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ANNUAL MEETING 2019

INCORPORATING JOINT STUDY DAY WITH BRITISH ASSOCIATION OF PAEDIATRIC SURGEONS
WEDNESDAY 23RD - FRIDAY 25TH JANUARY 2019, DOUBLE TREE BY HILTON HOTEL, MILTON COMMON, OXFORD

ABSTRACTS

Oxford University, Oxford

Thanks to all of our sponsors

On behalf of BSPGHAN and the local organising committee for Oxford, we once again express sincere gratitude to all our partners who contribute to the Annual Meeting.

To our commercial sponsors who not only provide financial support, but through their participation provide opportunities for us to share and acquire knowledge, provide a platform to stimulate research and future development, and enrich the meeting through their single topic symposia.

We also wish to acknowledge the valuable role that Charitable Organisations fulfil. Their partnership with the Society and the Annual Meeting provides a vital interface with families and the wider community, updates us on current issues and priorities, and guides us in maintaining a strategy that is child and family focussed

We are delighted to welcome back old friends and we are also pleased to see new sponsors at the 2019 meeting.

We encourage all the delegates to take time to visit their exhibition stands and express their personal thanks to them for enabling BSPGHAN to continue organising these annual events.

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Wednesday Plenary Abstracts

Evaluating coeliac disease diagnosis without biopsy in 900 children: diagnostic accuracy, pitfalls and interpretation of TTG serology for follow-up – the UK and AbCD trial group experience

Auth MKH[1]; Rodrigues A[2], Uhlig HH[1], Petroff D[3], Hasenclever D[3], Wolf J[3], AbCD trial group[4], Mothes T[3]

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Introduction: Largely based on retrospective data, ESPGHAN coeliac disease (CD) guidelines suggest omitting biopsy analysis for symptomatic patients with concentrations greater 10 upper limit of normal (ULN) of IgA-anti-tissue transglutaminase (IgA-TTG). However, studies and clinical incidents illustrated misinterpretation of results, leading to inappropriate diagnosis and treatment. Especially in children with IgA deficiency, coeliac antibodies other than anti-IgA-tissue transglutaminase (IgA-TTG) are needed for validation and guidance, including anti-IgG deamidated gliadin (IgG-DGL).

Aims and Objectives: 1. To assess prospectively the diagnostic accuracy of antibody-based diagnosis of CD in children in a multicentre trial: TTG-IgA alone or combined with IgG-DGL (TTG-DGL)

2. To investigate the kinetics of antibody response after starting a gluten-free diet (GFD) in order to establish typical and expected changes.

Subjects and Methods: Prospective, multinational, multicentre trial investigating 898 (n=264, 29.4% from UK) children aged 5 months to 18 years scheduled for duodenal biopsy to confirm or exclude CD. Blood tests were performed locally and centrally for IgA-TTG and IgG-DGL, and endomysial antibodies, applying references values and cut-offs for > 10 ULN. A GFD was started in all children diagnosed with or suspected to have coeliac disease and clinical symptoms and serology were assessed and collected at median of 98 (IQR 86-116) days. Unclear cases were discussed with the reference centre and expert panel (from 13 participating centres) to obtain a final diagnosis. We validated 2 procedures for diagnosis: total IgA and IgA-TTG (the TTG-IgA-procedure) and IgG-DGL with IgA-TTG (TTG-DGL procedure).

Results: In this large prospective diagnostic trial, n=529 children (58.9%) were diagnosed with CD, in n=345 (38.4%) CD was excluded, and n=24 (2.7%) had no final diagnosis. N=16 patients (1.7%) had selective IgA deficiency. The TTG-IgA procedure identified patients with CD with a PPV of 0.988 and NPV of 0.934, whereas the TTG-DGL procedure yielded a PPV of 0.988 and NPV of 0.958, applying cut-offs of > 10-fold the ULN as coeliac and <1-fold the ULN as no CD. Tests for endomysial antibodies and HLA-type did not improve the PPV for samples with IgA-TTG ≥ 10 fold the ULN. Notably, in n=36 (4.2%) of patients, pathologists disagreed in their assessment of morphology. In many patients with CD, TTG and DGL antibody levels reached concentrations of greater 1,000, 10,000 and 100,000 times ULN (real-life concentrations usually not measured in routine laboratory assays). After 3 months, antibody levels had declined by a factor of 14.0 (95% CI, 12.0-16.4). N=74 (8.2%)

patients with CD were asymptomatic, n=18 (2%) patients had discrepant findings, and n=11 (1.2%) IgA-competent patients required histology and clinical follow-up to ascertain diagnosis of CD.

Summary: In a prospective study, we validated the TTG-IgA and the TTG-DGL procedure for identification of children with or without CD. Symptoms were too unspecific to be helpful at diagnosing CD or assessing the effect of a short-term GFD. Notably, on a gluten-free diet antibodies persisted in 27% above 10-fold ULN after 3 months despite having decreased by more than a factor of four.

Conclusion Using the TTG-IgA or the TTG-DGL antibody procedure, duodenal biopsies can be avoided in a large proportion of children with coeliac disease, reducing patient risks, costs, endoscopy waiting times and delay of treatment. Patients with a substantial response to GFD often still have high antibody levels after 3 months.

German Clinical Trials Registry No. DRKS00003854

Unexpected hypoglycaemia in non-diabetic children undergoing colonoscopy

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Introduction: Recently in our centre, a number of non-diabetic children were incidentally found to have blood glucose levels of <3mmol/L after following standard colonoscopy preparation. Hypoglycaemia can affect the way a child behaves psychologically and physiologically and is of particular risk when they are poorly responsive during or after anaesthesia. If not identified early, this easily treatable metabolic disturbance can have detrimental effects on neuronal function, especially if blood glucose levels fall below 2.5mmol/L. Our literature review identified no publically available data on the risk of hypoglycaemia in non-diabetic patients undergoing preparation for endoscopy. We conducted an audit to determine the incidence of such hypoglycaemic events in our patient cohort.

Aims and Objectives: We set out to investigate the extent to which hypoglycaemia occurs in children undergoing upper and lower GI endoscopy with standard bowel preparation. We also aimed to identify those children at highest risk of hypoglycaemia and to create an alternative protocol which minimises this risk.

Subjects and Methods*:* A prospective observational cohort study of usual practice was performed on children undergoing outpatient endoscopy. Blood glucose (BG) was checked after induction of anaesthesia just prior to endoscopy using a point of care blood test. Hypoglycaemia was defined as BG of <3mmol/L and very low blood sugar <2.5mmol/L. Inpatients and children with known diabetes or metabolic disease were excluded from analysis. Following initial data collection, showing significant hypoglycaemia, an alteration was made to the bowel preparation protocol. The original regime, based on an adult protocol, was adapted to include sugar-containing fluids on the day and up to one hour before the procedure. The same BG monitoring was then applied to a second cohort of children following this new colonoscopy protocol.

Results: In the initial cohort of 34 patients, 16 underwent only oesophagogastroduodenoscopy (OGD) and 18 underwent at least colonoscopy. Average age was 8.7 years (± 4 years) and average weight 31.2kg (± 16kg). In total, 10 patients (29%) experienced hypoglycaemia. No children undergoing OGD became hypoglycaemic whereas 56% of children undergoing colonoscopy recorded a BM <3mmol/L. Six of these children (34% of colonoscopies) recorded a very low BG. All patients under 8 years of age and below the WHO 50th centile for weight undergoing colonoscopy became hypoglycaemic, no child over 8 years and above 50th centile did. Linear regression analysis identified positive correlations between age and BG (r=0.48) and weight centile and BG (r=0.72). Following the reduction in fasting time prior to colonoscopy, a second cohort of 19 patients was assessed. Of these children, only one became hypoglycaemic (BG 2.7mmol/L). This patient suffered with Autism and refused to eat any of the low residue diet. Colonoscopy view was comparable between children on either protocol.

Summary: A large proportion of children undergoing outpatient colonoscopy became hypoglycaemic following routine bowel preparation. Those aged under 8 years and weighing below the 50th centile were at very high risk. By shortening the time for which patients were fasted, we were able to markedly reduce the incidence of hypoglycaemia while not compromising the view at time of colonoscopy. These findings raise the possibility that hypoglycaemia may be related to a low physiological reserve.
Conclusion: We have highlighted a previously unidentified safety issue with local standard bowel preparation prior to colonoscopy. Based on our data, we advise testing of blood glucose when planning colonoscopies for younger and smaller children in order to detect and then treat potential hypoglycaemia.

The State of "GRID" Training: Looking to the Future Training of Paediatric Gastroenterology: An Integrated View of Cases from Gastroenterology, Liver, Nutrition and IBD

Al-Araji, R[1], Trainee Representative of PGHAN CSAC, Specialist Registrar; Nottingham QMC Protheroe, S[2], Chair of PGHAN CSAC & Consultant Paediatric Gastroenterologist; Birmingham Children's Hospital

Introduction: The provision of high quality paediatric gastroenterology, hepatology and nutrition (PGHAN) training is overseen by the College Specialist Advisory Committees (CSACs).First survey of the PGHAN training was curried in 2016 and this survey is a 2 year follow up

Aims and Objectives: To engage trainees and Grid Centres, CSAC requested qualitative feedback on current training in the UK, in order to provide clarity on the current challenges, review the differences and compare the results with the first survey. This will guide us to maintain and improve the quality of PGHAN Grid training.

Subjects and Methods: Between October and November 2018, all PGHAN Grid centres, trainees and newly appointed consultants were approached to complete a questionnaire detailing the recently updated requirements expected to deliver quality PGHAN subspecialty training.

Results: Feedback received from 14 PGHAN grid training centre (2 out of 3 liver centres and 12 out of the 16 gastroenterology centres) and 18 trainees or newly appointed consultants.

Centres reported differing service models in delivering PGHAN services, with all trainees and centres declaring that *patient needs and safety were put first*. Further results as outlined in the table below with comparison to 2016 PGHAN training survey. Comments from trainees indicating that time pressure, demand for service cover and variability in the availability of endoscopic lists contributed to the low endoscopy rate.

Categories	2016	2018
Supervision and staffing		
- Working time in the specialty less than the requirement	32%	33%
- Working more than 1/3rd in out of hours	29%	22%
- Meeting with educational supervisor every 2 months	87%	83%
- Having annual multi -source feedback	100%	100%
Training and education		
- Clinical exposure sufficient for curriculum coverage	97%	77%
- Adequate training for transitional care	58%	47%
- Anthropometrics training	52%	27%
Clinical skills		
- Upper GI endoscopy (average per month)	9	7
- Lower GI endoscopies (average per month)	5	2
Overall PGHAN training rate (1 -10)		
- Rate by trainees (average)	8	8
- Rate by trainers (average)	9	8

Summary and Conclusion: Trainees and recently qualified consultants reported achieving subspecialty competencies during their three-year period of training,

through rotation to more than one centre. In the face of increasing staffing issues and competing service demands, access to specific training needs continues to be a challenge now more than previously reported, and it will be important to ensure quality training is maintained across PGHAN Grid Centres in the future.

Rumination Syndrome in Children: A Distinct Diagnostic Pattern During Ambulatory Reflux Monitoring with Impedance-PhMetry

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Introduction: According to the Rome IV criteria the diagnosis of rumination in children is based on typical symptoms during clinical evaluation. High resolution manometry/impedance (HRM/Z) can be used to confirm the clinical suspicion of rumination. However, this technique is somehow invasive, particularly for younger children, and includes a test meal followed by postprandial monitoring. Ambulatory reflux monitoring is commonly performed in children with symptoms suggestive of reflux and/or frequent regurgitation.

The **aim** of our study was to identify a specific pattern of rumination during ambulatory reflux monitoring with Impedance-pHmetry (MII-pH).

Methods: We retrospectively assessed MII-pH tracings from children with a clinical diagnosis of rumination syndrome confirmed by HRM/Z (minimal 2 typical rumination episodes in postprandial evaluation i.e. abdominal straining accompanied by impedance retrograde flow reaching proximal esophagus, followed by swallowing and esophageal clearance. We then compared the MII-pH parameters of these patients with those from a group of children with GERD (i.e pathological esophageal acid exposure without rumination symptoms) and a control group (non-GERD) i.e. children that were investigated for possible GERD but normal acid exposure and low number of reflux events (<70).

Results: We identified 36 children who underwent both a HRM/Z and ambulatory MII-pH studies. Out of the 36, 12 had a confirmed diagnosis of rumination based on clinical and HRM/Z findings (median age: 13.9 years, 6M:6F). Another 14 children were identified with GERD (median age: 4.9 years, 8M:6F) and 14 children with Non-GERD (median age: 11.9 years, 7M:7F). There was no significant gender difference between groups.

Children with rumination had a significantly lower total acid exposure time compared to GERD and higher compared to Non-GERD ($p < 0.0001$). There was a significantly higher number of total reflux events (RE), total number of proximal RE, total bolus exposure time (%), postprandial RE/hr and postprandial bolus exposure time (%) in the rumination group compared to both GERD and Non-GERD ($p<0.0001$). The SI and SAP for the patients who recorded regurgitations/reflux or vomiting were positive in the rumination group and negative in the GERD and Non-GERD group ($p=0.005$ and $p=0.001$ respectively) (see table).

Conclusion: Our study demonstrates that there is a distinct pattern of rumination during ambulatory reflux monitoring with MII-pHmetry. Patients with rumination have many more symptomatic reflux episodes (SI/SAP positive) with high proximal extent, particularly during postprandial periods compared to GERD and controls. Such pattern during reflux monitoring should raise the alarm for diagnosis of rumination, providing the opportunity for early diagnosis and treatment.

Hepatitis C Treatment in Children: Optimism Justified

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Background: Progress with safe and effective antiviral therapy for HCV infection has led to the WHO goal of global HCV elimination by 2030. Ten years ago we reported our experience entitled "Vertically acquired HCV infection: a cause for optimism": in that study of 27 children: 16 had genotype 3 (G3), considered then the most favourable in terms of treatment (Rx) response, of which 8/9 responded to pegylated interferon with ribavirin (PEG-Riba). Since then, direct acting antivirals (DAA) have been established as first line treatment of all genotypes in adults. In 2017 the first interferon free DAA regime was licensed for children aged 12 or older with G1 and made available by NHS England. In 2018, all DAA regimes with NICE approval for adults are available for post-pubertal children. Clinical trials of DAA continue in children aged > 3 years.

Aim: Evaluate progress of Rx for children with HCV infection and assess likelihood of achieving elimination target.

Methods: Retrospective review of all children referred to a single centre with HCV infection from 2000-18. Clinical management included (a) counselling at diagnosis regarding management options (Rx side effects and efficacy v "watchful waiting") (b) six monthly monitoring of viral load and LFT and (c) update on clinical trials. Only children aged six years or older were considered for Rx (either PEG-RIBA, clinical trial DAA or NHS eligible DAA). PEG- RIBA was commenced if parent/guardian accepted estimate of efficacy (50% G1 80% G3) and side-effect profile.

Results: Of 167 children identified, 23 resolved viraemia spontaneously, and one died of haematological malignancy. 21 patients were either transferred to adults or another centre before Rx, and 17 patients were aged < 6 and therefore Rx not offered. Genotype distribution in remaining 105 is G3:54%; G1:39%; G2:5% and G4:2%. PEG-Riba Rx was administered to 65 children and achieved viral response in 55(85%): response in G3 was 46/51 (90%) and in G1 was 5/10 (50%). Trial DAA (restricted numbers) led to viral response in 10/10 including one PEG-Riba non-responder. NHS eligible DAA achieved viral response in 9/9 including two PEG-Riba non-responders. 15/ 19 responding to Rx with DAA have G1. In total, 74/81(91%) children who received Rx responded. Of 31 who remain infected (7 Rx non-responders and 24 untreated): 4 have transferred to adults or another centre. 9/18 with G1 will be eligible for current NHS DAA within two years. All remaining children, including those aged <6, are awaiting Rx eligibility or future trials.

Summary: The clinical approach to management at our centre resulted in 81/105 (77%) children receiving Rx and 91% responding. Response to DAA (100%) was superior to PEG-RIBA (85%) and improved efficacy in G1 (100% v 50%) was seen.

Conclusion

Improvement in HCV treatment in the last 10 years allows for optimism for future elimination. For the WHO target to be achieved within 12 years, DAA treatment needs to be made available for younger children. Until elimination is achieved in adults, children will continue to be at risk of perinatally acquired HCV infection.

Deep remission is not associated with improved quality of life in paediatric Crohn's disease

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Introduction: The management of paediatric inflammatory bowel disease (IBD) should follow a treat-to-target approach. Mucosal healing is associated with improved long term outcomes and is a therapeutic target. Faecal calprotectin is widely used as an effective non-invasive marker of mucosal inflammation, and has better performance than clinical disease activity indices. The correlation between calprotectin and quality of life (QOL) measures is not well established, nor are the drivers of QOL in children with IBD.

Aims and Objectives:

In this cross sectional analysis we aimed to evaluate QOL in patients with established Crohn's disease (CD) and ulcerative colitis (UC), and to investigate how this was related to clinical disease activity indices and faecal calprotectin levels.

Subjects and Methods: Patients with established CD or UC receiving biologic therapy were recruited into a study evaluating the microbiome and metabolome in paediatric IBD. At recruitment QOL (measured using IMPACT III questionnaire), disease activity index score (PCDAI or PUCAI), and faecal calprotectin value were recorded.

Results were analysed using linear regression, two-tailed student T test, and TOST equivalence test. IMPACT III answers were analysed to identify domains (IBD symptoms, systemic, emotional, social, body image, treatment) which contributed to greatest reduction in QOL.

Results: 53 patients were recruited into the study between March and September 2018, 48 (38 CD, 10 UC) completed the QOL assessment and were included in this analysis. Of these patients 45 (36 CD, 9 UC) had a recorded PCDAI or PUCAI score, and 30 (21 CD, 9 UC) provided stool samples for faecal calprotectin assessment.

In patients with CD a low proportion of the variation in QOL was explained by calprotectin ($r^2 = 0.096$) or PCDAI ($r^2 = 0.27$); the relationship between PCDAI and calprotectin was also weak ($r^2 = 0.19$). In those with UC over half of variation in QOL was explained by calprotectin ($r^2 = 0.55$) and PUCAI ($r^2 = 0.52$); PUCAI and calprotectin were more closely related ($r^2 = 0.47$).

Nine patients with CD had a calprotectin level indicative of deep remission (<100 µg/g). QOL score was statistically equivalent in patients with deep remission and active disease (deep remission: n=9, mean QOL =137; active disease: n = 12, mean QOL = 143; TOST = positive).

All domains contributed similarly to reduction of QOL in CD and UC except body image which had a larger impact in CD (14% of reduction of QOL in CD, 9% in UC; p= 0.015). Social factors made the largest contribution to reduced QOL in both CD and UC (27% and 31% respectively); the two questions with the lowest average QOL score concerned effect of IBD on the family, and children not having anyone to talk to about their IBD.

Summary: Calprotectin and clinical activity scores are weakly related to QOL in patients with CD, but more strongly in UC. CD patients in deep remission did not have improved QOL compared to those with active disease. Social factors had the greatest impact on QOL score in CD and UC.
Conclusion: Adopting a treat-to-target approach is an important step towards improving clinical outcomes in IBD, but achieving biochemical remission does not significantly improve QOL. These results should be confirmed using other validated patient reported outcome measures. Holistic care for the patient and their family remains essential, and social factors must be addressed in IBD management.

