13 weeks. Maternal smoking was associated with increased mRNA of transcription factors, SF-1 (P=0.04: males) and GATA-6 (P<0.001: both sexes), which are involved in steroidogenesis and cell proliferation. Conclusions: The rate of androgen and corticosteroid production is limited predominantly by expression of CYP17A1 and CYP21A1 as reflected by high levels of pregnenolone and 17OHP. Maternal smoking affects human fetal adrenal development in terms of changes in transcriptional regulation and steroid production, particularly in males, which may impact on post-natal health.
SO13 The impact of intravenous bisphosphonate on vertebral morphometry in children with secondary osteoporosis and vertebral fractures
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Background: Intravenous (IV) bisphosphonate (BP) is used for treatment of painful vertebral fractures (VF) in children with underlying chronic conditions and provides excellent pain relief. BP effect on vertebral heightreshaping in this population is however poorly studied. Aims/Objectives: To evaluate the impact of IV BP on vertebral morphometry in children with VF and underlying chronic medical conditions with associated glucocorticoid (GC) use. Methods: Retrospective study of 8 children (6M) with VF treated with IV BP for 1-2 years: 5 Duchenne muscular dystrophy, 2 Crohn’s disease, 1 juvenile dermatomyositis. Vertebral height from spine x-rays (T10-L5) were measured by one single observer using a 6-point quantitative morphometric method. Baseline spine x-rays were measured on two separate occasions to calculate repeatability co-efficient. Improvement in vertebral height ratio was considered to be significant if changes exceeded the 99% confidence level of the repeatability co-efficient. Results presented as median(range). Results: Median age at start of BP was 12.2 years (5.6, 17). A total of 7/64 vertebrae were affected. Height SD at start was -2.4 (-3.4, -1.4), significantly lower than height SD a year prior to commencement of therapy, -1.5 (-2.7, -0.8) \[p=0.0009\] but did not improve following BPs. Puberty stage SDS was -0.9 and remained unchanged (-2.8, 1.4) \[p=0.38\]. Lumbar spine bone mineral content SDS for bone area at start was -0.9 (-2.8, 1.9) and did not change with BP, -0.4 (-1.7, 1.6) \[p=0.08\]. Anterior:posterior ratio of vertebral height was changed in 4/8 patients overall. Vertebral height was improved in 2/8 patients at 3 vertebral levels. In a separate 2/8 patients, vertebral height was decreased at 2 vertebral levels each. Conclusions: Intravenous bisphosphonates in children with chronic disease and vertebral fracture led to improvement in vertebral height only in one quarter but did not prevent the development of new VF.

SO14 How was your on-call last night? Physiotherapists’ experience of on-call
Ms Kath Sharp, K MacNeil, S Brown, J Ballard, B Johnstone
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Background Paediatric physiotherapists working at RHC Glasgow have a requirement to participate in the respiratory on call. This service is provided by staff from different specialties and this has implications for maintaining a safe and effective service. Objective Explore the experiences of paediatric physiotherapists participating in the respiratory on call. Methodology A qualitative approach was used to explore the respiratory on call experiences of physiotherapists working in RHC Glasgow. There were 9 participants in 2 focus groups. Purposive sampling ensured the groups were representative of the staff. Focus groups were recorded and transcribed verbatim. Thematic analysis guided the data analysis process. Three physiotherapists analysed the data. Results Analysis of the focus group transcripts identified 4 key themes: What is on call? Self Efficacy; Environment and Training. The majority of staff were happy with the current on call training and felt supported. They made suggestions ways to develop clinical reasoning and confidence, especially when dealing with deteriorating patients. Interestingly, staff raised concerns with familiarity of the environment and expectation of their role as an on call physiotherapist. Conclusions / Implications for practice The confidence of staff seemed to be influenced by the environment, their on call experience and their perceived expectations of the role. Staff were very positive about the support and training they received. In order to ensure continued safe delivery of the on call service it would be important to define the role of the on call physiotherapist and provide relevant opportunities to allow staff to fulfil the role and increase self efficacy. References Braun V. 2006. Using Thematic Analysis in Psychology. Qualitative Research in Psychology. 3 (2) 77-101 Bowling A. 2009. Research Methods in Health: Investigating Health and Health Services. Open University Press.
SO15  Blood pressure monitoring and management in young girls with Turner syndrome
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Background – Hypertension is common in adults with Turner Syndrome (TS) but less is known about hypertension in children with TS. Aim - To determine the frequency of hypertension in a contemporary paediatric TS cohort and to assess its association with clinical characteristics. Patients and methods – Preliminary analysis of 22 girls with TS attending a designated TS clinic at RHC, Glasgow, with at least 2 blood pressure measurements in the preceding 12 months. Hypertension was defined by systolic or diastolic BP measurement \( \geq 95\text{th percentile for gender and height on 2 consecutive visits in one year.} \)

Stage 1 hypertension (95th-99th centile) and stage 2 hypertension (> 99th centile). Results – Median age at last clinic visit was 13 years (4,19), HtSDS -2.0 (-3.3,-0.8), BMISDS 0.3 (-3.2, 3.2). 10/22 had karyotype of 45X,0. None has a history of coarctation of aorta. 8/22(36%) were hypertensive: 4/8 were defined as stage I hypertension and 4/8 as stage II hypertension. 4/22(18%) were on anti-hypertensive therapy, however 2/4(50%) remained hypertensive. Of the other six who were hypertensive but not on treatment, 3/6 have been referred for 24 hour ambulatory blood pressure monitoring. Multivariate logistic regression analysis for factors associated with hypertension using age (95% CI 0.59 to 1.93), BMISDS (0.96 to 6.47), tanner stage (95% CI 0.25 to 9.01) and karyotype (95% CI 0.09 to 8.15) as independent factors showed that there were no single independent factor associated with hypertension in girls with TS. Discussion - Our current study demonstrated that 36% of young TS girls were hypertensive based on clinic measurements. No single factor was predictive of hypertension in our study. Optimal monitoring and management of blood pressure in paediatric TS is unclear and deserves future study.

SO16  Does Cidofovir increase human papillomavirus oncogenicity in juvenile recurrent respiratory papillomatosis?
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Background Juvenile recurrent respiratory papillomatosis (JRRP) is a condition with a median age of presentation at 3.2 years. Presenting warts are caused by human papillomaviruses (HPVs) 6 and 11 infection of the larynx, and if left untreated the growths may result in airflow obstruction and suffocation. Intraleisional injection of the anti-viral drug Cidofovir has been used to treat JRRP to reduce wart growth in patients, as the drug has been shown to repress proliferation of tumour cell lines positive for HPV16, that causes cervical cancer and a proportion of head and neck cancers. Some years ago researchers proposed that Cidofovir may induce cancer formation in HPV-infected tissues, which led to concern over the use of the drug in the clinic. Aim(s)/Objective(s) Our study aims to investigate the effect of Cidofovir on HPV oncoprotein E6/E7 expression in HPV-positive non-tumour invasive and tumour invasive cell lines. Methods Two cell lines were treated with 5μg/ml Cidofovir over a period of 144 hours: non-tumour invasive and tumour invasive keratinocytes with integrated HPV16 genomes expressing E6/E7. Oncoprotein expression was detected using quantitative reverse transcriptase polymerase chain reaction (q RT-PCR) and relative quantification was performed. Results Levels of oncoprotein E6E7 expression increased over time in the non-tumour JRRP like cell line, but no significant change was detected in oncoprotein expression levels in the tumour-invasive cell line. Our results suggest that oncoprotein E6E7 RNA expression levels in response to Cidofovir drug treatment differ between non-tumour and tumour cells. Discussion Our study indicates that use of Cidofovir may be problematic in RRP wart-like lesions but remains useful in therapies against oncogenic virus-induced tumours.
SO17 An audit evaluating adherence to the pulse oximetry monitoring protocol for detecting critical congenital heart disease in a paediatric hospital, USA

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Introduction
Congenital heart disease is present in 0.9% of live births. Of these, ¼ are critical — requiring intervention within the first year of life. Early diagnosis is important: many lesions rely on a patent ductus arteriosus, with its closure resulting in rapid deterioration. This audit evaluates adherence to the pulse oximetry monitoring protocol for detecting critical congenital heart disease. The protocol recommends oxygen saturation measurements at 24 – 48 hours of life – earlier measurement increases false positive results because of transitioning circulation, while later measurement may be too late for intervention.

Methods
Clinical notes for 147 neonates in a well-patient nursery from 26/03/14 – 23/04/14 were used (pre intervention n=64(43.5%); post intervention n=83(56.5%)). Gestational age, pulse oximetry time and results, echocardiography (if performed) and prenatal ultrasound results were collected. The intervention (08/04/14) was a senior nurse practitioner individually discussing the guideline with the nurses. Results
Pre-intervention, 26.6% (n=17) neonates received inappropriate screening: 4.7% (n=3) received screening before 24 hours and 21.9% (n=14) after 48 hours. Post-intervention, 12.0% (n=10) neonates were inappropriately screened – 4.8% (n=4) before 24 hours, 6.0% (n=5) after 48 hours and 1.2% (n=1) received no screening. The difference in the proportion of neonates inappropriately screened pre- and post-intervention (14.5%) is statistically significant (95% CI 1.6% to 27.4%, p=0.0273). Discussion
There were some limitations. Owing to time constraints, there was no interval between pre-intervention and post-intervention data collection. Therefore, the longer-term impact of the intervention was not evaluated. Furthermore, benefits of the intervention may be lost with staff changes. Conclusions
Most neonates received appropriate screening, and the intervention showed some improvement. Further recommendations include using posters to remind staff about the guideline, and explanations at staff inductions. A re-audit after a longer period is also indicated.

SO18 Paediatric population prevalence of primary immune deficiency in Scotland: Are these conditions under-diagnosed

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Background
Population prevalence of Primary Immune Deficiency (PID) varies widely worldwide. The authors report inaugural Scottish data including: 1) Paediatric population prevalence of primary immune deficiency 2) Prevalence variation by individual health board 3) Prevalence variation by distance from regional laboratory
Methods
Population prevalence was calculated using Scottish PID Registry data. This was compared with population prevalence by individual health board, followed by variance from the national mean. Frequency of testing for four principle immunology tests was calculated. The number of tests per head of population was calculated for each health board over the last 5 years. This data was analysed to demonstrate geographical variation in diagnosis. Results
National median prevalence was calculated as 1/4690 people. This varied from 1/13583 to 1/2922 across 14 health boards. Population prevalence is higher in health boards that are geographically closer to a regional testing centre. Three health boards have no diagnosed patients with primary immune deficiency; although national figures would anticipate their presence. Laboratory data analysis is ongoing; with results pending for individual health boards. This will be analysed to demonstrate effect of distance on diagnosis. The results support the hypothesis of under-diagnosis of PID in Scotland. Conclusion
Diagnosed population prevalence is 1/4690. Significant variation is present across health boards. Potential under-diagnosis is demonstrated in regions
at greater distance from testing centres. Multi-disciplinary work is required to standardise PID diagnosis nationally.