Thursday Plenary Abstracts

To blend or not to blend? The benefits and risks of a blended diet in gastrostomy fed children

Thomas, S[1], Consultant Nurse Child Health; Marchesi J[2], Professor Human Microbiome Research; Saldier, C[3], Specialist Nurse Paediatric Gastroenterology & Nutrition; Jenkins H[3], Consultant Paediatric Gastroenterologist
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Introduction: Many parents in the UK are giving home blended diets (BD) via a gastrostomy (G) device as an alternative to commercial feeds. There are several anecdotal reports suggesting benefits from using BD but there are few studies addressing the risks and benefits in the UK

Aims and Objectives: We studied a group of G fed children before and after a change from commercial feeds to BD to investigate the benefits and complications (Group A). In addition we compared two groups of children fed BD and commercial feeds (Group B) and recorded complications/risks.

The study also examined whether there is a difference in microbiome gut analysis between the children receiving a blended diet, those receiving a commercial feed and their siblings eating a usual family diet.

Subjects and Methods: Parents of children who administer a BD and commercial feed via gastrostomy tube were invited to complete a questionnaire detailing their experience. We also collected stool specimens to look at future microbiome analysis of the 2 groups and a third sibling control group (microbiome analysis not yet available)

Results: Parents of 32 children (2-16 yrs) with neurodevelopmental problems receiving BD (>50% intake) completed a questionnaire detailing their experience before and after the institution of BD. There was no increase in complications in tube blockage or infection rates but a significant improvement ($p<0.05$) in the prevalence of bowel problems (vomiting, diarrhoea & constipation) including a reduction in medication, improvement to general health and mood /overall comfort and an increase in quality of life

Summary and Conclusion: The change to BD resulted in no increase in complications or risks but improved overall quality of life for the children and families.

Genome editing of human liver organoids for treatment of alpha-1 antitrypsin deficiency

van Haasteren, J. PhD Student; Gill, DR. Professor of Gene Medicine; Hyde, SC. Associate Professor of Molecular Therapy Gene Medicine Research Group, Nuffield Division of Clinical Laboratory Science, Radcliffe Department of Medicine, University of Oxford

Introduction: Genome editing holds the promise of a curative treatment for genetic diseases, by directly modifying the mutant gene in the genome of affected cells. This approach is particularly relevant for diseases such as Alpha-1 Antitrypsin (AAT) deficiency in which genome editing could allow for expression of functional AAT whilst simultaneously reducing expression of the highly prevalent toxic PI*Z form of the gene.

Aims and Objectives: To assess the feasibility of genome editing using Homology-Independent Targeted Integration (HITI) for AAT deficiency in liver cell lines and human liver organoids.

Subjects and Methods: Human liver carcinoma cells (Huh-7) were transfected with a Cas9 encoding plasmid and a HITI donor plasmid. Recombinant Adeno-associated viruses (rAAV) were based on AAV serotype 2 genome with various capsids. Human liver samples were obtained, with consent, from liver resection surgery; healthy tissue, as assessed by a pathologist, was processed into liver organoids. Organoids were transduced with rAAV as a single cell suspension to allow access to the basolateral membrane of the hepatocytes.

Results: Using plasmid-based transfection of Huh-7 cells, a fluorescent reporter gene (mNeonGreen) could be inserted into a precise location within the genome. This achieved expression from the endogenous AAT promoter in ~30% of transfected cells (N=4). At the same time, an inserted poly-A (pA) sequence prevented expression of the genomic AAT gene downstream, demonstrating the feasibility of simultaneous expression of functional AAT combined with cessation of expression of the toxic PI*Z mutant highly prevalent in AAT deficiency. Derivation of mouse and human (N=3) liver organoids was successful and were effectively expanded and cryopreserved for future use. Transduction of mouse organoids with rAAV of various serotypes established rAAV6.2 as the most efficient. Human organoids were differentiated into mature organoids expressing AAT, providing a human liver model for ensuing genome editing tests.

Summary: Employing HITI as a genome editing strategy allows for integration of a reporter gene into the first intron of AAT and provides expression driven by the endogenous AAT promoter.

Conclusion*:* This genome editing strategy can integrate a specific DNA sequence into a precise location in the genome, thereby providing potential correction of AAT deficiency regardless of the patients' mutation. Human liver organoids provide a physiologically and genetically relevant *in vitro* model of the human liver, acting as an appropriate stepping stone to *in vivo* studies in mouse disease models.

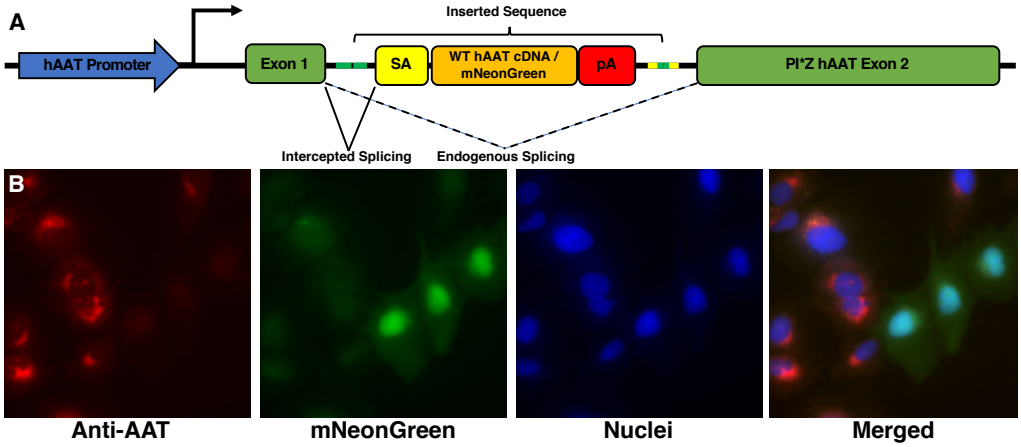

Figure 1 I The proposed integration strategy for AAT is shown in **A**, where the a splice acceptor (SA) intercepts transcription from the endogenous AAT promoter and a poly A (pA) sequence prevents expression of the toxic PI*Z protein. Proof-of-concept studies in human liver cells in **B** show that the reporter cDNA mNeongreen is successfully expressed (green) whilst at the same time preventing the endogenous AAT expression (red) in cells that have been targeted successfully.

Excess Adioposity is a common finding in children and adolescents with Inflammatory Bowel Disease

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[1]The Hospital for Sick Children, Toronto [2]Cincinnati Children's Hospital

Introduction: The growing prevalence of obesity in children and adolescents is a significant health burden, associated with both metabolic syndrome and non-alcoholic fatty liver disease. Obesity can also affect children with chronic diseases, even those traditionally associated with weight loss, such as inflammatory bowel disease (IBD). Obesity in IBD may adversely affect the efficacy of biological therapy, increasing drug clearance with subsequent low drug concentrations. Intra-abdominal surgery in patients with obesity can be both technically challenging and is associated with increased post-operative complications

Aims and Objectives: The objective of this study was to assess the body composition of children with IBD initiating treatment with Infliximab using air displacement plethysmography (ADP), and to assess the accuracy of clinically available tools in predicting excess body fatness in this context.

Subjects and Methods: Prospective cohort study performed at The Hospital for Sick Children (Toronto). All children and adolescents between the age of 5-17years with IBD receiving induction Infliximab therapy from January 2017 to July 2018 were recruited. Baseline phenotypic, demographic and laboratory data were recorded. Body composition was assessed using ADP. Fat mass index (FMI); fat mass weight divided by height squared was calculated to estimate excess adiposity, defined by FMI ≥ age- and gender- specific 75th percentile. Anthropometric measurements: weight, height, and BMI, were converted to z-scores using WHO criteria. Two trained dietitians obtained mid upper arm circumference (MUAC) and triceps skin fold thickness (TSFT) measurements using standardized approaches. MUAC and TSFT were used to calculate arm fat area (AFA) and arm muscle area (AMA), and converted into z-scores. Statistical analysis was applied when appropriate, and all analyses were performed using IBM® SPSS® Statistics Version 24.

Results: Fifty-three (68% male; 55% Crohn's disease, 45% Ulcerative Colitis) children with IBD were included. Median age was 15.3(13,16) years, 38% post-pubertal, 53% newly diagnosed. 24% of children and adolescents with IBD had excess adiposity, with FMI ≥75th centile. The mean BMI, MUAC and AFA z-score were all greater in those children with FMI ≥75th centile than those with FMI <75th centile. We found no gender difference in excess adiposity, 25% of male versus 24% of females (p=1.0). Similarly, no difference in pubertal status and children with excess adiposity (p=0.86). Approximately 1 in 4 children with CD and UC had evidence of excess adiposity, no difference in IBD phenotype (p=0.98).

Three children with FMI≥ 75th centile was not identified as being overweight by BMI alone (kappa=0.65 (SE=0.12)). Similarly, MUAC z-score ≥1 did not identify 4 children (kappa=0.60 (SE=0.14)), and AFA z-score ≥ 1 one child with FMI≥ 75th centile (kappa=0.70 (SE=0.11)). The intra- and inter- observer reliability between the two trained clinical dieticians was excellent with respect to both MUAC and TSFT measurements, ICC values between 0.999-0.982.

Summary: One in four stable paediatric patients with IBD have excess adiposity, with no difference in disease type, gender and pubertal status. We found moderate to good agreement in identifying children and adolescents with excess adiposity, comparing excess adiposity derived from ADP (FMI ≥ 75th centile) with other clinically available anthropometric measurements (BMI-, AFA- and MUAC- z-score ≥1).

Conclusion: Excess adiposity is common finding in stable IBD patients, and clinicians should be aware this population of children are at risk for excess fat and as such a healthy lifestyle should be encouraged to help prevent or treat excess adiposity.

Investigating potential association between disease activity, short chain fatty acid profiling with immune and vascular status in Paediatric Inflammatory Bowel Disease

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Introduction: Immune dysregulation is a known factor in IBD development, with it being predominantly Th1-mediated in Crohn's Disease (CD), Th2 in Ulcerative Colitis (UC) and Th17 in both. Intestinal vasculature is involved in IBD pathogenesis. Intestinal microbiota has a significant role in IBD, partly through its metabolites such as short chain fatty acids (SCFA).

Aims and Objectives: We aimed to (a) compare serum vascular and immune status of IBD patients with disease activity and treatment; and (b) assess any potential association with their faecal SCFA (acetate, propionate and butyrate).

Subjects and Methods: Blood samples were collected from healthy controls (HC) in the community, non-inflammatory control (NIC) and IBD patients from Great Ormond Street Hospital prior to diagnostic endoscopy or treatment then prospectively thereafter. Plasma biomarkers were quantified using the MSD kits V-PLEX Cytokine Panel 1 (GM-CSF, IL-12/IL-23p40, IL-15, IL-16, IL-17A, IL-1α, IL-5, IL-7, TNF-β, VEGF-A), V-PLEX Proinflammatory Panel 1 (IFN-γ, IL-10, IL-12p70, IL-13, IL-1β, IL-2, IL-4, IL-6, IL-8, TNF-α) and V-PLEX Vascular Injury Panel 2 (SAA, CRP, VCAM-1, ICAM-1). Stool samples collected were stored at -20^{o}C in 1M NaOH then freeze-dried prior to extraction using diethyl ether and orthophosphoric acid (1). Gas chromatography was used to quantified acetate, propionate and butyrate in the extracted stool samples. Biomarkers and SCFA were compared with clinical parameters and disease scores pre- and post-treatment. Statistical analysis was performed using GraphPad Prism.

Results: A total of 76 blood samples from HC (n=21), NIC (n=8) and IBD (n=12) patients, and 28 stool samples from IBD (n=12) and NIC (n=6) patients were analysed. Cytokines IL-1-α, IL-1β, IL-2, IL-4, IL-12p70and IL-13 were undetectable thus excluded from analysis.

- IBD patients were found to have elevated TNF-α ($p=0.007$), IL-6 ($p=0.0204$), IL-8 ($p=0.0451$) and IL-15 ($p=0.0012$), IL-5 ($p=0.001$), IL-16 ($p=0.004$) and IL-17 ($p<0.0001$) compared to HC.
- Increased circulating serum amyloid A (SAA) ($p=0.0353$) and vascular cell adhesion protein (VCAM-1) ($p<0.0001$), whilst decreased concentrations of vascular endothelial growth factors (VEGF) ($p=0.0299$) were seen in IBD compared to HC.
- Analysing CD and UC patients separately, IL-17, IL-15, IL-5 and VCAM-1 concentrations were elevated in active CD (IL-17 $p<0.0001$, IL-15 $p=0.002$, IL-5 $p=0.004$, VCAM-1 $p=0.0004$) and active UC (IL-17 $p<0.0001$, IL-15 $p=0.033$, IL-5 $p=0.035$, VCAM-1 $p=0.004$). In addition, SAA, IL-8 and IFN-γ were elevated in active

CD (SAA p=0.005, IL-8 p=0.038, IFN- γ p=0.0009) and IL-16 was raised in UC (p=0.007.

- Following treatment, IL-12p40, IL-17, TNF-α, IL-5 and IL-6 decreased with improving ESR. Additionally, SAA in CD, and VCAM-1 and VEGF in UC reduced with decreased ESR. In contrast, IFN-γ, IL-7, IL-15 and IL-16 in CD, SAA in UC and granulocyte-macrophage colony-stimulating factor (GM-CSF) in CD and UC increased in all patients still in active disease.
- A trend for increase in IL-10 with greater butyrate concentration was observed; this reached statistical significance for IL-5 (R^2=0.327, p=0.0207) and IL-8 (R^2=0.2968, p=0.0291. Interestingly, TNF- β showed negative correlation with increasing acetate (R^2=0.452, p=0.0043), and the reverse with propionate (R^2=0.285, p=0.0043) with a trend for greater cytokine levels with increasing butyrate. Increased acetate and propionate percentages were associated with a reduction in IFN- γ, VEGF, IL-8 and IL-17 in 3 UC patients.

Summary: Our pilot study supports the notion that IL-7, IL-15, IL-16 and SAA may serve as potential biomarkers for disease activity in PIBD. Trends observed between cytokines and SCFA suggests intimate links between microbial metabolites and host immune axis, with a key role in UC pathogenesis.

Reference: 1. Ijaz UZ, et al. The distinct features of microbial dysbiosis of Crohn's disease do not occur to the same extent as their unaffected, genetically linked kindred. PLoS One 2017 12(2): e172605.

A study of post induction Infliximab trough levels demonstrates most paediatric patients are being underdosed

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Introduction: Infliximab (IFX) is an anti-TNF alpha monoclonal antibody widely used for the treatment of paediatric inflammatory bowel disease (IBD). Therapeutic drug monitoring has allowed dose adjustment to individualise treatment.
Aims and Objectives: To evaluate the effectiveness of a 5mg/kg induction regime in attaining therapeutic post induction IFX levels and to investigate baseline laboratory values (haemoglobin, white cell count (WCC), platelets, albumin, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR) and faecal calprotectin) and other patient factors as a predictor of post induction IFX levels.
Subjects and Methods: An induction regime of 5mg/kg (Remsima) at weeks 0, 2 and 6 with 8 weekly infusions thereafter is utilised in our IBD patients as per ECCO guidelines[1]. Serum IFX trough levels and antibodies are tested immediately before the fourth (or a subsequent) dose; a target range of between 3 and 7mg/L is considered therapeutic. This retrospective study considered paediatric IBD patients who underwent the above induction regime between 28/08/15 and 27/08/17. Patients with no measured levels prior to dose 6 or an adaptation/discontinuation of regime pre initial trough level were excluded; leaving 62 patients included in the study (50 Crohn's disease (CD); 7 ulcerative colitis (UC); 5 inflammatory bowel disease unclassified (IBDU)). Baseline characteristics and laboratory values from time of IFX initiation, co-prescribed medication and outcome of initial infliximab trough level were recorded. A Mann-Whitney U Test was used to analyse the relationship between IFX trough levels and lab parameters to assess if these baseline values served as a predictor of post induction levels.
Results: Indication for commencement of infliximab comprised active luminal disease (45/62, 72.6%); chronic refractory disease (4/62 - 6.5%); acute severe disease (6/62 - 9.7%) and perianal disease (7/62 - 11.3%). Median disease activity scoring at induction of IFX was wPCDAI 30 for CD and PUCAI 20 for UC/IBDU. PGA scoring at baseline comprised 16/62 (25.8%) remission; 22/62 (35.5%) mild; 20/62 (32.3%) moderate and 4/62 (6.5%) severe disease. Of the 62 patients, 39 (62.9%) had a sub-therapeutic post induction IFX trough of <3mg/L; 18 (29.0%) had a therapeutic level of between 3 and 7mg/L; and 5 (8.1%) had a supra-therapeutic level >7mg/L. Of the 39 patients with a sub-therapeutic level, 18 (29.0% of total) had an unrecordably low level of <0.8mg/L. Consequent to trough level 40/62 (64.5%) of patients had their IFX escalated; dose was increased to 10mg/kg 8 weekly in 32/62(51.6%) patients and interval was decreased to 5mg/kg 6 weekly in 8/62(12.9%) patients. Only 1 patient had their interval increased (5mg/kg 10 weekly), and IFX was stopped in 3 patients (surgery/alternate therapy). 18/62(29.0%) did not have any change to regime post initial trough level. All patients were prescribed co-immunosuppressive medication during IFX induction regime (thiopurines, methotrexate or tacrolimus). 22/62 (35.5%) patients received steroids during their induction regime. A significant difference was found in the median albumin levels of patients with an IFX level of <0.8mg/L (median 34.5g/L) compared with those with a

level >/=0.8mg/L (median 37g/L) (p=0.02); and in those with a level <3mg/L (median 35g/L) when compared to those with a level >/=3mg/L (median 37g/L) (p=0.04). A significant difference in the IFX levels of patients with a baseline albumin of <35g/L (median 0.9mg/L) when compared with the levels of patients with an albumin of >/=35g/L (median 2.7mg/L) (p=0.02) was identified. No other factors were significant.

Summary: 62.9% of our patient cohort had a sub-therapeutic post induction IFX trough following standard induction regime; 29.0% had an unrecordable level. 64.5% had their IFX regime escalated following initial level. Significant difference was detected in the median albumin levels of patients when analysed according to IFX level and also in IFX level when analysed according to albumin thresholds.

Conclusion: A standard IFX induction regime was ineffective at achieving therapeutic post induction IFX levels in the majority of our patient cohort. Albumin may be a predictive factor for post induction IFX level as supported by the findings in this and other studies. It is also important to recognise that an IFX level is a small part of a larger clinical picture; and further work should include collection of data pertaining to clinical status at the time of IFX trough level as an indicator of patient response to therapy. We have now moved to 10mg/kg induction doses for certain high risk patients (e.g. perianal and multifocal small bowel Crohn's disease). We continue to monitor other indications and are considering a broader change of dosing practice. This area requires further study.

References: 1) Biologics: Anti-TNFs | ECCO e-Guide [Internet]. E-guide.ecco-ibd.eu. 2016 [cited 26 October 2018]. Available from: http://www.e-guide.ecco-ibd.eu/interventions-therapeutic/anti-tnfs#crohnsdisease#&section-4

Treatment failure, safety and immunogenicity of anti-TNF treatment in biologica-naïve children and adolescents with Crohn's disease: a subgroup analysis of the PANTS cohort

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Introduction: The pharmacokinetic mechanisms underpinning anti-TNF treatment failure in children with Crohn's disease (CD) are poorly elucidated.

Aims and Objectives: Personalised Anti-TNF Therapy in Crohn's disease (PANTS) is a three year prospective, observational UK-wide study. We performed a subgroup analysis on paediatric patients reporting treatment failure, safety, and immunogenicity data.