**SO19 Evaluation of the need for a paediatric palliative care service in the West of Scotland : A mixed methods analysis**

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Aims: To determine paediatricians’ perceptions of the palliative care needs of their patients, how well these are currently met, and to explore their experiences of current services. Methods: A semi-structured survey, containing 22 questions, was sent by email to all senior paediatric doctors working in NHS Greater Glasgow (G GC) between October 2014 - April 2015 (107 recipients). Data were analysed using a mixed methods approach. Quantitative analysis was performed using Microsoft Xcel; qualitative data were reviewed independently by the authors, common themes were identified, and higher order categories created. Results: 76 (71%) recipients responded; the majority were consultants, (n = 72, 95%). Most cared for children with palliative care needs (n=74, 98%), and for most (n=54, 71%) this constituted <5% of their work load. Barriers to palliative care provision included lack of: resources, time, a lead clinician, and coordination of services. The most common palliative needs of patients were immediate end-of-life care (n=58, 91%), family (n=54, 84%), nutritional (n=52, 81%), and social/emotional support (n = 53, 83%). Most (n=67, 88%) considered that GGC would benefit from an in-hospital paediatric palliative care service, including a lead clinician, integration of services, staff education and bereavement counselling. Recipients wished to engage with such a service by: individual consults (n=56, 77%), telephone advice (n= 49, 64%), and shared care of specific patients (n= 49, 64%). Conclusions: Paediatricians from a range of specialties lack the time, resources and skills to provide the palliative care children need, and would benefit from a dedicated service.
P1 Comparison of less invasive methods for surfactant administration with traditional intubation administration
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University of Glasgow

Background: Respiratory distress syndrome (RDS) is a condition that commonly affects preterm infants. Surfactant replacement therapy is an important management strategy of RDS. The standard method of surfactant administration is via intubation. Aims: This literature review aimed to discover less invasive methods for surfactant administration and compare them with the traditional intubation method.
Methods: The featured 11 experimental studies were obtained by searching OVID MEDLINE. They were all conducted on human preterm neonates and published within the last 15 years. The interventions compared were surfactant administration via intubation versus a thin endotracheal catheter or nasogastric tube. Results: It was found that surfactant administration via thin endotracheal catheters or nasogastric tubes resulted in reduced mortality and need for mechanical ventilation than intubation administration. However, these less invasive methods were associated with a higher risk of patent ductus arteriosus.
Discussion and Conclusions: In conclusion, intubation and mechanical ventilation for surfactant administration is invasive. The less invasive techniques for delivering surfactant through thin endotracheal catheters or nasogastric tubes have been reported to be feasible, well tolerated and favourable in the treatment of RDS, both in the short and long term. However, these less invasive methods should be reserved for stable infants with mild to moderate RDS only. Larger studies need to be conducted to confirm the findings reported in the current published studies. Researchers should also focus on developing completely non invasive methods of surfactant administration as the administration of surfactant through endotracheal catheters and nasogastric tubes is still invasive, although less so than intubation.

P2 Peri-operative Paracetamol prescribing in a Tertiary Paediatric teaching hospital.
Arrenvir Jaspal-Mander, K. Cruickshank, G. Bell, T. Moores
University of Glasgow

Background Clinicians have difficulty with the dosing recommendations in the British National Formulary for Children. (BNFc) Aim To evaluate the paracetamol prescribing by experienced anaesthetists in a children’s hospital. Method Retrospective analysis of anaesthetic charts and post-operative drug prescription charts for 110 patients. Dose of paracetamol and route of administration was noted. We decided on a dose of 15mg/kg of paracetamol as being our standard to compare our results. The patient’s actual weight was compared with the Resus council’s formulae calculated weight. This allowed a “Weight for age” ratio (WFAR) to be calculated for each patient (actual weight/ estimated weight). A ratio >1 indicates a patient is heavier than the Resus Council’s formula would estimate. Results Seventy nine patients had an intravenous dose of paracetamol intra-operatively. The median (IQR) dose given was 14.7mg/kg (14.3-15.0). Sixty nine patients then went on to be prescribed oral paracetamol post-operatively. The median (IQR) dose prescribed was 14.6mg/kg (13.7-15.0). The intra and post-operative median dose was compared to a hypothesized median of 15mg/kg using a one sample Wilcoxon test and this found both doses to be significantly lower than 15mg/kg (p<0.001). There was no evidence of a difference in the median dose in patients who received intra and post-operative doses (Wilcoxon p=0.331). The WFAR for our 1-5 years group was 1.14 and 6-12 years was 0.92. Using the previous Resus council equation for the latter group it would have been 1.2. Discussion Patients were receiving too small a dose both intra and post-operatively. The WFAR for the 1-5 year olds would suggest that they were on average larger than the population and were perhaps given an age appropriate dose, an underdose for this group.
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Session on Anaesthesia, Respiratory Medicine and Neonatology
11th November 2016
Queen Elizabeth University Hospital Campus, Teaching and Learning Centre

Older age groups and those over 50kg were underdosed. Dosing guidance is available for safer prescribing of intravenous paracetamol.

P3 Simulation Based Education (SBE) and its Role for On-Call Physiotherapy Training – Staff feedback on Early Implementation.
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Background Most physiotherapists working within the acute hospital setting have a requirement to participate in an ‘Emergency Out of Hours’ service (on-call). This service provides respiratory physiotherapy to those patients whose respiratory status has deteriorated. In order to staff an on-call service the majority of physiotherapists do not work fulltime within a respiratory specialism yet require to operate autonomously within the service. Training and support should be provided to ensure all physiotherapists covering on-call have the necessary skills to be safe and effective clinicians. Simulation Based Education (SBE) allows health care professionals to develop practical and decision making skills while maintaining patient safety. Respiratory physiotherapy interventions have the potential to cause harm and SBE facilitates experiential learning without the need for patient contact. As part of the on-call training and education, RHC – Glasgow had introduced SBE. Aims The aim of the project was to evaluate the benefit of SBE to support clinical reasoning for on-call Methodology On-call simulation scenarios were developed and physiotherapists were invited to participate in one SBE session. To evaluate the experience the physiotherapists completed an evaluation questionnaire before and after SBE. Results 8 physiotherapists completed the simulation training. 4 were not respiratory physiotherapists. 6/8 (75%) agreed or strongly agreed that the simulation highlighted areas for personal development to participate in on-call. 5/8 (63%) agreed or strongly agreed that the simulation helped with their clinical reasoning. 5/8 (63%) agreed or strongly agreed that further simulation training would be useful to support their learning in relation to on-call. Conclusions Within this small study most participants perceived this to be a useful method for on-call training. A few staff however did report some negative feelings and consideration of this is needed when designing future training. Further development and evaluation is required to gain greater insight into this area.