Subjects and Methods: Study inclusion criteria: <18 years at biologic initiation, active luminal CD, and no prior therapy with infliximab (IFX) or adalimumab (ADL). Sites chose to report either HBI or sPCDAI. Primary non-response (PNR) at week 14 included patients still on steroids, those who exited for treatment failure, or in whom neither CRP nor HBI/sPCDAI had fallen from baseline. Remission at weeks 14 and 54 was defined as HBI ≤3 points/sPCDAI $\underline{<}$ 15, CRP ≤3 mg/L, and no concomitant steroids. Dose optimisation was not performed. Age, CRP, calprotectin, and albumin were analysed as continuous variables. Drug and anti-drug antibody levels were measured using the IDKmonitor drug tolerant ELISA assays. Immunogenicity was defined as anti-drug antibody titre ≥10 AU/ml and undetectable drug level (<0.8 mg/L).

Results: Of 219 (133 male, median age [15 years, IQR 13 – 16] patients recruited from 48 sites, 202 (92%) were treated with IFX and 17 (8%) with ADL. Median duration of disease was 1 year (IQR 0.4 – 2); treatment at initiation: steroids in 67 (31%), thiopurines in 170 (78%), and methotrexate in 19 (9%) patients.

PNR occurred in 34/189 (18%, 95% CI 13 - 24) and non-remission in 90/178 (51%, 95% CI 43 – 58) patients at week 54. Non-remission rates at week 54 were lower in those receiving immunomodulator vs those that did not (72/155 (47%), vs 18/23 (78%), p=0.006). In IFX-treated patients, PNR was associated with low week 14 drug level (2.3 mg/L in PNR vs 3.8 mg/L in non-PNR, p=0.03). There was an exposure-response correlation between drug level and outcome up to 6 mg/L. The major determinant of non-remission at week 54 was clinical status at week 14.

Factors associated with suboptimal week 14 drug level: younger age (p<0.001), immunomodulator use (no immunomodulator 1.20 mg/L (IQR 0.7 - 1.7) vs with immunomodulator 3.75 mg/L (IQR 1.8 - 6.3), p<0.001), development of anti-drug antibody (p=0.02), and higher baseline markers of disease activity (raised CRP, raised calprotectin, or decreased albumin, p <0.001).

Serious adverse events (AE) occurred in 37 (17%) of IFX- and ADL-treated patients: 9 (4%) patients had serious infections and 11 (5%) had to stop drug.

For IFX-treated patients, immunogenicity rates were 53% (95% CI 44 - 60) and 61% (95% CI 51 - 69) at one and two years respectively. Low week 14 drug level was the main determinant of immunogenicity (p<0.007), whilst anti-drug antibody formation was the principle factor accounting for low drug level (p<0.001). Combination

immunomodulator use was protective against immunogenicity (HR 0.34 (95% CI 0.21 - 0.57), p<0.001).

Summary: There are demographic, disease-, and treatment-related factors associated with non-remission in paediatric patients starting infliximab. Immunogenicity rates are high at one and two years, largely as a result of sub-optimal drug level. Active management strategies should improve clinical outcomes

Friday Plenary Abstracts

Paediatric e-BANS: establishing a national database of children requiring home parenteral nutrition (HPN) in England

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Introduction: A cross sectional survey in 2012 estimated that 195 children were receiving HPN, supervised by 32 paediatric centres across UK. English adult HPN services are now required to use the electronic British Artificial Nutrition Survey (e-BANS) in order to register patients. The Paediatric e-BANS was established in 2015 in order to provide an accurate contemporary database of children requiring HPN in England; from February 2018 an administrator was appointed to facilitate data collection.

Aims and Objectives: We aimed to collect accurate prevalence data of children on HPN in England, with the secondary aim of maintaining the database to provide reliable national long-term outcome data. The database would include all Paediatric HPN centres, providing an accurate and updatable survey of the number of children requiring home PN in England, and the centres providing care.

Subjects and Methods: A list of paediatric centres providing HPN in England was obtained and all centres encouraged to enter cases. This was achieved by regular contact with identified leads in each centre and site visits where required. The data collected was validated by cross checking against the numbers obtained from home care companies on total numbers of patients aged <18 years in England receiving HPN. Scotland, Wales and Northern Ireland do not participate in eBANS and data from these centres was collected by personal communication with regional leads.

Results: A total of 518 patients were notified to the database of which 372 were receiving HPN in October 2018. 215 patients were added to the database since Feb 2018 following the appointment of the administrator. Their care was delivered through 18 centres, 5/18 centres cared for >25 children, whilst only 3/18 cared for <10 children. Over the recording period from Jan 2015 to August 2018, 19% were recorded to be weaned off PN, 4.5% transitioned to adult services, 1.8% underwent transplantation, and 3.1 % died. 45% of all cases were due to short bowel syndrome, of which 25% weaned off PN. 14% had a visceral neuromuscular disorder, of whom 9% were weaned; 10% had a congenital enteropathy, of whom 10% died, 9% had another mucosal defect and 18% were classed as "other disorder". Data obtained from home care companies showed that 374 patients <18 years were registered as receiving PN in October 2018 , which included some older children who have transitioned to adult care. No new cases aged <18 years were registered by adult HPN teams.

Data from Scotland, Wales, and Northern Ireland shows a further 32 children on HPN putting the total number of children on HPN in UK to 404. This means that there are about twice as many children on home PN in the UK than there were in 2012, cared for by about half as many HPN centres.

Summary: Paediatric e-BANS has been established as a national database for children with Intestinal Failure. In addition to understanding how many children require HPN, and where this care is provided, we will be able to collect longitudinal information on outcomes for all patients and selected subgroups of patients.
Conclusion: A National Database of Paediatric HPN patients is achievable in England. Longitudinal data from this will be very important in service planning and in determining outcomes of care.

Complicated disease and response to initial therapy predicts early surgery in Paediatric Crohn's disease: results from the prospective multicentre GROWTH study

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Introduction: There is an 80% lifetime risk of surgery for those with paediatric Crohn's disease (CD). The ability to predict risk for poor outcomes in paediatric CD would enable early treatment intensification.

Aims and Objectives: We aimed to identify children with CD with complications who are at risk for surgery two years from diagnosis.

Subjects and Methods: Newly diagnosed children with CD were enrolled into a prospective, multicentre inception cohort. Disease characteristics and serological markers were obtained at baseline and week 12. Outcome data including disease activity, therapies, complications, and need for surgery were collected through 104 weeks. Chi-square automatic interaction detection (CHAID) algorithm was used to develop a prediction model for early surgery.

Results: Of 285 children enrolled, 31(10.9%) required surgery within two years. Multivariate analysis identified stricturing disease at baseline (OR 5.26, 95% CI 2.02 – 13.67 (p=0.001)), and Paediatric Crohn's Disease Activity Index (PCDAI) >10 at week 12 (OR 1.06, 95% CI 1.02– 1.10 (p=0.005) as key predictors for early surgery. CHAID demonstrated that absence of strictures at diagnosis (7.6%, p<0.001), corticosteroid-free remission at week 12 (4.1%, p=0.014), and early immunomodulator therapy (0.8%, p<0.008) were associated with the lowest risk of surgery, while stricturing disease at diagnosis (27.1%) or elevated PCDAI at week 12 (16.7%) have an increased risk of surgery at follow-up. Anti-OmpC status further stratified high-risk patients.

Summary: A risk algorithm using clinical and serological variables at diagnosis and week 12 can categorise patients into high- and low- risk groups from diagnosis.

Conclusion: Stricturing disease and active disease post-induction of treatment is associated with poor outcomes in paediatric CD, including surgery. Risk stratification may reduce likelihood of early surgery; replication cohorts are needed.

The influences of the introduction of biologic agents on the rate of surgical intervention in paediatric inflammatory bowel disease – results from a population based dataset

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Introduction: Biologic agents (principally anti-TNFα medications such as Infliximab and Adalimumab) have become mainstays in the treatment of paediatric inflammatory bowel disease (PIBD). Recent published regional data have found a reduction in the rate of surgical intervention for PIBD since the time of their introduction, alongside increasing use in children.

Aims and Objectives: We aimed to determine whether a similar reduction in surgery for PIBD existed since the introduction of biological therapy by examining larger population dataset.

Subjects and Methods: Hospital Episode Statistics (HES) data were obtained for all admissions within England (1997-2014, 0-18 years of age) with an ICD-10 code for diagnosis of Crohn's disease (CD, ulcerative colitis (UC) or IBD-unclassified (IBD-U), OPCS codes for surgical procedures associated with PIBD, and OPCS codes for biological therapy. Data were analysed to determine changes in number of surgical resections and episodes of biological therapy given over time. A regional PIBD database was integrated to determine incidence. Statistical analysis was undertaken using Stata 15.0 (StataCorp). Chi-squared test was used to compare rates, $p<0.05$ considered significant.

Results: 22,645 children had a diagnosis of PIBD during the study period, 12,844 (57%) were male. Of these, 11,312 (50%) had a diagnosis of CD, 7,212 (32%) UC and 1,319 (5.8%) cases IBD-U. Additionally, 2,802 (12%) cases had multiple diagnosis codes. Biological therapy was used in 2,952 (13%) of cases. Surgical resection was undertaken in 2320 (10.2%) cases; more commonly for CD than UC (11% vs 7.1%, $p<0.0001$). There was no difference in median time from diagnosis to resection in those with CD and IBD, (0.81 vs 0.83 years, $p=0.85$). The use of biologic agents increased dramatically from 2006 ($p<0.0001$). The rate of surgery over the same time period remained unchanged despite the known increase in PIBD incidence and prevalence (figure 1 and 2).

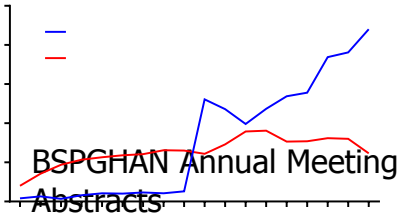
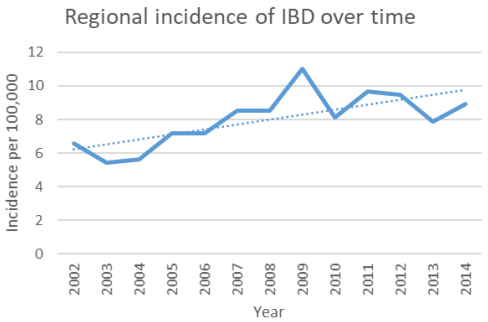


Figure 1 – Relationship between biological therapies and



surgical resection for IBD.
Figure 2 – Regional incidence of IBD including trend line (dotted).

Summary: This report examines the rate of surgery for PIBD from a large population dataset. These data provide an estimate of the rate of surgery required for patients diagnosed with CD or UC in childhood – 10% and 7% respectively. The rate of surgical intervention for either CD or UC did not increase between 1997 and 2014, despite a dramatic increase in the use of biologic agents since 2006.

Conclusion: The rate of surgery in children with a known diagnosis of PIBD has reduced between 1997 and 2014, when taking into account the known increase in prevalence of PIBD. This reduction is not as dramatic as the increase in the use biologic agents since 2006.

Nationwide incidence and prevalence of paediatric inflammatory bowel disease in Scotland 2015-2017 demonstrates the highest paediatric prevalence rate recorded worldwide

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Introduction: Robust epidemiological data on paediatric inflammatory bowel disease (PIBD; IBD diagnosed <16 years of age) is vital to organising current health care provision and planning future service design. Historically, Scotland has the highest incidence of PIBD in the United Kingdom and one of the highest worldwide, however data on prevalence is lacking.

Aims and Objectives: We aimed to calculate an updated incidence rate as well as both point and period prevalence rates of PIBD in Scottish children between 2015-2017.

Subjects and Methods: Incident and prevalent cases of PIBD were prospectively recorded by the three Scottish regional paediatric gastroenterology networks covering all paediatric units nationwide. PIBD was defined as children <16 years of age with Crohn's Disease (CD), ulcerative colitis (UC) or Inflammatory Bowel Disease Unclassified (IBDU) according to internationally accepted diagnostic criteria. Incidence rate for the period 2015-2017, as well as point (30th June each year) and period prevalence (calendar year) were calculated against age-specific population data for Scotland. A relevant literature review of PIBD prevalence rates to 12.2017 was performed for comparison.

Results: In total, 330 patients with PIBD were diagnosed in Scotland within the 3-year period providing an overall incidence of 12.0/100,000/year. The number of prevalent patients per year ranged from 523-541 with differences in rates for both gender and age noted: male 68.3 vs. female 47.4/100,000/year; preschool age (0-5yrs) 5.8, primary school age (6-10yrs) 39.7 and secondary school age (11-15yrs) 143.1/100,000/year. The highest point prevalence was 46.3/100,000/year (95% CI 42.0-50.9) at 30.06.17 and the highest period prevalence was 58.9/100,000/year (95% CI 54.1-64.2) between 01.01.2016 – 31.12.2016. Breakdown of prevalent cases according to disease subtype was CD 39.5 (68%), UC 12.5 (22%) and IBDU 6.1/100,000/year (10%). No major differences in prevalence rates across regions were noted, however different practices in transition to adult services are evident with 22/139 (16%) of patients being managed by PIBD services in North of Scotland >16yrs of age; in contrast to 56/156 (36%) in South-East Scotland and 100/308 (32%) in West of Scotland.

Summary & Conclusion: The PIBD prevalence rate in Scotland is higher than for any other cohort (aged <16yrs) published in the worldwide literature. These

prevalence rates are in keeping with the high incidence rate, which continues to rise, and the chronic nature of this disease. Given that the true case load within paediatric services includes patients >16yrs who are often not transitioned until they have completed schooling, these data urgently need to be explored across the UK as if replicated would have significant implications for the PIBD workforce overall.

Significant variants in monogenic inflammatory bowel disease genes identified by whole exome sequencing of 400 paediatric inflammatory bowel disease patients

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Introduction: Monogenic inflammatory bowel disease (IBD) refers to >60 conditions presenting with clinical signs and symptoms of IBD but caused by a single-gene defect. These conditions typically present at a young age, may have additional atypical features (such as frequent infections, skin abnormalities or haematological disturbances) and can be difficult to diagnose and treat.
Aims and Objectives: We aimed to identify variants in monogenic IBD genes from our paediatric cohort by whole exome sequencing (WES); this included causal variants, alongside mutations that are likely to contribute to disease pathogenesis in a non-strictly Mendelian fashion.
Subjects and Methods: Patients were recruited from the Wessex genetics of paediatric IBD study; to date ~500 children have been recruited. Patients who had undergone WES (n=401) were included in the analysis. WES data was processed through an in-house analysis pipeline. Variants were annotated using in-silico deleteriousness (CADD etc.) and frequency (gNOMAD) metrics. All variants identified in 68 known monogenic IBD genes were retrieved. Significant variants were defined as being present in the Human Genetic Mutation Database (DFP, DM, DM?) or variants predicted as highly deleterious (CADD >20, minor allele frequency <0.01). Variants were described only if in the assumed correct inheritance for that gene (AR, autosomal recessive, AD, autosomal dominant, XL, X-linked recessive).
Results: The mean age at diagnosis was 11.9 years (range 1.3-17.4), 64.9% had a diagnosis of Crohn's disease. Thirty patients (7.5%) were diagnosed <6 years of age with very early onset (VEOIBD).
Homozygous or hemizygous known monogenic IBD variants were seen 34 patients (8.5%). These included variants in IL10RA, CD40LG, NCF2, WAS, TRIM22 and MASP2. Variants within NCF1 (homozygous, AR), POLA1 (hemizygous, XL) and STAT1 (heterozygous, AR) were seen in VEOIBD patients. Additionally a rare, deleterious hemizygote non-synonymous variant was observed in BTK that had not previously been reported as associated with IBD in the literature.
Possible compound heterozygote variants were identified, 35 patients (8.7%) had at least 2 significant variants within monogenic IBD genes, including in MEFV, NCF1, NCF2, TTC7A, CARD9, LRBA and RAG2. Novel variants were seen in patients in CARD9, TRIM22 and RAG2. A patient diagnosed at the age of 4 years had two

variants within IL10RA and an additional patient aged two years at diagnosis harboured two potential disease causing variants in TRIM22.

Summary: WES is a powerful tool for identification of known and novel variants in monogenic IBD genes. Many paediatric IBD patients were identified with significant monogenic IBD gene variants. The impact of many of these variants in the development of disease is likely to be through a non-Mendelian mechanism (such as reduced protein function, interaction with other genes within the pathway or multiple variants within the gene/pathway). Functional validation of novel variants of unknown significance is important but remains challenging.

Conclusion: Variation in 'monogenic' IBD genes may contribute to disease in ways other than the reported pattern of inheritance. WES is an extremely useful tool for identification of variants, however it is important to interpret results in context and to collaborate to provide functional validation of genomic discoveries.

Influence of previous appendicectomy on subsequent diagnosis and disease course of paediatric inflammatory bowel disease

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Introduction: There is a strong inverse relationship between prior appendicectomy and the development of ulcerative colitis (UC) in adults, as well as some evidence that appendicectomy after diagnosis of UC may positively influence disease course (relapse rate, colectomy rate). This has led to a randomised controlled trial (ACCURE) investigating the potential effect of appendicectomy on disease course in adult UC.

Aims and Objectives: We aimed to investigate whether prior appendicectomy influenced the development of paediatric Crohn's disease (CD) or UC, and whether appendicectomy after a diagnosis of either CD or UC affected the rate of subsequent surgical intervention.

Subjects and Methods: Hospital Episode Statistics (HES) data were obtained for all admissions within England (1997-2014, 0-18years) with a ICD-10 diagnostic code for CD, UC or IBD-U, an OPCS procedure code for appendicectomy, or an OPCS procedure code for a surgical intervention associated with a diagnosis of IBD. Office of National Statistics (ONS) data were used to estimate population size. Data were analysed to 1) determine the risk of developing CD or UC following appendicectomy and 2) determine whether appendicectomy effects requirement for future resection after a diagnosis of UC/CD. Statistical analysis was undertaken using Stata 15.0 (StataCorp). Rates were compared using Chi-Squared test, $p<0.05$ was considered significant.

Results: During the study period, there were 11,312 children with CD and 7,212 with UC. A total of 256,722 children underwent appendicectomy during the same time. Children who underwent appendicecectomy had an increased risk of later developing CD, but not UC, when compared to those who had not undergone appendicectomy (1 in 954 vs 1 in 2084 [$p<0.0001$] and 1 in 3423 vs 1 in 3182 [$p=0.53$] respectively), see figure 1. Those children with CD who had previously had an appendicectomy were more likely to undergo resection compared to those who had not undergone appendicectomy (23% vs 15%, $p=0.0002$). Previous appendicectomy did not affect resection rate in UC.

Appendicectomy after diagnosis of either UC or CD did not influence the rate of subsequent surgical resection (1.9% vs 7.9% [$p=0.12$] and 6.1% vs 7.7% [$p=1$] respectively).

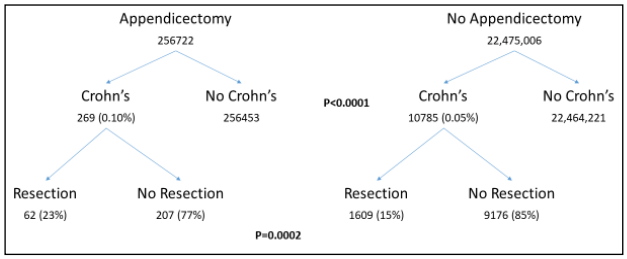

Figure 1 – Requirement for resection in children with Crohn's disease and Ulcerative colitis who have had a previous appendicectomy

Summary: In this large population-based study, prior appendicectomy was associated with an increased risk of a later diagnosis of CD and, in turn, an increased risk of surgical intervention after diagnosis of CD. Appendicectomy was not associated with an increased risk of later being diagnosed with UC.