P4 Cardiopulmonary exercise testing in children with Cystic Fibrosis: One centre’s experience.
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Background Exercise testing is increasingly being used as a prognostic indicator in Cystic Fibrosis (CF) but it is reported to be underutilised in UK CF centres, particularly in children. Here, we evaluated the CPET results of our children with CF at the CF annual review and its possible clinical value. Method A pilot observational study comparing CPET results using a cycle ergometer ramp test (peak oxygen uptake - VO2peak) and pulmonary function (forced expiratory volume in 1 second – FEV1) was performed. Body mass index (BMI) was used as a marker of disease severity. Data were identified from clinical case notes and our CF database. Results Thirty-eight children and adolescents (mean age 11±2.4; range 7-14 years; sex 17M: 21F) completed at least one CPET with 95 % achieving technically satisfactory tests allowing measurement of VO2peak. Mean VO2peak was 105 % predicted±18; range 74 - 150 % predicted with 8 % of children and adolescents having a reduced VO2peak of < 85 % of predicted. Mean FEV1 z-score was -0.77±1.24, range -4.42 – 2.24. We did not demonstrate a significant correlation between VO2peak and FEV1 or BMI z score (r=0.25, -0.05). Twenty-eight of 38 children completed a second CPET the following year with 71 % showing a decline in VO2peak, (mean decline of 8 % of predicted value, equivalent to 3.8 ml·kg-1·min-1). Conclusion CPET is feasible with 95 % of participants achieving technically satisfactory
assessments starting from age 7. In this group of children and adolescents with relatively mild CF, mean VO2peak was normal with no significant correlation between VO2peak and FEV1 or BMI, as markers of disease severity. The majority of participants demonstrated a normal VO2peak. However, 71% showed a downward trend on repeat testing 12-18 months later. A decline in fitness can be a trigger for more intensive physiotherapy intervention.

P5 Patterns and Prevalence of Prenatal Alcohol Exposure Using Infant Biomarkers.
Dr Elizabeth Henderson, Dr Helen Mactier and Professor David Tappin
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Foetal alcohol syndrome (FAS) is the most prevalent preventable neurodevelopmental disorder. FAS has both individual implications in educational and healthcare, but also population costs as a result of judicial implications and loss of workforce earnings. Patterns and prevalence of prenatal alcohol exposure (PAE) is poorly understood. Direct biomarkers of alcohol consumption Fatty Acid Ethyl Esters (FAEEs) and Ethyl glucuronide (EtG) are found in meconium and Phosphatidylethanol (PETH) in dried blood spot cards, are able to provide measures of PAE. Aim: Provide a repeatable measurement of the pattern and prevalence of PAE and assess the willingness of mothers to partake in an informed population study. Methods: Funded by Glasgow Children’s Hospital Charity, this population study planned to recruit 750 singleton mothers, delivering every four days at the Princess Royal Maternity, to provide meconium and blood spot cards, alongside an alcohol intake questionnaire. Meconium samples for the analysis of FAE and EtG, and blood spot cards, in addition to newborn screening were obtained on day five for the analysis of PETH. Both samples were frozen for stability of the biomarkers. The samples were anonymised with study number and maternal date of birth, attached were demographic details including age, parity and gestation. Results: Of 1016 eligible births, 826 mothers were recruited, providing 741 meconium samples (72.9% of eligible births) and 518 (50.9% of eligible births) blood spots in additional to routine testing. These were anonymised and will be analysed for FAE, EtG and PETH (blood spot only). Conclusion: The collection of samples for PAE in the population is deemed an acceptable method for both mothers and midwives. It is hoped that results from this cohort will be available in spring 2017, and will provide an accurate representation or the maternal population and PAE, which will feed into future public health initiatives.

P6 Tackling Emergence Delirium and Acute Pain in the Recovery Unit.
Dr Hal Robinson Dr Kay Davies
Royal Aberdeen Children's Hospital

BACKGROUND: Assessment and management of acute pain and emergence delirium are essential facets to paediatric post anaesthesia recovery. Delayed recognition and treatment has immediate and long-term physiological and psychological consequences, and impacts on the provision of safe anaesthesia. AIMS: This project aimed to assess the incidence of post-operative pain and emergence delirium in this tertiary paediatric hospital and to determine the number of patients requiring rescue analgesia in recovery and within 2 hours of ward return. METHOD: Post-operative pain and delirium were assessed for all children receiving general anaesthesia during 1 week in May 2016. Data was collected in recovery, on ward arrival and within 2 hours of ward return. FACES, CRIES, FLACC and Numerical Rating Scales were used for pain assessment. Emergence delirium was assessed after spontaneous eye opening, by observing the child for lack of eye contact or lack of awareness of surroundings. The presence of both features confirmed emergence delirium. RESULTS: Data was collected for 43 children with a mean (±SD) age of 6.9 (± 4.9) years. Emergence delirium was present in 21% (9/43) of children in recovery and in 27.9% (12/43) of children on ward arrival. Pain scores were >3 in 7% (3/43) of children on leaving recovery, 18.6% (8/43) on ward arrival and 23.3% (10/43) within 2 hours of ward return. 4.7% (2/43) of children received rescue analgesia in
recovery and 37% (16/43) received rescue analgesia within 2 hours of ward return. Of these children, 25% (4/16) had experienced emergence delirium in recovery. Median (range) duration in recovery was 30 (5 - 90) minutes. CONCLUSION: This audit demonstrates an unacceptably high incidence of emergence delirium and rescue analgesia administration on ward return. Emergence delirium and discharge protocols have been devised to improve management and avoid premature discharge.