Conclusion: We report this association between appendicectomy and CD in children. Our data demonstrates no decrease in risk of developing UC post-appendicectomy, conflicting with that in adult data. Due to small absolute differences these data do not support a RCT of elective appendicectomy in patients diagnosed with either CD or UC.

Posters
Dr Falk IBD Award

A Case Report on the role of Exclusive Enteral Nutrition and CDED as remission maintenance in a severely atopic teen with Crohn's Disease.

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Introduction: Crohn's Disease (CD) in children with severe multiple allergies to immunosuppressant medication is rare. We present the case of severe peri-anal CD complicated by anaphylaxis to steroids and infliximab, and the successful treatment using exculsive enteral nutrition (EEN) via single stage button gastrostomy, Crohn's disease exclusion diet (CDED) whilst desensitising to adalimumab.

Aims and Objectives: A 13-year old girl presented with tiredness, abdominal pain, and passage of PR blood and mucus. She was known to have asthma and allergies to animal hair with epipen due to previous anaphylaxis. She had confirmed allergy to penicillins multiple gastrointestinal allergies including egg, fish and nuts. In her family history, her maternal-aunt had CD and her mother had undergone a sub-total colectomy for colonic CD with subsequent proctectomy; being identified as having stricturing-type CD on a small bowel assessment. An initial endoscopy in the tertiary paediatric GI unit showed evidence of ileo-caecal CD with deep ulcers in the ileum, distorted caecal pole and macroscopic evidence of ulceration from rectum to ileum. Biopsies confirmed CD with granulomas identified. Initial treatment with oral exclusive enteral nutrition (EEN) was unsuccessful due to poor tolerance and ongoing symptoms. With continuing PR bleed and worsening pain she was admitted for intravenous methylprednisolone but had an anaphylaxis reaction. A similar reaction was found on IV hydrocortisone and so was put on a tapering dose of oral prednisolone and azathioprine. She continued to struggle with recurrent intermittent PR bleeding and sought a second opinion from Sheffield Children's Hospital (SCH). The MDT at SCH includes rheumatology and allergy specialists, who undertook a full reassessment. Her allergies were confirmed and rheumatological assessment confirmed juvenile idiopathic arthritis of her hands. The GI team identified apthous ulcers on wireless capsule endoscopy, active ileo-caecal disease and radiological (MRI) confirmation of an inter-sphincteric fistula tracking down to the left natal cleft. Nasogastric (NG) of EEN was commenced due to significant weight loss (dropping a centile from >75th to <50th centile), failure to achieve menarch and failure of growth potential (<9th centile). Dexa scan showed poor bone mineral density. This lead to an MDT decision of introducing infliximab (IFX). This induced clinical (PCDAI) and biochemical remission (normal faecal calprotectin & serum inflammatory markers) as well as resolution of peri-anal disease (confirmed on MRI). However she developed an anaphylactic reaction to IFX which was stopped and thereon was managed with NG EEN and adalimumab (Humira). Despite pre-medication of antihistamine (fexofenadine) she had further allergic reactions to Humira. Formal skin prick testing confirmed sensitisation to Humira, methyl-prednisolone and hydrocortisone despite normal drug antibodies and negative IgE and mastcell tryptase. She refused repeated NG insertions, and despite being on sole nutritional treatment of CD. A complex MDT discussion involving allergy and gastroenterology teams lead to pooled experience as well as seeking opinions from international

experts on CDED. We decided to pursue a pragmatic approach along with the patient and her mother's wishes; no further escalation with biologics or immune-suppressants but instead opted for combination therapy of partial EN (delivered via a single stage button gastrostomy), CDED and azathioprine whilst simultaneously commencing desensitisation therapy to Humira on HDU. Following an uneventful single-stage endoscopic button gastrostomy insertion and subsequent 6 weeks of EEN she gained both weight (>75th centile) and height (from 9th to >25th centile). After 3 months of successful completion of desensitisation of Humira EEN was 'relaxed' to CDED restarted. Consequently in the last 8months she continues to remain in clinical and biochemical remission and has attained menarche and height proportionate to her weight (>75th centile). She continues on 20mg of subcutaneous Humira on a weekly basis (instead of fortnightly) at home with fexofenadine and prednisolone as premedication along with Azathioprine, PEN and CDED. A recent MRI-Pelvis confirms resolution of peri-anal disease and she's recently completed a walk-a-thon to raise funds for Crohn's Colitis U.K.

Conclusion: In complex cases of Crohn's disease with multiple allergies, there may be a role for single stage gastrostomies to maintain remission with ELN +/-CDED. In children with IgE mediated allergies to biological or steroid agents, desensitisation therapy should be considered, alongside close collaboration with allergy and immunology specialties.

A Home Infusion Programme for Infliximab (RemiCare) in Paediatric Crohn's Patients is feasible, safe and cost-saving

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Introduction: The increasing use of biologics in paediatric Crohn's disease has implications on surveillance, costs, and logistics. Regular infusions in hospital not only disrupt school attendance but also family life and functioning. Three tertiary gastroenterology centres with a pharmaceutical company (MSD) therefore explored both feasibility and safety of an Infliximab home infusion programme (RemiCare) in a pilot trial.

Aims and Objectives: To assess the safety, feasibility and cost-effectiveness of a Home Care Infusion system for children with stable Crohn's disease on maintenance Infliximab treatment.

Subjects and Methods: The programme ran from October 2014 until April 2018 and was offered to all eligible patients. Feasibility was assessed in 3 centres (Liverpool, Glasgow and Edinburgh). Inclusion criteria were >14 years of age at infusion, more than 5 previous infliximab infusions in hospital, and clinical remission. Exclusion criteria were ulcerative colitis, previously significant infusion reaction or difficult venous access. Disease phenotype was defined according to Paris Classification. N=5 patients met inclusion criteria and volunteered to participate in one centre (Liverpool); the Health Board covering Edinburgh did not approve the programme and Glasgow included 3 patients in the programme. A qualified infusion nurse obtained routine blood samples and assessed disease activity by PCDAI score. A patient and carer satisfaction questionnaire was collected at the end of the programme.

Results: Full data were available from N= 5 patients with Crohn's disease which were treated over 14 to 33 (median 28) months exclusively in the Home infusion trial. The median (range) distance from home to hospital was 48 (10 – 58) miles. Some patients eligible for the home infusion trial preferred to continue with hospital infusions. The cost per home visit (excluding medication) was £373 whereas the cost for day case admission (excluding medication) was £800. The median (range) age at initial diagnosis was 14 (12-15) years. All patients were receiving azathioprine co-immunosuppression. Infliximab infusion intervals remained 8 weeks in n=3, or were adjusted to 7 weeks (n=1) or 6 weeks (n=1) as required for emerging loss of response. During the trial, one patient had one flare up. Four (80%) were transitioned to adult care, and Home infliximab had to be stopped for 1 patient due to the study end. All 5 patients and carers agreed that RemiCare had reduced time spent travelling to hospital, time away from school or work, and fitted in with the patient's family routine more easily.

Patient	PCDAI Range	Average PCDAI	Median PCDAI
1	0-15	2.8	0
2	0-17.5	4.8	2.5
3	0-5	4.8	0
4	0-5	0.5	0
5	0-17.5	4.3	3.75

Table 1: Disease activity during home Infliximab infusion

Summary and Conclusion: During the Home infusion pilot, no complication or unexpected worsening of Crohn's disease was noted. The cost of home infusion was substantially cheaper and feedback from parents and patients was positive. On the other hand, the system required surveillance via IBD nurses in the local IBD register and hospital infusions were preferred by some patients and carers eligible for home infusion. Taken together, this pilot study provides first paediatric data to guide patients, carers and professionals about the safety and feasibility of this innovative treatment option. A wider introduction of the Home Infliximab infusion programme appears a cost saving option for managing children with IBD living remote from IBD centres and for other social preferences.

A Retrospective review of tertiary management of Paediatric Crohn's Disease.

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Introduction: Recent ESPGHAN guidelines recommend escalation of medical management and consideration of surgical management in paediatric Crohn's disease (CD).

Aims and Objectives: To assess Crohn's disease phenotype at diagnosis, timing of thiopurine and biologic treatment initiation and incidence of surgery from diagnosis in a paediatric tertiary centre, to transition to the respective tertiary adult unit.

Subjects and Methods: A systematic retrospective electronic record review was undertaken for a group of children with CD diagnosed in a single paediatric tertiary centre between 1st January 2005 and 31st December 2016, and subsequently transitioned to the respective adult tertiary centre. This is a subgroup of a larger study focussing on the natural history of paediatric CD from diagnosis to transition. We collected data on patient demographics, Paris Classification at diagnosis, medical management and surgical intervention. Therapeutic drug level monitoring was not collected due to incomplete data (limitation from retrospective review).

Results: 88 patients were diagnosed with CD and 10 patients were excluded due to incomplete clinical data. Disease phenotype is shown in Table 1. Median age of diagnosis was 13.6 years (Range 8.4 - 16). 65 patients achieved clinical remission with exclusive enteral nutrition. 66/78 patients were started on Azathioprine as maintenance therapy; 35/66 were started within 4 weeks and 31/66 were started within 15 months from diagnosis. 28/78 patients received anti-TNF treatment. 16/28 had endoscopic re-evaluation prior to escalation. The median time to starting anti-TNF was 17 months (range 1-66months). 18/78 patients had surgical intervention. 14 patients had right hemicolectomy; 3 patients had subtotal colectomy and 1 patient had pan-proctocolectomy. 8/18 patient did not receive anti-TNF prior to surgery and median time to surgery was 18 months post diagnosis (range 0 – 39 months). 10/18 patients had anti-TNF prior to surgery and median time to surgery was 23 months (range 0 – 36 months). No serious side effect was noted with Azathioprine and anti-TNF use.

Crohn's disease	Age	Disease	Behaviour	Growth

n=78				
Disease Phenotype according to Paris Classification	A1a n=3 A1b n=75	L2 n=7 L2 L4a n=5 L3 n=33 L3 L4a n=29 L3 L4b n=2 L4a n=2	B1 n=62 B1 p n=4 B2 n=8 B2 p n=1 B3 n=1 B2B3 p n=1 B3 p n=1	G0 n=46 G1 n=32

Table 1: Disease phenotype at diagnosis according to Paris Classification

The use of azathioprine was significantly higher in patients who did not have surgery (Pearson's Chi square p=0.003). Anti-TNF use was statistically not different between patients who had surgery and those who did not (Pearson's chi square, p=0.14).

Summary: Over 11 years, the majority of CD patients were started on azathioprine as first line, with significantly higher use in patients that did not have surgery. 36% of patients were escalated to anti-TNF. There was no significant variation in anti-TNF use with regards to occurrence of surgical intervention, however the findings are based on a small sample size and further research in larger prospective cohorts is required.

Conclusion: Despite the limitations of a retrospective single centre study, we have observed that anti-TNF usage in paediatric CD does not influence the incidence of surgical intervention. Early azathioprine use was associated with a reduced need for surgical intervention.

A Single Centre Experience in the use of Vedolizumab in Paediatric Inflammatory Bowel Disease

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Introduction: Vedolizumab, an anti-integrin monoclonal antibody, is licensed and NICE approved for treatment of ulcerative colitis (UC) and Crohn's disease (CD) in the adult population. Vedolizumab is recommended in patients with moderate to severe inflammatory bowel disease (IBD) who have failed primary and secondary (anti-TNF) therapy. Its efficacy to induce and maintain remission and its safety profile is well established in the adult population. Ledder et. al. (2017) reported a multi-center retrospective study describing its efficacy and safety in the paediatric population. We describe our single centre experience of Vedolizumab use, its efficacy and its safety profile.

Aims and Objectives: Primary outcome was successful treatment at 14 weeks post-induction. This was defined by physician global assessment (PGA) based on steroid and exclusive enteral feed – free remission, PUCAI <10 / PCDAI <12.5, biochemical parameters and with no new medical or surgical intervention. Response/remission rates were assessed at last follow-up based on PGA, faecal calprotectin (FC) levels and endoscopic mucosal healing (where available). Patient records were scrutinized for surgical intervention and recorded adverse events.

Subjects and Methods: Patients with a diagnosis of IBD and treated with Vedolizumab were identified. Patient records were evaluated retrospectively at the start of treatment, week 14 and at last follow-up.

Results: 13 patients were identified, 9 with UC and 4 with CD. Mean age was 15y (12y to 17y). 8 patients were male and 5 female. All patients had previously received anti-TNF therapy [10 (77%) were primary failures]. All patients had immunomodulation therapy. PGA indicated treatment success in 6 (46%) patients at 14 weeks. Median follow-up was 35 weeks (interquartile range 14 to 90 weeks). Response/remission rates at last follow-up were: 4 [31%; all UC patients] achieved complete remission (asymptomatic, FC <100ug/g), 4 [31%; 2 UC and 2 CD] partially responded (minimal symptoms, FC 100 – 600ug/g), and 5 [38%; 2 CD and 3 UC] were non-responders (symptomatic, FC > 600). 8 patients had reassessment colonoscopies, 3 (37%; all UC patients) achieved endoscopic remission. 2 patients went on to have surgery. No adverse events or side effects were reported.

Summary: Our retrospective analysis has shown 46% treatment success at 14 weeks with 31% achieving complete remission over the follow-up period. No side effects or adverse events were reported.

Conclusion: Our single centre experience using Vedolizumab for patients who had failed conventional and anti-TNF therapy corroborates with published data and confirms a role for its use in this difficult to treat cohort. Further prospective paediatric studies are required which will hopefully make a case for extending its license to children.

Alterations in intestinal microbial composition and metabolic profiles in response to treatment in Paediatric Inflammatory Bowel Disease

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Introduction: Intestinal microbiota and associated metabolite e.g. short chain fatty acids (SCFA), are known key players involved in paediatric IBD pathogenesis. At present, the impact of treatment on microbial biomarkers remains less studied.

Aims and Objectives: We aimed to characterise dynamic changes in (a) stool and mucosal microbial profiles in active IBD and the impact of treatment; and (b) the corresponding stool SCFA profiles (acetate, propionate and butyrate).

Subjects and Methods: A spectrum of IBD (IL-10Rα mutation, IL-10Rβ mutation, Infantile IBD, VEOIBD, Crohn's Disease (CD) and Ulcerative Colitis (UC)) and non-inflammatory control (NIC) patients in addition to healthy children (HC) from the community were recruited for opportunistic, prospective collection of stool and mucosal biopsy samples.

To characterise intestinal microbiota, DNA was extracted as per manufacturer's instructions (Stool: MPBio FastDNA SPIN for Soil; biopsies: Qiagen QIAamp Mini Kit) and the V3-V4 16s rRNA gene region amplified from each extract. Purified PCR products were pooled and sequenced on an Illumina MiSeq. Sequencing data was processed with Mothur (V1.35.1) using a published pipeline (1) to perform Operational Taxonomic Unit (OTU) picking and taxonomy assignment. Sample reads were subsampled at 2,000 to allow for comparison. Data was then imported into RStudio (V1.0.153) for further analysis.

SCFA were extracted from the same stool samples using diethyl ether and orthophosphoric acid (2) followed by gas chromatography utilising internal and external controls. SCFA concentrations were calculated based on the chromatograms. Clinical history and results were gathered for correlation with laboratory results.

Results: We present stool and mucosal microbial profiles of a patient with IL-10Rβ pre- and post-HSCT (IL-10Rβ mutation, 15y). As comparison, we present microbial profiles pre- and post-treatment with HSCT (Infantile IBD, 7y), Prednisolone (UC, 15y) and colectomy (VEOIBD, 4y) in addition to those with CD (16y) , IL-10Rα (3y), NIC patients (n=2, 14y, 15y) and HC (n=2, 13y, 14y). Our findings included:

- HC stool predominantly consisted of Firmicutes (Clostridiales) and Bacteroidetes (Bacteroidales). NIC stool were similar but higher Proteobacteria abundance and with higher butyrate percentage than HC.
- Stool microbiota differed from mucosal microbiota.
- Increased Proteobacteria (particularly Enterobacteriales) was associated with more severe disease.
- Bacteroidetes (Bacteroidales) was associated with disease improvement.

- Stoma samples were dominated by a single phylum, Proteobacteria (IL-10Rβ, VEOIBD) or Firmicutes (IL-10Rα), and associated with high acetate percentages.
- With treatment, the microbial profiles for the UC and Infantile IBD patients altered favourably which included reduction of Proteobacteria with associated increased Bacteroidetes. The increased Bifidobacteriales in UC was associated with increased stool propionate and butyrate percentages.

Summary: Variations in microbial profiles occur with disease severity and treatment, and is reflected in the SCFA profiles. Differences exist between luminal (stool) contents and mucosal profiles. These observations would benefit from confirmation in a bigger cohort.

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Autoimmune liver disease in children with Inflammatory Bowel Disease

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Introduction: Abnormal liver function tests are observed in a third of the children with inflammatory bowel disease (IBD), however, this tends to be transient and is probably related to the medications used to manage the condition. Nonetheless, there is a strong and well-established association between IBD and liver disease. Autoimmune hepatitis (AIH), particularly autoimmune sclerosing cholangitis (ASC), is reported in up to 8% of children with IBD and according to the ESPGHAN position statement, 45% of children with ASC and 20% of those with AIH have IBD. Currently, there are no established guidelines for paediatric gastroenterologists for managing children with IBD associated with abnormal liver investigations.

Aims and Objectives: This is the first in a series of planned nested studies that have an overarching aim of developing hepatology/gastroenterology interdisciplinary referral guidelines for children with IBD and autoimmune liver disease (AILD).

The aim of this study is to collect baseline data on the number and reasons for referral of children with IBD to the liver unit**.**

Subjects and Methods: This is a retrospective 8-year review (2010-2017) of patients under the age of 18 with a primary diagnosis of IBD who were subsequently diagnosed with autoimmune liver disease (AIH, ASC and overlap syndrome) for which they were referred to the liver unit. Data were obtained from the liver unit database. We collected data on the reasons for referral to hepatology, presenting features of the liver disease: liver enzymes, immunological markers, histological and radiological findings.

Results: Eighteen children were identified with AILD and IBD (15 Ulcerative Colitis, 2 Crohn's Disease and 1 IBD-Unclassified). 4/18 (22%) were females with a median age of 13 years at the time of referral to the liver unit. The median time of hepatology referral from the time of IBD diagnosis was 3 months (range 1-11 months).

The most common reason for referral was abnormal liver enzymes (AST, ALT and GGT) in 17 (94%). Other reasons for referral along with deranged liver enzymes were abdominal pain (n=4), radiological changes (n=2), jaundice (n=2) and pruritus in one patient. One patient was referred with exclusive radiological finding on ultrasound and MRE (with normal liver enzymes).

Of those presenting with abnormal liver enzymes; the ALT was over 1.5 the upper limit of normal (ULN) in 50% (9/18), AST was over 1.5 times ULN in 38 % (7/18) and GGT was over 1.5 times the ULN in 78 % (14/18) of the patients at the time of referral.

Fifteen patients had a liver biopsy of which 12 biopsies were consistent with sclerosing cholangitis (80%), 2 had autoimmune hepatitis (14 %) and only one with overlap syndrome (6%).

At the time of referral, 14 patients were already on mesalazine for their IBD, 4 were on steroids, 2 on infliximab and 4 on azathioprine. For those on Azathioprine, liver function tests (LFTs) were deranged before starting the medication.

All the patients we have included remain stable or are currently in remission from the active disease.

Summary: The most common presentation of liver disease in children with IBD is abnormal liver enzymes specifically GGT. Nevertheless, abnormal radiological findings of the biliary system can be the only presenting feature of AILD in children with IBD.

Conclusion: We suggest that all newly diagnosed IBD patients should have baseline investigations- Bilirubin, ALT, AST, GGT and Abdominal Ultrasound. Persistently abnormal LFTs over 3months should be referred to the liver unit after ruling out reversible causes (eg drug-induced).

Children with Crohn's Disease Who Respond to an Enteral Diet are Twice as Likely to Remain in Clinical Remission Over 5 Years

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Introduction: Exclusive enteral nutrition (EEN) is the primary therapy for children newly diagnosed with Crohn's disease (CD) in the UK. It is proven to be as efficacious as corticosteroids (CS) at inducing remission. However, longer-term benefits associated with response to EEN have infrequently been investigated.

Aims and Objectives: We hypothesize that remission with EEN predicts a longer duration in remission and better growth.

Subjects and Methods: Data was prospectively collected on children newly diagnosed with CD between 2003-2006, at a tertiary centre. All patients had 60 months of follow up data. Outcome measures were: remission and relapse rates, time to relapse, treatment escalation, and growth. These were analysed retrospectively. Response was determined by Physician's Global Assessment (PGA). Relapse was defined as an increase in disease activity, as determined by PGA, and/or an escalation in therapy. Data was analysed with SPSS 21 (Armonk, NY, USA). Significance was two-tailed and defined as $p<0.05$.

Results: 132 children were diagnosed with CD; 126 had 5 yr follow-up data. 111 children (88%) received EEN upon diagnosis. Others received either 5-ASA (n=11) or antibiotics (n=4) and were excluded. No children received CS as initial treatment. The median age [range] at diagnosis was 11.93 [4.90-16.08] yrs. 69% (n=77) of patients had ileocolonic disease. 94% (n=104) of patients tolerated EEN and 62% (n=69) of children went into complete clinical remission; others received CS or treatment escalation to induce remission. Perianal disease was more common in non-responders (40.5% vs 14.5% in responders; $p=0.003$).

Children who responded to EEN maintained a 15-20% greater proportion of remission when compared to non-responders ($p<0.0001$); they spent 5.8 extra months in remission over 5 years ($p<0.001$). 33% (n=23) of responders stayed in remission without needing any treatment escalations. The median time to relapse was significantly longer in responders when compared to non-responders (median [range]: 13.9 [3.0 – 49.3] vs [2.4 – 47.6] months; $p=0.003$). Treatment escalation rates using a thiopurine ($p=0.1$), anti-TNF ($p=0.2$) or surgery ($p=0.5$), were no different in either group.

Although at diagnosis there was no significant difference in height z scores between groups, at 1-year responders demonstrated an increase in height z scores (mean [SD] change +0.13 [0.59] vs -0.23 [0.37] in non-responders; $p=0.01$), which was not seen in non-responders. This was maintained at 5 years (mean [SD] change +0.12 [0.88] vs -0.30 [0.74]; $p=0.01$).

Summary: Clinical remission with EEN predicts an improved clinical course for children with CD over 5 years.

Conclusion: These children had a greater probability of remaining in clinical remission, a longer time to relapse, better growth, and longer periods of inactive disease. This is possibly due to mucosal healing in those responding to EEN.

Clinical outcomes in a prospective cohort of children with Crohn's disease (CD) commenced on anti-TNF therapy- A single teritary centre experience

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Introduction: Anti-TNF therapies have revolutionised the management of CD in recent years. Their use in inducing remission as well as maintenance therapy for patients with inflammatory bowel disease is well established.
Aims: To prospectively report the efficacy of anti-TNF therapy in children with CD in inducing and maintaining clinical remission.
Subjects and Methods: Paediatric patients diagnosed with CD, who were commenced on anti-TNF therapy between January 2014 to June 2018 were included in this study. These patients were followed up during this time period and had clinical data and biological samples taken before and during their treatment course. The Paris classification was used to record disease phenotype. Disease activity was defined using the paediatric Crohn's disease activity index (PCDAI) score. Body weight and systemic inflammatory markers of disease activity including CRP, ESR and faecal calprotectin were documented before starting treatment, at the end of induction therapy and at cessation of treatment. Statistical analysis was done using paired t testing.
Results: 23 patients (14 male, mean age at diagnosis, 12 yrs) were included in this study. The mean time between diagnosis of CD and commencement of anti-TNF therapy was 15.8 months. The indication for starting anti-TNF in this cohort of patients was treatment escalation for ongoing active disease. All the patients received Infliximab (IFX). 22 patients had ileo-colonic disease (L3) and 15 of them also had upper GI disease (L4a). 14 patients had perianal disease and 10 children had growth failure (G_1) at diagnosis. Concomitant immunosuppression with thiopurines was used during induction of anti-TNF therapy in 21 patients. The remaining two patients were commenced on Azathioprine within 12 months of starting anti-TNF therapy. Following induction course of anti-TNF, 22 patients achieved clinical remission (PCDAI score <10).

Table 1: Blood parameters, weight and PCDAI before and after anti-TNF induction

Parameter	Week 0 Mean (SD)	Week 6 Mean (SD)	P value
Weight (Kg)	44.6 (14.7)	48.4 (14.5)	p=0.0001***
Albumin (g/L)	39.6 (5.9)	43.2 (4.2)	p=0.0049**
ESR (mm/hr)	23.3 (14.2)	13.4 (25.0)	p=0.0717
CRP (mg/L)	29.1 (26.5)	12.3 (22.3)	p=0.0088**
FCP (µg/g)	988.3 (914.0)	509.1 (609.7)	p=0.0897
PCDAI	28.8 (6.2)	2.9 (2.6)	p<0.0001***

Of the 23 children with CD on anti-TNF, 6 switched to Adalimumab (ADA) therapy due to loss of response. One patient required a third biologic (Ustekinumab) due to loss of response with ADA. 17 patients remained on IFX during this time. Of those 17 patients, 4 required dose escalation and subsequently showed good clinical response. Surgical intervention was required in 2/23 patients.

Summary and conclusion: Anti-TNF therapy is associated with high rates of clinical remission in 96% of patients treated as assessed by the PCDAI. In addition, there was significant improvement in blood parameters and calprotectin, but normalisation of calprotectin occurs in a minority. The results of this study are in keeping with published data. The longitudinal nature of this study seeks to continue to follow the clinical course of these patients, specifically looking at patients who fail to respond to treatment and to determine whether the benefits of anti-TNF treatment can be sustained longer-term.

Current practice in UK centres providing surgery in paediatric inflammatory bowel disease - a survey from the BSPGHAN IBD working group

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Introduction: Recent published guidelines for surgery in both paediatric ulcerative colitis and Crohn's disease (ESPGHAN/ECCO) make recommendations regarding best practice. For example, it is recommended that pouch surgery case volume should be 9-10 case per year to maintain good outcomes.

Aims and Objectives: The aim of this survey was to obtain a snapshot of current practice at UK centres regarding provision of services (with an emphasis on surgery) for paediatric inflammatory bowel disease (PIBD) patients. We planned to use information obtained from this survey to highlight and share areas of good practice, and to facilitate quality improvement.

Subjects and Methods: Invitation to participate in a piloted and validated online survey were sent to all UK centres with tertiary paediatric gastroenterology/surgery services in December 2017. Follow-up invitations were sent in January and November 2018. Results are presented as median values (range). Several centres were unable to provide numbers of newly diagnosed cases per year.

Results: Responses from 19/26 (68%) centres were received, approximately 50% from surgery and 50% from gastroenterology teams. Reported new IBD cases diagnosed per year were 52 (22-90); 35 CD (9-60), 20 UC (11-30), IBDU 7 (2-12).

All centres (100%) have a regular gastroenterology/PIBD multi-disciplinary team (MDT) meeting, 8/19 (42%) of these occur weekly. Transition clinics take place at 13/19 (68%) centres. Yearly frequency of index surgical procedures was - ileo-caecal resection 3 (0-10), subtotal colectomy 3 (0-5), ileal pouch- anal anastomosis (IPAA) 1 (0-8). Laparoscopic resectional surgery is undertaken at 16/19 (84%) of centres. IPAA surgery was performed by paediatric surgeons alone at 4 centres, with annual case frequency of 8, 2, 2, 0.5 per year at these centres. Endoscopic balloon dilation was available at 15/19 (79%) centres.

Summary: There was evidence of good practice – with regular MDT meetings, transition clinics and collaboration with adult surgical services. There is a wide variation in the number of new cases diagnosed per year. As per ECCO/ESPGHAN guidelines, laparoscopic surgery was widely practiced, although annual IPAA case volume was lower than recommended in some centres.

Conclusion: This survey provides a broad overview of practice within the UK, specifically in relation to IBD surgery and number of new cases diagnosed.

Prospective data collection on procedures and outcomes is important in paediatric IBD surgery to improve quality and maintain good practice.

Diagnostic Accuracy of Primary Care Faecal Calprotectin in Children with Suspected Inflammatory Bowel Disease

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Introduction: A minority of children who present to their general practitioner (GP) with gastrointestinal symptoms will have inflammatory bowel disease (IBD).

Primary care physicians often rely on presenting symptoms alone to formulate a differential diagnosis which often have poor discriminative power.

Faecal calprotectin is a stool biomarker that distinguishes paediatric IBD and other organic intestinal disorders from functional gut disorders, however, there is a paucity of data surrounding the use of calprotectin in paediatric primary care referral pathways.

Aims and Objectives: We hypothesised that calprotectin testing would distinguish IBD from non-IBD with clinically useful positive and negative predictive values, save secondary care referrals and reduce the time to diagnosis.

Subjects and Methods: This was a prospective observational cohort study describing the diagnostic accuracy of calprotectin in children with suspected IBD across 49 GP practices in the South-West of England, UK.

142 children aged between 4-18 years referred on the pathway between January 2014 and August 2017 for investigation of gastrointestinal symptoms, and followed-up for at least 12 months were included. Those who used NSAIDs in the previous six months were excluded.

Results: 8% (11/142) tested patients were diagnosed with IBD. Using our pre-specified cut-off of 100 µg/g, calprotectin had a diagnostic accuracy of 93% (95% CI 87-97%) with a sensitivity for distinguishing IBD from non-IBD of 100% (95% CI 72-100%), a specificity of 92% (95% CI 86-96%), a positive predictive value of 52% (95% CI 30-74%) and a negative predictive value of 100% (95% CI 97-100%). Calprotectin testing had no effect on the time to diagnosis, but a negative test saved referrals in 39% (40/102) and was associated with fewer diagnostic tests in secondary care.

Summary: Calprotectin□testing of children with suspected IBD in primary care accurately distinguishes IBD from a functional gut disorder, reduces secondary care referrals and associated diagnostic healthcare costs.

Evaluation of clinical outcomes in a prospective cohort of paediatric Crohn's disease patients receiving exclusive enteral nutrition - A single tertiary centre experience

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Introduction: Exclusive enteral nutrition (EEN) is the first-line treatment for induction of remission in paediatric Crohn's disease (CD).

Aims and Objectives: This study reports on the efficacy of EEN upon disease activity and growth in children newly diagnosed with CD.

Subjects and Methods: Patients were recruited if they were diagnosed with CD and commenced EEN between January 2014 and June 2017. Diagnosis was made using clinical evaluation, endoscopic examination and histological confirmation. The Paris classification was used to record disease phenotype. Disease activity was defined using the paediatric Crohn's disease activity index (PCDAI) score. Body weight and systemic inflammatory markers of disease activity including CRP, ESR and faecal calprotectin were documented before and on completion of a 6 week course of EEN. Statistical analysis was done using paired t testing.

Results: 57 children (34 male, mean age at diagnosis, 12.6yrs) were commenced on EEN. All patients received EEN orally. 13 patients failed to respond to EEN and required corticosteroids at 2-3 weeks from diagnosis. These patients were excluded from the study. 44 children completed the prescribed period of EEN and of these 38 achieved clinical remission (PCDAI < 10).

Table 1: Blood parameters, weight and PCDAI in the 44 patients treated with EEN

Parameter	Week 0 Mean (SD)	Week 6 Mean (SD)	P value
Weight (Kg)	39.3 (13.6)	43.8 (14.1)	p<0.0001***
Hb (g/L)	111.4 (13.8)	119.9 (12.8)	p=0.0001***
Albumin (g/L)	37.1 (8.8)	44.9 (6.1)	p<0.0001***
ESR (mm/hr)	35.3 (24.5)	13.0 (14.9)	p<0.0001***
CRP (mg/L)	30.1 (33.1)	5.7 (2.9)	p<0.0001***
FCP (µg/g)	1256.3 (1710.2)	360.3 (349.8)	p=0.0029**
PCDAI	33.9 (11.7)	2.8 (3.8)	p<0.0001***

The 6 children who were not in remission had perianal disease, which remained active after EEN and they required escalation to anti-TNF therapy. These patients were not included in follow up data. 32/44 (73%) relapsed during follow-up with a mean time to relapse from diagnosis of 7.8 months. 29/44 (66%) patients required escalation to immunosuppressant therapy and 15/44 (34%) patients received biologic therapy.

Summary: 6 weeks of EEN induced remission in 86% of children with newly diagnosed CD. This correlates with significant improvement in blood parameters, calprotectin as well as weight gain.

Conclusion: The high rates of clinical remission and relapse as defined by clinical symptoms, PCDAI and calprotectin are in keeping with published work. Longitudinal data, which will be available for this cohort in due course, will be valuable to identify factors which may be associated with the maintenance of remission or linked to relapse following EEN.

Exclusive enteral nutrition uptake in treatment naïve Crohn's disease patient - Leicester experience

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Introduction: Exclusive Enteral Nutrition (EEN) is recommended as first line therapy to induce remission in children with active luminal Crohn's Disease (CD) [1]. 6-8 weeks of EEN provides bowel rest and nourishment to bowel promoting mucosal healing, reduces antigenic load, decreases permeability and protein loses from the inflamed bowel, decreases colonic faecal bile salt load to help restore bone mineral density and improve growth. EEN should be preferred over corticosteroids in paediatric inflammatory intestinal CD, including colonic involvement.

Aims and objectives: To study rates of uptake of EEN and associated factors influencing this in East Midlands South region in treatment naïve patients with CD.

Method: Retrospective data collection of treatment naïve patients with new diagnosis of inflammatory bowel disease (IBD) was done over 18 month period. Patients with ulcerative colitis and IBDU with extensive colonic involvement treated with steroid were excluded. Details of exclusive enteral nutrition treatment discussed with family (leaflets), choice of feed, dietician input, duration of the treatment and success both in terms of completion as well as steroid free remission 6 months post treatment along with the cause of failure were reviewed.

Results: 53 patients were diagnosed with IBD over 18 month. 24 patients with UC and IBDU patients with severe colonic involvement treated with steroids were excluded. EEN was offered to 27/29 patients with CD (2 had top down treatment with biologics for severe perianal disease). Specialist Gastroenterology Dietician (SGD) contacted patients and families within one week from diagnosis in 26/27 (96.3%). EEN was accepted in 16/27 patients (59.25%). 3/16 patients started on EEN could not complete the full course in spite of adequate support and were prescribed steroid course as an alternative. 13/27 (48%) patients completed at least 6 weeks on EEN with at least 4 phone consultations from SGD during this period. Steroid free remission at 6 months was seen in 8/13 (61%)

Conclusion: Majority of our endoscopy lists were done on Friday afternoon which meant poor availability of dietetic support on the day of the diagnosis. In addition, we did not routinely admit patients for establishing EEN. Patients are given written information on EEN and starter pack with instructions to try sample Modulen feeds and were contacted early next week by SGD. It is encouraging that we are achieving nearly 60% EEN treatment completion rates with 61% steroid free remission rates at 6 months. We have discussed strategies to improve our local practice by routinely offering EEN for 8 weeks with other modular feeds offered with Modulen in the starter pack. We would like to re-audit this as a part of multicentre study to compare results with centres where patients at diagnosis are routinely admitted for establishing EEN.

Reference: Consensus guidelines of ECCO/ESPGHAN on the medical management of paediatric Crohn's disease F.M. Ruemmele G. Veres K.L. Kolho; Journal of Crohn's

and Colitis, Volume 8, Issue 10, 1 October 2014, Pages 1179–1207, https://doi.org/10.1016/j.crohns.2014.04.005

Experience of Ferric Carboxymaltose (Ferinject) Across Paediatric Gastroenterology : An Integrated View of Cases from Gastroenterology, Liver, Nutrition and IBD

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Introduction: Iron deficiency anaemia (IDA) is commonly seen in children with gastrointestinal disease, particularly in inflammatory bowel disease (IBD). In addition to causing anaemia, chronic iron deficiency can have a significant impact on growth, cognitive development and immune regulation and hence prompt treatment is essential. Parental iron preparations can be used in this population to improve anaemia but have traditionally been associated with significant allergic reactions. Newer preparations reduce this risk, bringing a new therapeutic approach to the management of this common clinical problem.

Aims and Objectives: To assess the efficacy, safety and side-effect profile of ferric carboxymaltose (Ferinject®) in children and adolescents across our whole department in a large teaching hospital in Scotland, encompassing cases from general gastroenterology, liver, nutrition and IBD.

Subjects and Methods: This is a retrospective study of all gastroenterology patients from 0 to 18 years who received Ferinject® from October 2015 to October 2017 at a large teaching hospital in Scotland.

Data was collected from TrakCare, the electronic medical record system. Data collected included demographics, diagnosis, Ferinject® dose administered, number of infusions, side-effects/adverse effects, weight, duration, any oral iron supplementation and reason for intravenous therapy.

Laboratory parameters were recorded pre-infusion, 4 weeks, 3 months, 6 months and 1 year post-infusion. Lab parameters collected included haemoglobin (Hb), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), haematocrit, platelets, C - reactive protein, liver function tests, erythrocyte sedimentation ratio (ESR), ferittin, transferrin saturations, iron and faecal calprotectin.

Results: 66 children with underlying gastrointestinal disease were identified. 5 patients were excluded from the study due to inadequate available data. 61 patients are therefore presented in this study. 52 % were male. The mean age was12.6 years (SD 4.9) the youngest patient was 4 months old, and the oldest 18 years. The majority of the patients had IBD 67% (Crohn's 68%, ulcerative colitis 22%, inflammatory bowel disease type unclassified 10%), 8.3% had liver disease (post-

liver transplant 60%, chronic liver disease 40%), 13.3% were on parenteral nutrition and 12 % had coeliac disease or other conditions resulting in chronic gastrointestinal blood loss.
The total number of Ferinject infusions during this period was 79, with 58 infusions for IBD patients. The mean dose/kg was 19.6mg/kg. The maximum dose within one course was 1000mg given across two infusions in one course.
The mean Hb at baseline was 106 g/l. (SD 17.7)This rose to to 127g/l (SD 15.5) 1 year-post infusion ($p<0.0001$), however the maximum increment was 6 months post-infusion with a mean of 128g/l (SD 13.4 , $p<0.0001$). During the study period only 2 patients had side-effects.1 patient was noted to have tingling and bruising at the site of infusion. The second patient developed skin staining secondary to iron extravasations, which it is thought may be permanent. None of the patients had an acute type-1 allergic reaction or anaphylaxis.
Summary: Ferinject® is well tolerated and appears to be effective in correcting IDA. The Hb increased significantly at 3 months post-transfusion and was generally sustained throughout the monitoring period of 1 year. Maximum improvement in haemoglobin was noted at 6 months.
Conclusion Ferinject® appears to be safe and has sustained efficacy in the treatment of IDA. It is important, however, to recognise skin staining as a possible side-effect. Care must be taken to avoid extravasations, but otherwise Ferinject® is a useful addition to practice within our specialty.