P7 The development of a Pain Assessment Scale for Neonatal Transport. [withdrawn]
Dr Lavinia Raeside
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Background: There are currently no pain assessment scales developed for use in the transport setting and little evidence on the effects of transport on pain and pain assessment. This study offers a unique approach in adding to the body of knowledge on neonatal pain assessment and facilitated the development of a scale adapted to transport. Underpinned by the rights of the child to have appropriate assessment and management of pain and the important deleterious effects pain can have on the physiological stability of the neonate, this study utilises a qualitative consensus paradigm of enquiry to inform the content and structure a pain assessment scale specific to the transport setting. Aim: The aim of this study was to develop a pain assessment scale for use during neonatal transport. Primary research questions: 1. Which neonatal pain indicators should be included in a transport pain assessment scale? 2. What are the practicalities of using a neonatal transport pain assessment scale? 3. Has a transport pain assessment scale developed within the current research study by consensus methods achieved face validity? Methods: The study was conducted in three Phases, Phase One consisted of a nominal group meeting with transport clinicians to ascertain their views on items to include in a pain assessment scale for transport. Phase Two utilised the Delphi technique to gain consensus from a large cohort of transport clinicians on the content, structure and design of a transport pain assessment scale. Results of the first two Phases of the study were then applied to the adaptation of an existing pain assessment scale. Phase Three was then tested in semi-structured interviews with transport clinicians. Results: Results of initial face validity testing suggested positive results in relation to feasibility and clinical utility of the scale, however further testing is strongly recommended. Conclusions: This study supports the view that a pain assessment scale is a practical and feasible measure of assessing pain during transport. Further research is suggested to undertake psychometric testing of the developed scale and establish validity and reliability in the clinical setting.

P8 Impact Of Anti-Tumour Necrosis Factor Therapy On The Insulin Like Growth Factor Axis And Bone Development In Childhood Crohn’s Disease
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Background: There is currently no published study evaluating the role of the IGF axis on bone development following anti-tumour necrosis factor (TNF) therapy in Crohn’s Disease (CD). Method: Prospective, 12-month study in 19CD (12M) who were clinical responders to anti-TNF therapy, median age 14.9 yrs (range 11.2, 17.2). IGF1, insulin growth factor binding protein 3 (IGFBP3), acid labile subunit (ALS), bone specific alkaline phosphatase (BALP) and c-telopeptide of collagen cross links (CTX) were adjusted for bone age and gender. Assessment of bone mineral density (BMD) and geometry at tibia were performed using peripheral quantitative tomography (pQCT). Results: At baseline, IGF1 SDS was +0.1(-3.8, 2.1)[p=0.80 vs zero], IGFBP3 SDS +1.4(-2.9, 3.0)[p=0.02 vs zero] and ALS SDS -0.9(-2.2, 1.5)[p<0.0001 vs zero]. IGF1 SDS was <-2.0 in 5(26%) at baseline and none at 12 months. At 12 months, IGFBP3 SDS was +0.5(-1.1, 2.9) and not different from zero [p=0.09]. ALS SDS was <-2.0 in 1(5%) at baseline and none at 12 months. BALP SDS of -1.7-
3.6,1.0)[p<0.0001 vs zero] and CTX SDS of -1.1(-2.6,0.4)[p=0.01 vs zero] at baseline reflect a low bone turnover state. BALP SDS increased significantly by 6 weeks[p=0.01], whereas CTX remained unchanged, leading to net increase in bone formation. pQCT bone and muscle remained unchanged over 12 months: trabecular BMD -1.6(-3.2,1.1) to -1.3(-2.6,1.2), cortical thickness -0.1(-2.1,1.0) to -0.3(-2.0,0.7), muscle -2.4(-4.3,-0.3) to -2.0(-4.3,0.2). Mixed model regression analysis showed that ALS SDS(p=0.007) and muscle area(p=0.003) were positively associated with trabecular BMD; muscle area(p<0.0001) and IGFBP3 SDS(p=0.004) were associated with cortical thickness positively and negatively. Conclusion: Comprehensive assessment of the ternary complex in childhood CD demonstrated disproportionately low ALS for the first time. AntiTNF therapy was associated with improvement in IGF axis for those with low levels. Markers of the IGF-1 axis and muscle mass show independent associations with bone mass and structure. Interventions to improve muscle mass or manipulation of the GH/IGF axis in combination with antiTNF therapy needs further exploration.

P9 Accelerometer measured levels of moderate-to-vigorous intensity physical activity and sedentary behavior in children and adolescents with chronic diseases: a systematic review and meta-analysis.
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CONTEXT: Moderate-to-vigorous physical activity (MVPA) and sedentary behavior (SB) are important for child health. OBJECTIVE: To examine accelerometer measured MVPA and SB in children and adolescents with the chronic disease compared to healthy peers. Methods: DATA SOURCES: An extensive search was carried out in Medline, Cochrane library, EMBASE, SPORTDiscus and CINAHL from 2000-2015. STUDY SELECTION: Studies with accelerometer-measured MVPA and/or SB for at least 3 days and 6 hours/day in participants age up to 19 years with the cardiovascular disease, respiratory disease, diabetes, and malignancy, studied while well and clinically stable. RESULTS: Out of 1505 records, 20 studies were eligible. Patient MVPA was below the recommended 60 min/day and SB generally high regardless of the disease condition. Comparison with healthy controls suggested no difference in MVPA between controls and patients with cardiovascular disease (1 study, n=42) and type 1 diabetes (SMD -0.70, 95% CI -1.89 to 0.48, p=0.25, n= 400, 5 studies). In patients with respiratory disease MVPA was lower in patients than controls (SMD -0.39, 95% CI -0.80, 0.02, p=0.06, n=470, 5 studies). Meta-analysis indicated significantly lower MVPA in patients with malignancies than in the control group (SMD -2.2, 95% CI -4.08 to -0.26, p=0.03, n=90, 2 studies). Time spent in SB was significantly higher in patients in 4/9 studies compared with healthy peers CONCLUSIONS: MVPA in children/adolescents with chronic disease appear to be well below recommendations, but may be comparable with activity levels of their healthy peers except for those with malignancies. Tailored intervention strategies might be needed to increase MVPA and reduce SB in children and adolescents with chronic diseases.

P10 Development and feasibility testing of an intervention to support active lifestyles in youth with Type 1 diabetes. The ActivPals programme,
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Physical Activity for Health, University of Strathclyde and Yorkhill Childrens Hopsital.