Experience with therapeutic Drug Monitoring (TDM) on Infliximab (IFX) in Paediatric Inflammatory Bowel Disease (pIBd)

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Introduction: IFX is effective in treatment of pIBD. Low IFX trough levels and high antibodies to IFX (ATI) are associated with loss of response to IFX. Optimizing therapy with early trough levels and maintenance of monitoring has been suggested to be effective in the pIBD management.

Aims and Objectives: To evaluate whether proactive TDM with ATI is enabling clinicians to improve clinical outcomes, additionally to looking at biomarkers and PCDAI/PUCAI indices. Data suggest that drug levels between 5-10 mg/l with negative ATI should be aimed to improve clinical outcomes and biomarkers.

Subjects and Methods: Retrospective review over 5 years of pIBD patients (n= 55) treated with IFX (5 mg/kg, 8 weekly); Crohn's disease [CD]=34; Ulcerative Colitis [UC]= 10; Inflammatory Bowel Disease Unclassified [IBDU] = 6; Early Onset Inflammatory Bowel Disease [EOIBD]=4; Males= 29, age at diagnosis 3-14 years, median 9. All patients were additionally on Azathioprine. 3 groups were identified: group 1 included patients with IFX level pre 4th dose <0.8 mg/l; group 2 were patients with IFX levels between 0.8- 5 mg/l and group 3 patients with IFX levels> 5 mg/l.

Results: IFX and ATI levels pre 4th dose were available for 34 patients, with IFX median level=2.50 mg/l (range 0.8 -31.6) and ATI median=0mg/l (range 0-203). **Group 1:** n=5(14.7%). In 4/5 (80%) patients treatment were escalated to 10 mg/kg. 50% had negative ATI pre 4th dose, but developed ATI afterwards, 50% already had ATI before escalation of treatment. 3/4 patients went in to clinical remission. One was switched to Adalimumab (ADA). **Group 2:** n= 16 (47%). IFX median levels=2.2mg/l (range 0.9-4.7), ATI median level=0 (range 0-203). 3/15 (20%) were switched to ADA: 1 for allergic reaction to IFX, the remaining 2 did not clinically respond. 5/15(33%) patients continued on IFX 5 mg/kg 8 weekly with clinical response. In 7/15(47%) of patients treatment was escalated by either double dosing or shortening intervals. Only 3/15(20%) developed ATI. The PUCAI/PCDAI decreased from mild to quiescent in 11/13, in 2/13 patients worsening of symptoms occurred leading to escalation of treatment. **Group 3:** n=13(38%). IFX median level=10mg/l(range7.8 -27), ATI median level=0 (range 0-54). 10/13 (77%) patients remained on 5 mg/kg 8 weekly; 2 patients switched to ADA (1 for allergic reaction to IFX); in 1 patient the IFX interval was shortened to 6 weekly, going into clinic remission. The PUCAI/PCDAI decreased from moderate to inactive in 8/10 (80%), 2/10 (20%) patient had quiescent disease.

Summary and conclusion: Our study suggests that proactive TDM approach improved clinical outcomes (PCDAI/PUCAI) in all 3 groups by increasing and maintaining adequate drug levels and reduction ATI in some patients.

Gamma Interferon based Latent Tuberculosis testing prior to Commencing Biologic Treatment in Children with IBD is more Cost-effective with Risk Based Testing Strategies

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Introduction: It is usual practice for patients with IBD to be screened for evidence of latent Tuberculosis (TB) prior to commencement of biologic treatment. As part of policy change in our hospital since 2017, we have started using gamma interferon based tests along with a targeted history of TB risk and chest X- ray for all children with IBD prior to starting biologics treatment, irrespective of their risk status for TB.

Aims and Objectives: We aimed to analyse the result of this revised screening strategy.

Subjects and Methods: A retrospective analysis of 100 consecutive children with IBD who had undergone screening for TB prior to commencing biologic treatment from February 2017 to September 2018 was done. Clinical diagnoses, results of TB screening and treatment details were collected. Costs of chest-X-Ray and gamma interferon based tests were calculated as per standard NHS tariff.

Results: 100 children (36 female & 64 male; 66-Crohn's disease, 33-ulcerative colitis and 1- IBD unclassified) had gamma interferon based TB testing (107 tests total). 49 children were Caucasians, 42 Asian/mixed and 9 Afro-Caribbean/mixed ethnicities. All children were prescribed steroids or immunomodulators for their IBD. 96 children had Quantiferon Gold and 4 had T-spot as their primary tests. Only one patient (Afro-Caribbean/mixed ethnicity with Crohn's disease) had positivity to both Quantiferon Gold and T-Spot test, he was started on anti-Tuberculosis treatment (ATT) by TB specialist team even though his chest X-ray was normal. 9 patients (5 Caucasians and 4 Asian/mixed ethnicities, 8-Crohn's disease and 1-UC) had indeterminate Quantiferon Gold test results and on retesting 1/6 had indeterminate results and 5/6 had negative results. 3/9 patients with indeterminate results were started on biologics without repeating Quantiferon Gold or T-spot because of clinical urgency after discussion with TB specialists. One patient with indeterminate Quantiferon Gold test was started on ATT by TB specialist team because of abnormal chest X-ray and cervical lymphadenopathy. The costs of gamma interferon based tests in these patients were £5350/-. Gamma interferon based tests were not positive in any children with IBD with low risk for TB (Caucasian ethnicity, born in the UK, no past history of TB or contact with TB).

Summary and conclusions: The positive rate of gamma interferon based TB tests for children with IBD with low risk for TB is very low. Cost of these tests and the potential delay to treatment with biologic agents need to be considered prior to implementing TB screening strategies for children with IBD.

Higher Adalimumab Drug Levels during Maintenance Therapy for Paediatric Crohn's Disease are not associated with Endoscopic Healing

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Introduction: Adalimumab is an effective treatment for children with Crohn's disease. Very limited data are available in children regarding the relationship between adalimumab drug levels and endoscopic healing. A recent study (Plevris et al Inflammatory Bowel Diseases https://doi.org/10.1093/ibd/izy320) had shown that in adults with Crohn's disease had shown higher adalimumab levels were associated with biologic remission and an optimal level of >8.5 microgram/ml was identified .

Aims and Objectives: We aimed to analyse the relationship between adalimumab levels and endoscopic healing in maintenance therapy for children with Crohn's disease.

Subjects and Methods: A single-centre prospective cross-sectional study was done on children with Crohn's disease patients who had received adalimumab therapy for a minimum of 3 months after induction. Data on clinical activity (Physician Global Assessment), C-reactive protein (CRP), adalimumab drug and antibody levels, endoscopic healing and faecal calprotectin, where available, were collected. Endoscopic healing was defined as lack of deep or aphthous ulceration in the colon and ileum.

Results: 61 children (females 20 & males 41; disease distribution- L1 24.5%, L2 24.5%, L3 48%, L4 1.5%, L3 1.5%) with Crohn's disease receiving Adalimumab maintenance therapy were included in this study. Median follow-up was 33 months (range 4-55 months). 45/61 (74%) patients were in clinical remission. Endoscopic healing was noted in 36/51 (71%) patients. MRI healing was seen in 17/39 (44%). Median Humira levels of <5 was seen in 3/59 (5%), 5- 8.5 17/59 (29%) and > 8.5 in 39/59 (66%) patients. Anti-adalimumab antibody levels were <10 in all patients. There was no statistically significant difference in the proportion of patients achieving clinical remission or endoscopic healing when comparing patients with adalimumab levels between 5-8.5 or >8.5 (Table 1)

Effect	**Median Humira level <5 (N=3)**	**Median Humira level 5-8.5 (N =17)**	**Median Humira level >8.5 (N=39)**
Clinical Remission	2/3 (67%)	12/17 (70.5%)	30/39 (77%)
MRI healing	0/2	4/9 (44%)	12/27 (44%)
Mucosal Healing	1/2 (50%)	13/16 (81%)	21/32 (66%)
F. Cal (<250)	0/2	6/10 (60%)	14/26(54%)

Summary &Conclusion: We did not observe an association between Adalimumab level >8.5 and endoscopic healing or normalisation of faecal calprotectin in our cohort of children with Crohn's disease on maintenance treatment with adalimumab.

Incidence and Outcome of Surgical Intervention in Our Paediatric Crohn's patients over 5 years

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Introduction: Although surgery is non curative in Crohn's disease (CD), surgery still plays a major role in Crohn's management. With the increasing incidence of CD in paediatric population, it is important to measure the outcome of Crohn's patients requiring surgery.

Aims and Objective: To assess the disease phenotype at diagnosis and to measure the incidence of surgery for paediatric CD in a paediatric tertiary centre 5 years post diagnosis.

Subjects and Methods: All CD patients in a single tertiary centre aged 0-16 who was diagnosed between 2012 and 2013 were included. Relevant data including demographics, Paris classification at diagnosis, maintenance treatment, type and timing of surgical intervention post diagnosis and post-operative outcomes where collected using the hospital data-base up to 5 years post diagnosis.

Results: 65 patients were diagnosed with CD between 2012 and 2013. 9 patients required right hemicolectomy or subtotal colectomy during the 5 years. Median age of diagnosis 13years (range 9 to 15years). 6/9 patients had right hemicolectomy; 1 patient had right hemicolectomy with enterovesical and enterorectal fistula repair; 1 patient had right hemicolectomy with small bowel resection and 1 patient had subtotal colectomy with ileostomy. Pre-op disease location, 4 at terminal ileum; 4 at terminal ileum and colon and 1 was unsure (had right hemicolectomy at diagnosis). 6/9 patients develop stricture pre-op and 4/6 had pre-stricture dilation. Pearson chi square was performed to explore the association between disease phenotype at diagnosis and surgical intervention.

Table 1: p value for difference of disease phenotype in patient with and without surgery. According Paris classification, L3,L4a is ileocolonic disease with small bowel involvement distal to Treitz ligament; B2 is structuring disease.

Phenotype at diagnosis	Surgery-chi square
L3, L4a	P=0.0001
B2	P=0.0001
Perianal disease	P=0.42

Table 2: Medication pre-op and post-op.

Medication	**Pre-op**	**Post-op**
Nil	0	1
Azathioprine	5	4
Azathioprine & Anti-TNF	3	4

Table 3: Time of surgery post-diagnosis

Time of surgery Since Diagnosis	No. of Patients
At diagnosis	1
1 – 12 months	6
13 – 33 months	2

1 patient developed intra-abdominal collection (managed conservatively) and 1 patient developed stoma site infection in the early postoperative period. 5/9 patients reported weight gain and symptomatic improvement within 6 months post-op, 3 patients reported ongoing symptoms post-op (at transition) and 1 patient was lost to follow-up.

Summary and Conclusion: The incidence of our Paediatric Crohn's patients required right hemicolectomy or subtotal colectomy was 14%. Ileo-colonic distribution with small bowel involvement distal to the Treitz ligament, and stricturing disease (B2) at diagnosis were significantly associated with early surgical intervention in our patient cohort. Perianal disease was however not significantly associated with surgery (p=0.42). Treatment with anti-TNF made no difference on rate of surgical intervention (p=0.59).

Intestinal Spirochaetosis : An infectious colitis with normal calprotectin

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Introduction: Spirochaetes is a phylum of chemoheterotrophic, double membraned, flagellated bacteria comprising of 14 generas, the most notable being Leptospira, Borrelia, Treponema and Brachyspira. Brachyspira aalborgi and Brachyspira pilosicoli (both Gram negative anaerobes) are known to cause Human Intestinal Spirochaetosis (HIS). It is considered to be associated with poor socio-economic status and immunocompromised states. The paediatric prevalence is not well understood however it is known to be prevalent in 32.6% of aboriginal Australian children.[1] **Aims and Objectives:** A case series of 9 paediatric patients presenting to a Children's Hospital and were later diagnosed as HIS amenable to antibiotic treatment.
Subjects and Methods: The data bases of the histopathology and gastroenterology departments were searched for cases of HIS presenting in the last 10 years.
Results: A total of 9 cases were found, one of which presented as acute abdomen needing laparotomy and appendectomy. No records could be extracted for one female patient except for the histopathology report.
S**ummary:** HIS could be an incidental finding or can present with diarrhoea, failure to thrive and weight loss.[2] By and large these children look well. Notably, this is an infectious colitis, but the faecal calprotectin is often normal or variable between mildly abnormal or normal. Colonoscopic appearance was normal in this cases series but one case in the published literature had erythematous or polypoid appearance[3] from anywhere between appendix and rectum. Histologically HIS gives 'false brush border' appearance of blue fringe along the intercryptal epithelium when stained by haematoxylin-eosin. Warthin-Starry or Dieterle silver impregnation stains can be used to further identify the bacteria. More recently polymerase chain reaction (PCR) has been used to confirm the diagnosis with far greater sensitivity and specificity.
Conclusion: This is the largest known series of paediatric HIS. HIS should be born in mind when investigating children with chronic diarrhoea and a normal faecal calprotectin.

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Age	Sex	Presenting features	Investigations	Calprotectin	Endoscopy	Histopathology	Outcome
12	M	RAP with recent onset diarrhoea	Normal inflammatory markers.	8	Normal OGD and IC	Spirochaetes throughout colon	Treated with Metronidazole
7	F	RAP with weight loss. Strong Family H/O Crohn's disease	Normal inflammatory markers, coeliac screen, stool infection screen	191	Normal OGD and IC	Spirochaetes throughout colon. Mild oesophagitis.	Lost to F/U
15	M	RAP, Chronic diarrhoea with urgency	Normal blood indices. Low lactase	86 then 56	Inflamed ascending colon, inflamed TI, aphthous ulcer in hepatic flexure & sigmoid colon	Spirochaetes throughout colon. Mild oesophagitis.	Required 14 days of Metronidazole and lactose free diet
13	M	RAP, Chronic diarrhoea with urgency and blood in stools. Travelled to Pakistan.	Normal blood indices and stool screen	142 then 11	Patchy gastric erythema	Spirochaetes in Sigmoid and rectum. Eosinophilia in caecum and transverse colon.	Treated with Metronidazole.
4	M	RAP with blood and mucus in stools. Family H/O coeliac disease and UC.	Normal blood indices. Stool screen	84	Normal OGD and IC	Spirochaetes in transverse and sigmoid colon.	Treated with metronidazole.
12	F	RAP with nausea, chronic diarrhoea and urgency. Background H/o Russel Silver syndrome	Normal blood and stool indices	12	Antral Erythema	Spirochaetes in ascending, transverse and descending colon.	Treated with metronidazole. Continues to have anxiety and IBS like symptoms
14	F	RAP with bleeding PR	Normal blood indices	Not done	Left sided colitis	Spirochaetes throughout colon	Treated with metronidazole
10	F	Acute abdomen	Raised White cell count and CRP		Appendicectomy	Severe acutely inflamed, perforated appendix with the mucosa lined by Spirochetes	Did not receive antibiotics

Microbiome data is a promising future biomarker for paediatric IBD

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Introduction: The gut microbiome is a sensitive ecosystem which is altered in paediatric IBD. This dysbiosis may be a cause of IBD, or be secondary to mucosal inflammation. There is emerging evidence that microbiome data could be used as a biomarker for diagnosis, disease activity, or predicting clinical outcomes.

Aims and Objectives: This systematic review of studies reporting clinical applications of microbiome data aims to evaluate efficacy of current strategies and identify approaches which are most promising.

Subjects and Methods: A structured search of Medline, Biosis, and Pubmed Central was performed in June 2018. Included studies used gastrointestinal microbiome data to attempt diagnosis, measure disease activity, or predict a clinical outcome. Results were tabulated and subject to narrative analysis.

Results: Ten studies met inclusion criteria (Table 1), this comprised four case control studies and six prospective cohorts which ranged in size from ten to 445 patients. In all studies a machine learning approach was used to create a model for clinical application. Reported accuracy of the model ranged from 0.66 to 0.87 for diagnosis, 0.72 to 0.79 for disease activity, and 0.67 to 0.92 for predicting clinical outcome. All ten studies included patients with CD, four also included patients with UC. There is a trend towards lower accuracy in studies combining CD and UC data. Analysis was performed on stool samples in eight studies, mucosal biopsies in three studies, and mucosal washings in one study. There was no apparent difference in accuracy according to sample type. Eight studies used 16S sequence for phylogenetic classification, two performed shotgun metagenomic sequencing (MGS) and these reported the highest accuracies. Validation in an external cohort was attempted in five studies and successful in one (Papa et al, 2012).

Summary: Existing studies are heterogenous in design, sample choice, sample handling, and analysis. Reported accuracies are good, but most models do not perform well in external validation.

Conclusion Microbiome data holds promise as a biomarker for paediatric IBD, however complex modelling will be required. At present performance is cohort specific. Defined best practice guidelines are required for sample collection, handling, analysis, and open-access data publication. This will promote study homogeneity and allow in-silico meta-analysis of data; facilitating creation of more robust and generalisable models for clinical application.

Study	n	Cohort	Application	Sample	Analysis	Accuracy (AUC)
Papa et al, 2012	67	Est IBD	Diagnosis	Stool	16S	IBD vs control: 0.83
Gevers et al 2014	445	New CD	Diagnosis	Both	16S	Stool: 0.66, Ileal M: 0.85
Lewis et al, 2015	86	Est CD	Diagnosis	Stool	MGS	CD vs control: 0.87
Wang et al, 2016	60	New CD	Diagnosis	Both	16S	Stool: 0.84, Ileal M: 0.81
Douglas et al 2018	20	New CD	Diagnosis	Biopsy	16S	CD vs control: 0.84

Papa et al, 2012	67	Est IBD	Activity	Stool	16S	High clinical activity: 0.72
Quince et al, 2015	23	CD EEN	Activity	Stool	16S	High Calprotectin: 0.79
Mottawea et al 2016	86	New IBD	Activity	M wash	16S	Severe disease: 0.74
Gevers et al 2014	305	New CD	Outcome	Biopsy	16S	Sustained response: 0.67
Kolho et al, 2015	62	Est IBD	Outcome	Stool	MA	Treatment failure: 0.85
Dunn et al, 2016	10	New CD	Outcome	Stool	16S	Sustained remission: 0.8
Shaw et al, 2018	17	New IBD	Outcome	Stool	16S	Response: 0.75
Douglas et al 2018	20	New CD	Outcome	Biopsy	MGS	Induction response: 0.92

Table 1: Key results from systematic review. Est = established diagnosis, EEN = patients starting exclusive enteral nutrition, M = mucosal, MA = phylogenetic microarray

Outcome of treat to target strategy in paediatric patients with Crohn's disease and ulcerative colitis on Infliximab

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Introduction: Treat to target strategy has been proposed in adult IBD to improve Quality of Life, symptoms and to treat inflammation. There is little data in the paediatric population for this approach.

Aims and Objectives: The aim of this study was to look if set goals (reduced PCDAI/PUCAI and Mayo/SES-CD) were achieved.

Subjects and Methods: We conducted a retrospective analysis of children with IBD who received Infliximab (IFX) in our institution. Data were collected to evaluate mucosal healing for UC from colonoscopy results, using Mayo Scoring and for CD using SES-CD. We also compared this data with activity scores (PUCAI and PCDAI), CRP and Faecal Calprotectin, (FC).

Results: A total of 61 patients were identified, 46 (Group 1) with Crohn's Disease (CD), 15 (group 2) with ulcerative colitis (UC); Male n=38, age range 3-15 years, median 10 years.

Group1: there were 46 patients, Male n=26, age range 0-15 years, median 9 years.