Background/objective: Building on a platform of research in youth with Type 1 diabetes including: a systematic review/meta- analysis of physical activity interventions; an objective measurement study of physical activity behaviour and qualitative interviews exploring experience of being physically active while living with type 1 diabetes. This protocol abstract describes the next steps involving the development and feasibility testing of the ActivPals programme – an intervention to support active lifestyles in youth with Type 1 diabetes. Methods: Key intervention components identified (individual and family focus, peer
mentoring, technology integration and improved communication and understanding) are being developed into a pragmatic intervention supported by recruitment pathways. A steering group of patients and parents, health care professionals and managers will guide the intervention to patient needs, tailor delivery to current clinical practice and support broader audience dissemination. A pilot trial is providing data on intervention implementation, acceptability and feasibility. Approximately 20 youth with Type 1 diabetes are being recruited and randomised into an intervention or control group. Physical activity is being measured using the Actigraph GT3X+ monitor at baseline and one month follow-up. Qualitative interviews with young people and parents will explore contextual factors associated with intervention delivery. Results: Preliminary feasibility results will be available by the end of the year. Changes in PA will be analysed using repeated measures mixed models. The results will allow the development of a larger trial, powered to evaluate intervention effectiveness. Conclusions: This study will contribute to the development of evidence based, user informed and pragmatic interventions leading to healthier lifestyles in youth with Type 1 diabetes.

P11 Skeletal disproportion in girls with Turner Syndrome.
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Background: Girls with Turner syndrome have a mean final height deficit of 21 cm, although the degree of skeletal disproportion is poorly characterised, as is the effect of recombinant growth hormone(rGH) and oestrogen on disproportion. Objective and hypotheses: To describe baseline (pre-rGH) skeletal disproportion in girls with Turner syndrome, and to compare the severity to disproportion immediately prior to synthetic oestrogen introduction and at final height. To evaluate the effect of treatment factors on disproportion at final height. Method: Retrospective study of sitting height(SH) and leg length(LL) standard deviation score(SDS), using SH-LL SDS and SH/H SDS as measures of disproportion in 59 girls with Turner syndrome. Eligible girls were aged at least 4 years, had not started rGH and had no other chronic disease. 30 girls with serial measurements prior to pubertal induction and at final height were also assessed. Results as mean ±SEM. Results: In 59 girls prior to rGH(6.6±0.27 years), Ht SDS was -2.60±0.12 with disproportionately shorter legs (LL SDS -3.38±0.15) compared to spines(SH SDS -1.19±0.10) [p<0.001], as demonstrated by both disproportion scores (SH-LL SDS 2.19±0.14; SH/H SDS 2.30±0.13). Disproportion did not differ between girls with 45X (n=19) and those with other karyotypes (n=38) [p=0.137]. Girls became less disproportionate as they grew from baseline (SH-LL SDS 2.44±0.20; SH/H SDS 2.53±0.20), to pre-pubertal (1.66±0.17 [p<0.001]; 2.30±0.19 [p=0.209]), to final height (1.12±0.15 [p<0.001]; 1.75±0.14 [p=0.001]). On univariate regression, disproportion at final height was not affected by age of rGH induction (r-sq 0.85%), oestrogen induction (4.80%), or duration of rGH prior to oestrogen (3.09%). Conclusion: Assessment of skeletal disproportion is important in the evaluation of a short girl as a significantly lower leg length may make the diagnosis of TS more likely, although this requires validation in larger cohorts. At adult height, with the current rGH and oestrogen replacement regime, disproportion was still present but less pronounced.

P12 Involving parents and professionals in the development of parenting interventions for parents of children with chronic health conditions.
Miss Kirsty Wiseman, Dr.Kerri McPherson, Dr. Susan Kerr, Dr. Joanna McParland.
Glasgow Caledonian University

Background The psycho-social impact of chronic health conditions (CHCs) on children and their families is well-documented. To date, interventions for parents have focused, to the large extent, on condition
management. In recent years the need to focus on ‘parenting’ interventions has been identified, both in the literature and by professionals working locally in the Royal Hospital for Children (RHC), Glasgow. This study represents a collaborative venture undertaken by researchers at Glasgow Caledonian University and the RHC. Aim and Objectives The study, part of a wider programme of research, aimed to gather information to inform the development of a tailored parenting intervention for parents of children with CHCs. The objectives were to: identify parents’ needs and preferences for support; identify potential parent and professional barriers and facilitators to engagement/delivery. Method Following ethics approval, cross sectional survey methods were used to collect data from parents of children with CHCs (n=131) and professionals who work with these children and their families (n=160). Data were analysed using SPSS v20, with descriptive statistics being prepared. Results While many parents felt that their support needs were currently being met by family and/or professionals, a significant proportion (40%) reported a need for additional parenting support from professionals. The needs and preferences for support articulated by the parents will be discussed. While acknowledging a requirement for parenting interventions, the professionals stated that lack of time, limited resources and a dearth of trained staff would function as potential barriers to the successful implementation of parenting interventions. Discussion/Conclusion The next stage of this research programme will involve interviews with parents and professionals to explore, in some depth, issues raised in the survey, and to co-produce solutions. The final stages will comprise intervention modelling and testing in a feasibility study and subsequent trial.

P13 RAST testing to determine causes of allergic rhinitis in children
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Aims: A study was conducted at Sligo University Hospital by extracting data on RAST tests undertaken on a paediatric patient population who attended the ENT and paediatrics units at the hospital with symptoms suggestive of allergic rhinitis. Methods: A total cohort of 98 children who were tested in the first half of 2014 was included in the database. Their demographics were computed, including average age at presentation, and gender ratio. RAST tests at the hospital looked at the most common allergens such as house dust mites, timothy grass, wheat, egg white and milk. However, a number of less common allergens were included such as soya, tomato and apple. The study looks at the outcomes of RAST testing in this patient population and attempts to correlate these findings with environmental allergens found in the north-west of Ireland. Results: House dust mite was the most common allergen in the cohort, with 57 (58% of the cohort) patients showing some immunological response, followed by milk with 55 (56%) patients. 31 children were allergic to cat dander. Some uncommon allergens such as orange (2 patients), penicillin G (2 patients) and pea (1 patients) were also noted. Conclusions: Our study, it is hoped, will allow an assessment of the specificity and sensitivity of the test as it relates to this part of the world. In addition, Sligo University Hospital has commenced a skin allergy testing service in the last year or so, and it is hoped that future data will be able to give us a better idea of the best way forward for investigating this common condition in the paediatric age group.