SES-CD was assessed in all patients pre-treatment with IFX, median score was 3 with a range from 0-8; In 36 patients 1 year after treatment SES-CD score dropped to a median of 1 with a range between 0-7.

Pretreatment median FC (n=37) was 2282mg/kg with a range of 133-6000mg/kg and post treatment FC was (n=39) 105mg/kg with a range of 15-6000mg/kg. Median CRP pre-commencing (n=42) was 12mg/L with a range of 5-167mg/L. Post treatment (n=42) the median was 5mg/L with a range of 0.6-67mg/L.

The 1 year follow up PCDAI was 78% (PCDAI <10).

Group2 15 children were identified, Male n=13, age range 4-13 years, median 10 years. Mayo pre commencing (n=15) median was 2, range 1-3, post (n=10) was median of 1 with range of 0-3. FC precommencing (n=13) median was 1032mg/kg with a range of 23-3000mg/kg and was decreased to 69mg/kg with a range of 15-1852mg/kg (n=14). CRP precommencing median (n=15) was 6mg/L with a range of 5-19mg/L and after (n=15) it was 5mg/L with a range of 5-8mg/L. PUCAI was found to be <10 after 1 year of follow up in 60% of the children with UC.

Summary: We retrospectively analysed 61 children with UC and CD who were treated with Infliximab and collected data to assess mucosal healing. Then, we compared the results with inflammation markers. Before the treatment, patients had higher Mayo and SES-CD scores and activity indices, whereas after one year follow up, they had improved results.

Conclusion: Our data suggests that set goals were achieved in CD with a decrease of SES-CD and in UC a decrease of the Mayo scoring with an improvement of PCDAI

and PUCAI. We suggest that Paediatric patients get targets set at the beginning of their treatment and assess outcomes at set times.

Performance of Unrestricted Faecal Calprotectin in Paediatric Inflammatory Bowel Disease

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Introduction: Recommendations on the utility of faecal calprotectin (FC) are based on its use in secondary care as a non-invasive tool that can rule out Inflammatory bowel disease (IBD) in children with gastrointestinal symptoms[1,2].
The diagnostic accuracy of faecal calprotectin for PIBD in primary care has been inadequately evaluated in UK practice although has been evaluated in other healthcare systems[3].
Aims and Objectives: The aim of the study was to evaluate the utility of FC within a well-defined geographical area. A secondary aim of the study was to study the performance of faecal calprotectin in children with GI symptoms and evaluate the predictive value of this test within a single laboratory serving both primary care and secondary care.
Subjects and Methods: Two cohorts of children were studied over one year: children seen in primary care and children referred for GI symptoms to specialist care. FC that was measured as part of the initial work up was recorded and compared with the reference standard for IBD: endoscopic assessment or one year follow up, whichever was later.
Results: Over a one year period 1004 FC test were requested on 744 patients under the age of 18. Only those patients undergoing FC for the first time in their diagnostic pathway were included. Patients with an already known diagnosis of IBD, those with incomplete results of FC and those on whom records at 1 year were not available were excluded. 497 patients were therefore studied (53%M, 47%F). The median age of children was 13 years.
257 patients had their initial FC test requested in primary care (primary care group). 23 out of 257 patients had an endoscopic assessment. 7 patients had a final diagnosis of IBD (2% yield); 16/23 had a negative endoscopic assessment. Although 33 patients in primary group had FC >250ug/G, only 12 of these on secondary screening proceeded to endoscopic evaluation of which only 7 patients had confirmation of IBD.
240 patients had the initial FC test requested following evaluation by a specialist (secondary care group). 71 out of 240 patients in this group proceeded to endoscopic assessment. 23 had a final diagnosis of IBD (9.5% yield); 48/71 did not have features of IBD on endoscopic or histological assessment. 64 out of 240 patients had FC>250 ug/G, of which 36 were evaluated further by endoscopy and 22 had IBD.
Using a FC threshold value of greater than 250ug/G, the positive predictive value (PPV) in primary care is 21% (95%CI: 15.7 – 27.9%). Using the same cut off, the PPV in specialist care is 35.3% (95% C.I 28% - 41%).
Summary & Conclusion: A positive FC result in children undergoing this test in primary care is less likely to be indicative of IBD than a positive test in children undergoing this test by a specialist. However a negative test is likely to be a true negative. The yield for a diagnosis of PIBD through faecal calprotectin in primary care is 2% compared to 9.5% in specialist clinics. These findings should influence care pathways that include the FC test to determine endoscopic assessment in children suspected with IBD.

Safety and efficacy of ferric carboxymaltose (FCM) for the treatment of iron deficiency anaemia in paediatric patients affected by inflammatory bowel disease (pIBD)

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Introduction: Iron deficiency anaemia (IDA) is a common complication of pIBD affecting cognitive development and quality of life, and its oral treatment might be is hampered by as poor compliance and efficacy. Intravenous FCM has been shown to be effective and safe for IDA in adult patients, but paediatric studies are limited.
Aims and Objectives: To study the safety and efficacy of FCM in the treatment of IDA in pIBD.
Subjects and Methods: Retrospective review of all pIBD patients with IDA treated with FCM between 2013-2018 in two tertiary care paediatric IBD centres. IDA was diagnosed by combining haemoglobin (HB), haematocrit (HCT), mean cell volume (MCV), iron levels, Total Iron Binding Capacity (TIBC), transferrin saturation (TSAT) and ferritin. Inflammatory biomarkers (C-Reactive Protein [CRP] and faecal calprotectin [FC]) were also assessed. Patients received 500-1500 mg of FCM according to body weight. Bloods were repeated 4-6 weeks after each infusion. Patient and disease characteristics are expressed as percentage and mean±SD. Paired samples t-test was used for statistical analysis, and significance was set at the $P<0.05$ level.
Results: A total of 213 infusions were administered to 132 pIBD patients with IDA, 70 males (53%), Crohn's disease=90 (68.2%), Ulcerative colitis=25 (18.9%), Inflammatory Bowel Disease Unclassified=17 (12.9%). Mean age at the first injection was 12.53 years (SD 3.811, range 3-18). Four-six after first FCM injection a significant improvement was found in HB (107.36±15.899 vs 122.34±SD, $p<0.001$), HTC (0.333±0.4 vs 0.375± 0.375; $p<0.001$), MCV (75.94±6.8 vs 80.35±6.82, $p<0.001$), iron (7.37±5.03 vs 11.96±7.21 umol/l, $p<0.001$), TIBC (63.71±18.02 vs 54±49.80 umol/l, $p<0.001$) TSAT (12.16±8.14 vs 24.19±13.64 %, $p<0.001$) and ferritin (64.32±168.45 vs 215.77±195.43 ug/l, $p<0.001$) was shown. No statistical difference was observed pre and post infusion for CRP and FC. Only 3 patients showed an adverse reaction: one developed an anaphylactic reaction, the remaining 2 itch and transient fever. No adverse events were recorded in patients under 6 years old (n=11).
Summary and conclusion: FCM administration is safe and effective for routine management in children with IBD, including those who are under 6 years old

Surgical management of paediatric inflammatory bowel disease in the era of biological therapy – a single centre experience

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Introduction: Infliximab and Adalimumab are able to induce clinical and biological remission in patients with moderate and severe Crohn's disease (CD) and ulcerative colitis (UC). These therapies have led to a shift in management from controlling clinical symptoms to preventing disease progression. However, despite these advances in medical therapy, surgery is still required in 30%-40% of adult patients with CD and 20%-30% of adult patients with UC at some point during their lifetime.
Aims and Objectives: Review the indication, incidence and outcomes of children with IBD undergoing surgical intervention from a single centre.
Subjects and Methods: A retrospective case note review was undertaken on all patients with IBD over 5 years (2013-2018). We included all patients managed up to and including 18 years of age and reviewed the duration on medical management, indications for surgery, surgical procedures performed and outcomes following surgery.
Results: 20 patients were identified that required surgical input over the 5 year period (14 males, 6 females). Diagnosis was confirmed as CD in 13 patients and UC in 7 patients with median age of 11 years (range 2-15 years) at diagnosis. Median age at surgery was 14 years in CD (range 11-18 years) and 14.5 years in UC (range 5-17 years). All patients with UC were on Methotrexate, Infliximab or Adalimumab at the time of surgery. All patients with luminal CD were on Biological therapy. Rationale for surgery included refractory disease or failed medical management with on-going symptoms (4 patients: CD, 7 patients: UC), perianal fistula (2 patients: CD), stricturing disease (2 patients: CD), subacute bowel obstruction (2 patients: CD), acute abdomen (2 patients: CD) and acute perianal disease (1 patient: CD). 59% (10/17) of the abdominal surgeries were performed open (laparotomy) and 41% (7/17) were laparoscopic, the majority undertaken by a paediatric surgeon. 2 patients had been transitioned to adult care at the time of referral for surgery. Procedures performed included: 10 subtotal colectomy and ileostomy (7 for UC, 3 for CD), 5 right hemicolectomy and anastomosis (all for CD), 1 defunctioning loop colostomy (CD), 1 single incision laparoscopic surgery (SILS) for jejunal resection and anastomosis (CD), 2 EUA and insertion of seton (both in CD) and 1 EUA and excision of perianal skin tag (CD). Complications were documented in 7/20 (35%) patients; these included 1 anastomotic leak, 1 port site hernia, 2 superficial wound concerns, 2 hospital acquired pneumonia and 1 small bowel obstruction. At time of follow up 8/16 patients are documented as being off all medical therapy (4 patients with CD, 4 patients with UC). 8 patients are on medical therapy of which 4 patients have required further biological therapy (infliximab, adalimubab or vedolizumab).

Summary and Conclusion: The need for surgical intervention in PIBD commonly occurs peri-transition. It would therefore be important to involve adult surgeons in the decision making process when planning surgery in PIBD. Laparoscopic bowel surgery for IBD is emerging as the preferred intervention when second/third line medication has failed. It is important to be aware of the rates of surgical morbidity. This may be contributed by the cumulative effect of immunosuppressant therapy at the time of surgery.

The risk of nephroxicity from 5-ASA in children with ulcerative colitis (UC) is not dose related

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Introduction: 5-aminosalicylate (5-ASA) is efficacious in UC and IBD-unclassified (U). Nephrotoxicity is a rare side-effect. In adults, 5-ASA-induced nephrotoxicity presents at any age with chronic tubulointerstitial nephritis. A delay in diagnosis may result in progressive end-stage renal disease, even after drug discontinuation. However, case reports in children are scanty.

Aims and Objectives: We examined the hypothesis that renal disease is commoner in children receiving higher doses. We therefore investigated:

-The usage of all 5ASA brands, orally or rectally in all UC and IBDU diagnosed children <18 years from 2005 to 2017 in a major centre.

-5-ASA dose in mg/kg and other IBD treatment.

-Serum creatinine (µmmol/l), and calculated eGFR, correlating the maximum dose of 5-ASA with maximum creatinine and lowest eGFR levels respectively.

Subjects and Methods: Retrospective collection from a prospectively recorded database (Infloflex), verified with electronic records when full data were available. eGFR was calculated based on heights. Data were analysed using a non-parametric correlation test.

Results: 117 children with UC and IBDU were treated with 5-ASA drugs. 102 were diagnosed as UC and 15 as IBDU. 62 were male and 55 females. Their ethnicity was: 51 white British; 14 Black British; 18 British Asian; 14 other and 14-ethnicity not stated. 92 had pancolitis; 21 had left sided colitis; 3 proctitis and 1 right sided colitis only. They received the following other IBD treatments: 79 received prednisolone; 65 azathioprine/6MP; 21 biologics; 14 hydrocortisone; 8 received Methotrexate; 2 ciclosporin and 13 underwent colectomy. 72/117 (62%) had increased creatinine values at some point: 2/72 (3%) had pre-existing renal disease with raised creatinine. A further 3/72 (4%) children with raised creatinine had their 5-ASA drugs discontinued without renal damage. 2/72 (3%) cases were identified with permanent renal damage identified by raised creatinine, and the 5-ASA was discontinued. 3/117 (2.5%) had non-renal intolerance to 5 –ASA, e.g. rash. We correlated the maximum 5- ASA dose against the maximum creatinine (r^2=3.6%, p=0.66) and against minimum eGFR (r^2=0.6%, p=0.61) respectively using linear regression.

Summary and Conclusion: There was no correlation between maximum 5- ASA vs maximum creatinine or minimum eGFR. Therefore, the effect of 5-ASA on renal function is not dose-related.

The surgical management of paediatric inflammatory bowel disease - a review over 5 years

Introduction: Infliximab and Adalimumab are able to induce clinical and biological remission in patients with moderate and severe Crohn's disease (CD) and ulcerative colitis (UC). These therapies have led to a shift in management from controlling clinical symptoms to preventing disease progression. However, despite these advances in medical therapy, surgery is still required in 30%-40% of adult patients with CD and 20%-30% of adult patients with UC at some point during their lifetime.
Aims and Objectives: Review the indication, incidence and outcomes of children with IBD undergoing surgical intervention from a single centre.
Subjects and Methods: A retrospective case note review was undertaken on all patients with IBD over 5 years (2013-2018). We included all patients managed up to and including 18 years of age and reviewed the duration on medical management, indications for surgery, surgical procedures performed and outcomes following surgery.
Results: 20 patients were identified that required surgical input over the 5 year period (14 males, 6 females). Diagnosis was confirmed as CD in 13 patients and UC in 7 patients with median age of 11 years (range 2-15 years) at diagnosis. Median age at surgery was 14 years in CD (range 11-18 years) and 14.5 years in UC (range 5-17 years). All patients with UC were on Methotrexate, Infliximab or Adalimumab at the time of surgery. All patients with luminal CD were on Biological therapy. Rationale for surgery included refractory disease or failed medical management with on-going symptoms (4 patients: CD, 7 patients: UC), perianal fistula (2 patients: CD), stricturing disease (2 patients: CD), subacute bowel obstruction (2 patients: CD), acute abdomen (2 patients: CD) and acute perianal disease (1 patient: CD). 59% (10/17) of the abdominal surgeries were performed open (laparotomy) and 41% (7/17) were laparoscopic, the majority undertaken by a paediatric surgeon. 2 patients had been transitioned to adult care at the time of referral for surgery. Procedures performed included: 10 subtotal colectomy and ileostomy (7 for UC, 3 for CD), 5 right hemicolectomy and anastomosis (all for CD), 1 defunctioning loop colostomy (CD), 1 single incision laparoscopic surgery (SILS) for jejunal resection and anastomosis (CD), 2 EUA and insertion of seton (both in CD) and 1 EUA and excision of perianal skin tag (CD). Complications were documented in 7/20 (35%) patients; these included 1 anastomotic leak, 1 port site hernia, 2 superficial wound concerns, 2 hospital acquired pneumonia and 1 small bowel obstruction. At time of follow up 8/16 patients are documented as being off all medical therapy (4 patients with CD, 4 patients with UC). 8 patients are on medical therapy of which 4 patients have required further biological therapy (infliximab, adalimubab or vedolizumab).
Summary and Conclusion: The need for surgical intervention in PIBD commonly occurs peri-transition. It would therefore be important to involve adult surgeons in the decision making process when planning surgery in PIBD. Laparoscopic bowel surgery for IBD is emerging as the preferred intervention when second/third line medication has failed. It is important to be aware of the rates of surgical morbidity.

This may be contributed by the cumulative effect of immunosuppressant therapy at the time of surgery.

Thiopurine-induced hepatotoxicity in paediatric inflammatory bowel disease (IBD) patients.

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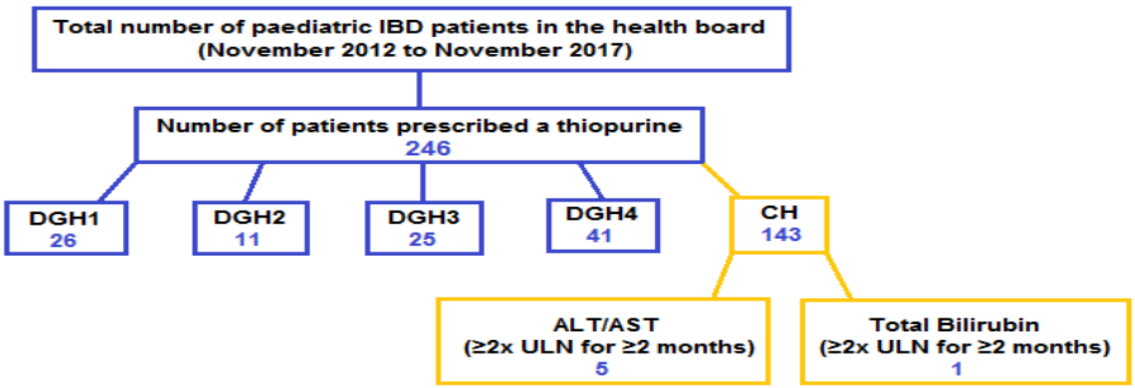
Introduction: Hepatobiliary disorders are the most common extraintestinal complaint in patients with IBD and these can result from immune-related disorders, thrombosis or medication toxicity. The thiopurines, azathioprine (AZA) and 6-mercaptopurine (6-MP) are widely used in the management of paediatric IBD. There is an inter-individual difference in therapeutic response and adverse effects. Thiopurine-induced hepatotoxicity can include dose-dependent or dose-independent reactions that occur by three possible mechanisms: hypersensitivity, idiosyncratic reaction and endothelial cell injury. The challenges faced by the paediatric gastroenterology team is to ensure patients and their parents are educated about the risk of developing hepatotoxicity with thiopurine use.

Aims and Objectives: To review the rate of thiopurine-induced hepatotoxicity in the paediatric IBD population with a single major Scottish teaching hospital.

Subjects and Methods: All paediatric patients diagnosed with IBD and prescribed a thiopurine between November 2012 and November 2017 were included. Patients were identified from reported thiopurine metabolite (6TG) levels and the clinic letters were reviewed to determine which thiopurine was prescribed. The British Society for Paediatric Gastroenterology, Hepatology and Nutrition (BSPGHAN) IBD working groups definition for thiopurine-induced transaminitis was used: AST and/or ALT and/or bilirubin level ≥2x upper limit of normal for ≥2 months. The transaminases were reviewed and those identified as meeting the BSPGHAN definition had their clinic notes reviewed to identify any documented reason for the transaminitis and the action taken.

The data was collected for patients at the corresponding children's hospital (CH) only (Fig. 1) which is the main paediatric centre within the region as the Patient Portal system for the other hospitals (DGHs 1-4) could not be accessed at the time data collection took place.

Results:



	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
Peak ALT (10-45 U/L)	154	177	42	251	541	808
Peak AST (15-45 U/L)	98	135	36	400	594	274
Peak Total Bilirubin (0-20 umol/L)	8	11	72	28	23	<5
Duration of transaminitis (months)	2	6	3	3	4	5

Six (4.2%) of the 143 patients had been prescribed a thiopurine at the time of the reported transaminitis. It was documented in two of the patient's clinical notes that the transaminitis was caused by the thiopurine medication. In both of these cases, the patient's thiopurine dose was changed to a twice-daily split dose, which resolved the transaminitis. Reviewing the other four cases, in two the patient had active disease and the patient was switched to methotrexate, which resolved the transaminitis, and the other patients' transaminitis resolved after the resolution of the acute flare. In the other two cases, one patient had autoimmune hepatitis, and the other had an unknown cause for the transaminitis. Both cases resolved on observation.

Conclusion: This review highlighted that there is a low incidence (1.4%) of thiopurine-induced hepatotoxicity in the paediatric IBD population within our hospital. This review will allow the paediatric gastroenterology team to provide relevant information based on a local and similar population when counselling patients about the potential adverse effects of thiopurines.