P14 Monopolar Suction Diathermy as a cause of Growth Hormone Deficiency in Children.
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Background It has been suggested that monopolar suction diathermy may cause thermal damage to structures adjacent to the adenoidal bed, one of these structures being the pituitary gland. As growth hormone (GH) secreting cells are sensitive to damage, this could result in growth hormone deficiency. Aims To determine whether monopolar suction diathermy could cause growth hormone deficiency. Methods The
study involved a retrospective review of paediatric patients known to have GH deficiency, in a single tertiary paediatric centre. Patients with identifiable causes for GH deficiency were excluded, such as radiation, structural abnormalities of the pituitary gland and genetic causes. Therefore only patients with idiopathic GH were included in this study. Notes of these patients were reviewed to determine if they had an adenoidectomy and which surgical technique was used, in particular monopolar suction diathermy. Results 7 of the 50 patients (14%) with isolated GH deficiency were found to have undergone an adenoidectomy. All of those would have most likely have had monopolar suction diathermy technique with the assumption based on the date that the operation was carried out and the surgeon who performed the procedure. 3 out of the 7 adenoidectomies occurred post-GH stimulation testing ruling out the adenoidectomy procedure as the cause. Out of the 4 patients who had an adenoidectomy and then became GH deficient, the average age at adenoidectomy was 5.5 yrs and at GH testing was 9.4 yrs. Conclusions As this is a pilot study, no solid conclusions can be drawn from the preliminary data, however 8% of patients identified with idiopathic GH deficiency had a history of monopolar suction diathermy. Further studies are still required to determine whether the surgical technique used for adenoidectomy in children needs to be reviewed.

P15 Waste management in RHC operating theatres.
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Background Around £8 million per annum is spent in the NHS on waste management.1, 2 Responsible waste management is becoming even more important with the marked increased utilisation of single use equipment. There is currently untapped potential for recycling waste in the RHC operating theatre environment, both clinical and domestic. Previous audits have suggested that up to £625,000 per year could be saved if improvements were made.1, 2 We undertook a bin audit in line with the recommendation in NHS GGC waste management policy3 which requires “reviewing performance...and effectiveness of this policy.” Aim The three main aims for this audit were: • To identify the current arrangements for waste management in the theatre environment by looking at available points for recycling and waste disposal • To assess the current standard of segregation of waste • To identify areas where waste management could be improved Method The locations of black general waste bins (recyclable) and orange clinical waste bins in the operating theatres were recorded. The contents of the orange clinical waste bins were weighed before being emptied and possible recyclable material removed. The bag was then weighed again to determine the weight of potential recyclable material removed. Black general waste bags were also examined for any inappropriate disposal of clinical waste which was noted. Protective clothing & calibrated weighing scales were used. Results The department had a varied set up for waste disposal. The audit found that although there were a similar number of clinical and general waste bins, these were inconsistently spread throughout the department. One morning session examining 11 areas produced 53.8 kgs of combined waste from the department. Of this waste sorted, around 10% of this was potentially recyclable but disposed of incorrectly. Discussion Although our audit focused on one facility over a relatively short period of time, the results may be indicative of wider failures. The percentage of recyclable waste in this study was found to be less than that in previous literature1, 2 ; however, once inappropriately disposed of waste was taken into account the percentages were similar. This suggests that the current waste management in the department was comparable to the rest of Scotland but that there is great potential for improvement. Resources 1. http://www.audit-scotland.gov.uk/uploads/docs/report/2005/nr_050512_waste_management.pdf - Waste management in Scottish hospitals: a follow up report, Audit Scotland, May 2005 accessed 07/02/2016 2. http://www.audit-scotland.gov.uk/docs/health/2000/nr_010131_waste_management.pdf - Waste management in Scottish hospitals, Audit Scotland, January 2005 accessed 07/02/2016 3.
Significant structural congenital anomalies in the West of Scotland: a 45-year cohort.

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Background: Three percent of newborn infants are diagnosed with a congenital anomaly. These rare conditions may have major implications for the individual, their families and health providers. Significant structural congenital anomalies (SSCA) require specialised management in the newborn period and may confer lifelong chronic illness. Provision of well-designed, patient-centred services requires an appreciation of the nature and frequency of SSCAs and their long-term effects on health. Aims: To investigate the frequency of SSCAs in a 45-year cohort of infants admitted to the Royal Hospital for Children (RHC) Glasgow Methods: Infants with SSCA were identified from admission records of RHC 1971-2015. SSCAs were defined as congenital anomalies requiring neonatal admission in the first 28 days of life. Cardiac anomalies were excluded for separate analysis. Frequency of SSCAs was compared between 5 year eras. Results: 5446 infants with SSCA were admitted in the 45-year study period. The five commonest SSCAs were (n, %): Neural tube defects, NTD, (774, 14.2%), oesophageal atresia/trachea-oesophageal fistula, OA/TOF, (522, 9.6%), hydrocephalus (519, 9.5%), congenital diaphragmatic hernia, CDH, (455, 8.3%) and gastroschisis (398, 7.3%). Of the ten commonest SSCAs, frequency was highest in the era 1996-2000 (n=489) and lowest in 2010-15 (n= 272). Frequency of NTD decreased and frequency of gastroschisis increased over the study period. Conclusions 1) SSCAs are important indications for neonatal intensive care. 2) Frequencies of specific SSCAs have changed over the past five decades. 3) Understanding patterns of SSCA frequency may inform design of improved health services for patients as they age. 4) Future record linkage of this SSCA cohort with national health data will improve understanding of long-term outcomes in SSCA.

Intra-observer Precision Of Vertebral Height Measurements Using Spine X-Rays And DXA In Boys With Duchenne Muscular Dystrophy.

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Background: The role of untrained observers in evaluating vertebral height for detection of vertebral fracture (VF) from spine x-rays (SXR) and dual energy-absorptiometry (DXA) images in children with suspected osteoporosis is currently unknown. Objectives: To assess intra-observer agreement of morphometric measurements of vertebra height by an untrained observer using SXR and DXA in boys with Duchenne Muscular Dystrophy (DMD). Methods: Vertebral height from SXR and DXA in 14 boys with DMD, median age of 9.5 years (range 7.1 to 14.9), were measured on two separate occasions using the 6-point quantitative method by one untrained observer (RM, 4th year medical student). Relative technical error of measurement (rTEM) and Bland-Altman analysis were performed to evaluate intra-observer agreement of vertebral height measurements. Weighted kappa scores (κ) were calculated to assess intra-observer agreement of VF grading based on measurements of vertebral height. Results: Both SXR and DXA provided highly readable images for vertebral assessment with 97% and 96% of vertebrae readable in the T5-L4 region. Intra-observer error (rTEM) of vertebral height measurements on SXR and DXA was 2.5% and 2.9%, respectively. Intra-observer error was lowest in lumbar spine using SXR (rTEM 1.9%) and highest in mid-thoracic region using DXA (rTEM 3.1%). Bland Altman plots comparing the two observers for vertebral height ratios were closely distributed around zero. Limits of agreement of anterior: posterior ratio 8.0% and 11.0% on SXR and DXA, whilst limits of agreement of middle:posterior height ratio 7.9% and 9.7% on SXR
and DXA. Intra-observer agreement of VF grade was substantial for both imaging modalities (SXR, κ=0.76, DXA, κ=0.61). Conclusions: Recent consensus recommends that the detection of vertebral fracture is diagnostic of paediatric osteoporosis regardless of densitometry results. Our study shows that vertebral height measurements from spine XRs and DXA scans can be performed to a high level of precision without the need for extensive training.

**P18 Peripubertal GnRH agonist treatment is associated with long-term changes in resting Heart Rate Variability in male sheep.**

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**Background**

Chronic peripubertal GnRH agonist (GnRHa) treatment is used clinically to suppress reproductive axis activity in humans e.g. treatment of central precocious puberty and gender dysphoria. As GnRH-receptors are expressed outside the reproductive axis, side effects of treatment can be more generalised. Chronic GnRHa-treatment, in adult men, has been linked with increased cardiovascular risk, although whether this is a direct effect or is secondary to suppressed testosterone, is contentious.

**Aims**

To test the hypotheses that 1) chronic peripubertal GnRHa-treatment influences cardiovascular control, 2) the effects of GnRH and testosterone on heart rate variability (HRV) are independent, 3) effects of chronic peripubertal GnRHa-treatment persist after discontinuation of treatment

**Methods**

At birth, male lambs were allocated to three groups. Untreated controls (Control, n=60); 2) GnRHa-treated (GnRHa, n=55); and 3) GnRHa-treated that received testosterone replacement (GnRH+T, n=24). GnRHa-treatment consisted of monthly subcutaneous implants of goserelin acetate (Zoladex 3.6 mg), from 8 (prior to pubertal onset) until 50 weeks of age. Testosterone replacement consisted of fortnightly intramuscular injections of testosterone cypionate to replicate endogenous testosterone production in controls. At ~50 weeks of age, all GnRHa+T and half of the Control and GnRHa groups were euthanised and GnRHa administration discontinued, giving 2 group during year 2 Controls (n=30) and GnRHa-recovery (GnRHa-Rec, n=25). HRV was assessed at 8, 27, 48, 84 and 98 weeks of age.

**Results**

Both GnRHa and Testosterone influenced mean heart rate and HRV. GnRHa treatment leads to sympathetic dominance of cardiac control. Effects of GnRHa were dependent on the steroid background and were mitigated when testosterone was elevated. Effects of peripubertal GnRHa exposure, on HRV, were present even ~50 weeks after discontinuation of treatment.

**Conclusion**

Peripubertal GnRHa-treatment may have long-term effects on the regulation of cardiac function that could result in increased cardiac risk.

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P19 FOR-DMD: The Scottish experience of recruitment challenges to determine the optimum steroid regimen for boys with Duchenne Muscular Dystrophy.

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Background:
The FOR-DMD trial aims to compare steroid regimes in the management of DMD:
~Daily prednisolone
~Intermittent prednisolone
~Daily deflazacort

Securing funding and recruiting a large enough population to produce reliable clinical results can be difficult where the condition is classed as a rare disease. This poster will discuss the recruitment challenges we have experienced.

Objective:
Daily corticosteroids are of greater benefit in improving function and patient/parent satisfaction than intermittent steroids.
Daily deflazacort is associated with fewer adverse effects.

Method:
300 boys with DMD are randomized to one of the steroid regimes. The following outcome measures are used:
• Time to stand from lying
• Forced Vital Capacity
• Subject/Parent Global Satisfaction
• NSAA and 6 minute walk test

Eligibility Criteria: Boys between the ages of 4-8, steroid naïve with confirmed DMD mutation and displaying physical symptoms. They must fully engage with the study protocols and they must be able to swallow the drug whole. Parents should have the capacity to give informed consent, be able to comply with scheduled visits, drug administration plan and study procedures.

Results:
The recruitment failures were due to parents being unable to comply with drug administration and visits due to suspected maternal learning difficulties and the child having significant behavioural challenges. One child was unable to rise from the floor and three parents preferred to be in charge of the study drug regimen. Three subjects were unable to comply with the physical evaluation due to poor attention span and poor understanding.

Conclusion:
Despite these recruitment challenges, Scotland has a 42% success rate and is the current global leader for recruitment in the FOR-DMD trial. It would be useful to undertake larger demographic studies to investigate recruitment challenges in other countries participating in the FOR-DMD trial to consider whether overall recruitment for future trials could be improved.