Transition from Paediatric to Adult Services: Adolescents with Inflammatory Bowel Disease Experience

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Introduction: The transition from paediatric to adult services can be a challenging period for both patients and their families therefore creating a safe and empowering environment allows these patients to be an effective partner in their own transition.

Aims and Objectives: The aim of this study was to evaluate the experiences, concerns and preferences of post transition adolescents.

Subjects and Methods: Seven participants who were transitioned over a period from 2016-2018 completed a patient experience satisfaction questionnaire containing open-ended qualitative questions via telephone consultation regarding their experience, expectations and the management of the transition process. This was then compared against standards set in NICE guideline for transition.

Results: On average the adolescents started discussing transferring care at mean age of 17 years. The participants highlighted the transition process was person centred with their opinions being integral in the transition management plan. The participants implied a positive and supportive interaction with both teams with attending a transition clinic and the completion of the 'Ready Steady Go' Questionnaire being the most informative and empowering for both participants and their parents. Several participants described challenges surrounding communication and contact after initial transfer with their being a lack of coordinated care and contact between the teams as well as between hospitals. A recurring theme was a lack of a transition care plan for reference after the transition had taken place highlighting important factors such as appointment management, new responsibilities of the adolescent and how adult and paediatric healthcare differs. The recommendations of this study have led to the introduction of a formal transition care plan.

Conclusion: This study showed how initiating discussions over transitioning early encompassing the multidisciplinary team aided the process and allowed a person centred transition. Additionally, it highlighted the importance of a written summary available to patients, parents and care providers encompassing what was discussed during the transition and the need of gradually shifting self-management responsibilities over to the adolescent early in the transition process easing them into adult healthcare.

Tubular Interstitial Nephritis: An extra-intestinal manifestations of Crohn's Disease

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Introduction: CD is a 'chronic, idiopathic transmural inflammation affecting one or several segments of the digestive tract' with a reported incidence of 3.12 per 100,000 individuals per year. [1] It may present with a variety of extra-intestinal features, which are often difficult to detect. We describe a rare presentation of Tubular Interstitial Nephritis (TIN) as an extra-intestinal manifestation of CD in a 13y old patient.

Aims and Objectives: To raise awareness of the extra-intestinal presentation of TIN in patients with CD.

Subjects and Methods: A 13y old girl was diagnosed with Crohn's colitis at 9y of age after presenting with loose and bloody stools, anaemia and raised inflammatory markers. At colonoscopy, she had confluent pancolitis but the presence of granulomas at histology was consistent with Crohn's colitis. She had no past medical history of note and had been thriving along the 90th centile previously. She quickly responded to oral Prednisolone and Mesalazine and was symptom free within 7 months.

Results: In October 2017, aged 12, she recommenced Mesalazine due to a mild relapse of her colitis with a faecal calprotectin >600mcg/g. A few weeks later her creatinine increased to 201umol/L from a baseline of 60-70umol/L. A diagnosis of possible Mesalazine induced nephritis was considered and Mesalazine was discontinued [2]. Unfortunately, despite stopping treatment, her creatinine continued to be elevated in association with glycosuria. A renal biopsy in December 2017 revealed normal glomeruli, moderate to severe interstitial inflammation and scarring of the tubulointerstitial space consistent with TIN. Ophthalmology assessment was unremarkable. Treatment was initiated with high dose (60mg) oral Prednisolone alongside liquid enteral nutrition. Although the renal function improved our patient was left with renal impairment (creatinine 120-130 µmol/L). Over the 10 months, despite being off Mesalazine, her renal function deteriorated on 3 further occasions, each time responding to an escalation in steroids; this thus making Mesalazine induced nephritis unlikely and raises the suspicion that TIN may be an extra-intestinal manifestation of CD. Although asymptomatic she has a persistently elevated faecal calprotectin (>600 mcg/g) and mildly elevated ESR, with evidence of active disease on rescoping and biopsies. She has, therefore, commenced treatment with Azathioprine and Infliximab in the hope that treatment optimization of CD will improve the TIN and allow withdrawal of steroids. This supports our conclusion, that in this patient, TIN is an extra-intestinal manifestation of CD.

Summary: Tubular Interstitial Nephritis is characterised by inflammatory cell infiltration and eventual fibrosis of the kidney interstitium. [3] Aetiology is varied and includes drug-induced, genetic, infectious and systemic inflammatory causes such as inflammatory bowel disease. It has been proposed that routine screening for TIN should be conducted in children with inflammatory bowel disease. Regardless of the cause, treatment predominantly includes steroid therapy.

Conclusion: Tubular interstitial nephritis can be a rare extraintestinal manifestation of Crohn's disease and associated with high morbidity. Early detection and treatment optimisation can minimise impact upon patients.

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Use of Vedolizumamb in Paediatric IBD: Experience in Royal Manchester's Children's Hospital

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Introduction: Vedolizumab is a Humanized Monoclonal Antibody that selectively downregulates T-Cell migration into Intestinal tissue by targeting the α4β7 integrin exclusively. Its gut selective nature offers obvious advantages in the treatment of IBD

Aims and Objectives: To share our experience of Vedolizumab and its use in Paediatric patients with refractory disease and non-responders to conventional Anti-TNF therapy

Subjects and Methods: We have commenced Vedolizumab in a total of 6 patients since October 2017. Dosing was 6mg/kg up to a maximum of 300mg. Patients were inducted at week 0, 2 and 6, with 8 weekly maintenance.

Results:

Age Sex	Diagnosis + Previous Treatment	Vedolizumab Indication + Start Time	Vedolizumab Course And Side Effects. Remission Achieved?
17 M	-UC Since 2015. Pancolonic -Azathioprine, Infliximab, Adalimumab, Recurrent Steroids	Primary non-responder – October 2017	-Changed to 6 weekly at 32 weeks. -Erythematous rash on face and arms 48 hours after infusion, improved on subsequent infusions. -Achieved remission, Weight gain from week 20, Calprotectin 52 at week 40.
17 M	-IBD-U Since 2014. Pancolonic + Small Bowel -Azathioprine, Adalumimab, Infliximab, Recurrent Steroids	Antibody formation and low levels – October 2017	-8 Weekly -Achieved remission, weight gain and normal inflammatory markers at week 12
17 F	-Crohns Since 2015 Pancolonic -Polymeric Diet, Azathioprine, Infliximab, Adalimumab, Recurrent Steroids	Active disease, low levels, symptoms 3-4 weeks after Infliximab infusion – November 2017	-8 Weekly with poor compliance. -Local rash around cannulation site on each administered which was self-limiting. -Stopped at week 16 at patient request without remission
14 M	-Crohns Since 2012 Pan-Enteric, Perianal, Intraabdominal Abscess -Polymeric Diet, Azathioprine, Infliximab, Recurrent Steroids, Triple Antibiotics, Topical Steroid/Mesalazine	Resistant distal disease – January 2018	-Changed to 4 weekly at 20 weeks following reassessment which showed near complete distal ulceration -Not in remission -Improvement clinically at 12-20 weeks, increasing symptoms

			thereafter and weight loss. Inflammatory markers raised throughout
14 M	-IBD-U Since February 2017 Upper GI + Pancolonic -Polymeric Diet, Azathioprine, Infliximab, Adalimumab, Recurrent Steroids, Topical Steroid/Mesalazine	Primary non-responder – May 2018	-8 Weekly -Achieved remission -Clinical remission at 8 weeks with weight gain and no Steroid use since
5 F	-G6PC-3 Constitutional Neutropenia – IBD since late 2016 -Steroid dependent, Infliximab, Antibiotics, Azathioprine (limited by marrow suppression)	Primary non-responder – March 2018	-6 weekly at 12 weeks -Not in remission -Slightly less pain and admissions, Calprotectin >2100, weight static

Summary And Conclusion: In our small cohort Vedolizumab appeared to be a safe option to use in non-responders to Anti-TNF therapy with no major adverse effects (2 minor skin rashes) and good response when selected well (3 cases of remission). One patient with significant distal disease showed little improvement and has been referred for Surgery. One patient was non-compliant. Our experience is consistent with the literature which suggests early response to colonic disease and a delayed response to extensive Crohns disease. Vedolizumab appeared to not help in our 5 year old patient with an immunodefiency, but its use has not demonstrated any ill effects, perhaps opening use of Vedolizumab in younger patients to be explored further.

Utilising a steroid sparing tool in paediatric IBD demonstrates low rates of steroid dependency and excess compared to adult practice

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Introduction: Although alternative therapies such as exclusive enteral nutrition have been used in place of corticosteroids for induction of remission in the paediatric inflammatory bowel disease (IBD) population[1], steroid excess remains an important issue. Steroid free remission is a key performance indicator in modern IBD care. An online tool was recently used to assess steroid use in a population of adult IBD patients.[2]

Aims and Objectives: To evaluate the use of steroids in the prevalent paediatric IBD population at a tertiary paediatric centre during a year long period from 01/05/17 to 30/04/18 using an online steroid assessment tool; to identify cases of steroid excess/dependency; and to assess factors associated with this.

Subjects and Methods: This retrospective study considered all patients with a diagnosis of IBD as defined by the ESPGHAN revised Porto criteria[3] diagnosed before 01/05/17 and active under the care of the IBD team as of 30/04/18 (n=247). 231 eligible patients were identified; those receiving oral steroids for other comorbidities (n=4) and those for whom complete data collection was not possible (n=12) were excluded. Questions within the pre-existing online tool[2] were modified following peer discussion to appropriately reflect use in a paediatric population. Data on diagnosis, medications, disease severity at last clinical assessment, number and duration of oral steroid courses during study period, ability to wean steroids to target dose (<0.25mg/kg/day for patients <40kg and <10mg for patients >40kg) within 3 months of commencement and if relapse occurred within 3 months of stopping steroids were collected from clinical records. Steroid dependency/excess was defined as one or more of: inability to wean steroids as above; relapse within 3 months of cessation; >1 steroid course within 12 month study period; and steroid course duration >3 months. The online tool was utilised for data entry and analysis where possible, with additional paediatric-specific data analysed outwith the tool where necessary.

Results: Diagnosis comprised Crohn's disease (CD) (183/231 - 79.2%); ulcerative colitis (UC) (31/231 -13.4%); and IBD unclassified (IBD-U) (17/231 - 7.4%). 129 patients (55.8%) had quiescent/inactive disease activity; 53(22.9%) were mild; 49(21.2%) moderate. The most common therapies used at the end of the study period were thiopurines (n=137-59.3%), anti-TNF therapies (n=93-40.3%), and 5-ASA agents (n=46-19.9%). 37/231 (16.0%) patients received a course of exclusive enteral nutrition (EEN) during the study period; 77 (33.3%) had previous use

documented. 39/231 patients (16.9%) had recorded oral steroid exposure during the study period; 8/31(25.8%) of the UC patient cohort, 29/183(15.8%) of CD patients and 2/17(11.8%) of IBD-U patients (p=ns). In comparison 353/1176 (30.0%) of adult IBD patients received steroids during the year-long study on which the tool was based.[3] The maximum number of steroid courses received by our patients during the study period was 2, with 11/39 (28.2%) steroid-treated patients receiving more than 1 course. The longest recorded duration of steroid course was 12 months, with median length of course 3 months and 12/39 (30.8%) patients receiving steroids with a documented course duration >3months. 27/39 patients (69.2%) were able to successfully wean their steroid dose within 3 months without recurrence of active disease and without documented relapse within 3 months of discontinuation; the remaining 12/39 (30.8%) were not. Overall, 18/39 patients (46.2% of steroid-treated patients - 7.8% of total patient cohort) were deemed to have steroid dependence or excess as per above definition, compared to 175/353 (49.6% of steroid treated patients - 14.9% of total patient cohort) of patients in the adult study.[3] Of these 18 patients, 15 (83.3%) had active steroid sparing strategies employed (e.g. commencement or optimisation of thiopurine or anti-TNF; new medication class) during their steroid course.

Summary: 16.9% of our patient cohort were found to have steroid exposure during the study period with 7.8% showing evidence of steroid resistance or dependency.

Conclusion: We demonstrate a lower rate of steroid use and excess within our service than published adult figures.[2] In patients with steroid excess, steroid sparing strategies were employed in the majority. Use of EEN during the study period (37/231 patients); a steroid sparing agent which is not conventionally utilised in adult IBD patients will undoubtedly contribute to this lower figure. The higher rate of steroid use reported in children with UC compared with CD here perhaps also supports this, however the lower rate in IBDU warrants further exploration. Replication of this study in other paediatric centres would allow comparative analysis. Development of a paediatric specific tool would aid data entry, increase data collection ability and facilitate ongoing quality improvement.

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Variations in Short Chain Fatty Acids reflect the Intestinal Microbial Dysbiosis seen in Paediatric Inflammatory Bowel Disease

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Introduction: The intestinal microbiota and its metabolites e.g. short chain fatty acids (SCFA) are key determinants of host physiology. SCFA are a major source of energy for colonocytes, and participate in metabolism and maintaining mucosal and systemic immune homeostasis.

Aims and Objectives: The study aims were to (a) characterise SCFA profiles in health and IBD; and (b) investigate potential association(s) between SCFA levels and clinical/nutritional status in response to treatment.

Subjects and Methods: Healthy infants (HI) and healthy children (HC) were recruited from the community. IBD patients from Great Ormond Street Hospital were recruited prior to diagnostic endoscopy, and samples collected prospectively. Stool samples from non-IBD controls (NIC) were also included. Stool samples were stored (-20^{o}C in 1M NaOH) then freeze-dried prior to extraction with diethyl ether and orthophosphoric acid followed by gas chromatography. SCFA concentrations were calculated utilising internal and external standards. Clinical results (calprotectin and disease scores) and dietetic assessments (24-hour recall) were gathered. Active disease was defined as PUCAI >10 and weighted PCDAI >12.5. Two-tailed Mann-Whitney U test and linear regression for assessing correlation with clinical parameters were conducted.

Results: Overall, the total SCFA concentrations across all groups showed a mean of 524, median 482 (65-1149) µmol/g. Our salient findings were:

- HI (n=5; age 6-16 months) had higher percentage of acetate compared to HC (n=11; age 4-7 years) (p=0.005). Significant increase in UC versus HC was also observed (active p=0.031; remission p=0.005);
- NIC (n=6; age 8-15 y) had higher propionate (p=0.009) and butyrate (p=0.017) percentages than HC;
- Lower propionate concentrations and percentages were observed in active UC (p=0.014, p=0.001) as well as UC in remission (p=0.016, p=0.005). Significant differences between UC (active and remission) and CD patients (p=0.0009, p=0.0061 respectively) were also recorded;
-Lower butyrate concentrations and percentages were observed in IBD compared to NIC (CD p=0.01, p=0.005; UC p=0.032, p=0.016). Correlation was observed with increased butyrate percentages and raised calprotectin in CD patients (R^2=0.48, p=0.027);
- Valerate concentrations were lower in UC than HC (active UC p=0.002; UC in remission p=0.005);

- Ileal (n=2) total SCFA concentrations were lower than HC (p=0.019) and NIC patients (p=0.01), and predominantly consisted of acetate (>85%);
- Nutritional assessment: HC had more fruit/ vegetable intake compared to IBD (p=0.016) and NIC patients (ns).

Summary: Infant SCFA profiles predominantly consisted of acetate, as did the ileal samples. Propionate and valerate were significantly reduced in IBD, in addition, butyrate concentrations and percentages showed a trend of decrease in UC, supporting the hypothesis that there is reduction in microbial butyrate-producers in UC. We are currently confirming our findings by 16S rDNA profiling.

Conclusion: There were distinct variations in SCFA profiles between healthy, NIC and PIBD. SCFA appears to play a critical role in the pathogenesis of UC. Finally, the observed differences between HC and NIC patients are likely a reflection of the well-characterised dysbiosis reported in these patients, thus caution should be exercised when comparing SCFA profiles between disease groups.

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Gastroenterology, Hepatology and Nutrition
Posters

A case of gastroenteritis?

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Introduction: Intussusception is the prolapse of one part of intestine into the lumen of the adjoining distal part, commonly involving the ileo-caecal region. The symptoms can be episodic severe abdominal pain, vomiting and at later stages, passage of stools mixed with blood and mucus. Clinical dehydration and shock can also be presenting features.

Aims and Objectives: We therefore present a patient case initially thought to be gastroenteritis. The patient remained tachycardic despite intravenous volume replacement, and developed more signs during admission signifying an underlying surgical problem.

Subjects and Methods: This 9-month-old patient was referred to hospital by GP due to concerns with persistent vomiting and being lethargic.

Results: -A 9-month-old boy was referred to hospital with a two-day history of worsening non-bilious vomiting. He last had his bowels opened in the morning of the day of admission, with passage of loose stools with no blood/mucus. When initially assessed, he was tachycardic with a heart rate of about 200 beats per minutes (but normal blood pressure), with prolonged capillary refill time and cold peripheries. He was given fluid boluses in the emergency department, which improved his tachycardia and perfusion. There was also improvement of his lactate levels (from 5 to 2.3) on serial blood gases. His abdominal examination otherwise revealed a soft, non-distended abdomen that was not tender on palpation. He was admitted to the ward for continuation of intravenous fluid therapy for gastroenteritis.

-Shortly after admission to the ward, he became tachycardic again with increasing lethargy. He developed pyrexia, and started having faeculent vomiting. A nasogastric tube was inserted which drained further faeculent contents. He received another fluid bolus and was started on intravenous antibiotics. An urgent AXR was performed which showed significant dilated small bowel loops throughout the abdomen indicative of obstruction. His admission blood results returned, showing raised CRP of 207. His repeat blood gas at this stage showed a compensated metabolic acidosis, with a lactate level of 2.5. He was distressed with palpation of his abdomen at this stage. He was discussed with the paediatric surgical team, and transferred to a tertiary hospital for paediatric surgical assessment.

- He underwent a laparotomy where an ileo-colic intussusception was identified and reduced. No bowel resection was required.

Summary: This case was initially thought to be gastroenteritis-related on the grounds of vomiting, loose stools and clinical dehydration. Evolving signs and continued re-assessments of his tachycardia were key to identifying an urgent underlying surgical problem - intussusception.

Conclusion: Intussusception is not usually immediately life-threatening; however, it is important to suspect and consider it, especially in this case. Intussusception can be treated with either a water-soluble contrast or air-contrast enema. However, surgery

is necessary for intussusception if it does not resolve with enema, or if the child is too ill and suspected to have complications such as bowel ischaemia/perforation.

A Case of Paediatric Oesophageal Pseudodiverticulosis with Associated Eosinophilic Oesophagitis and Diabetes Mellitus: First Reported Case

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Introduction: Oesophageal intramural pseudodiverticulosis (EIP) is a rare, benign condition characterised by 'flask-like' oesophageal diverticulae. EIP case series have been presented in adult literature, but few paediatric examples have ever been presented. Little is known about the pathophysiology of EIP, but an association with eosinophilic oesophagitis (EoE) has recently been explored. EoE is a chronic, inflammatory, oesophageal disease with clinical features, such as dysphagia and food bolus obstruction, as well as diagnostic histological characteristics. Increasing evidence supports the hypothesis that there is a link between EoE and EIP, but as with most of the work in this area, little has been described in paediatric cases. Our case demonstrates this link can occur in paediatric patients and further affirms the association with diabetes mellitus (T1DM).

Case Report: A 14-year-old boy, with a past medical history of T1DM, presented with a food bolus obstruction. An oesophagoduodenoscopy (OGD) was performed and a small piece of meat was retrieved from the lower oesophagus. He then reported a several-year history of difficulty swallowing and had a family history (sister) of eosinophilic oesophagitis, requiring annual dilatation due to stricturing. During the OGD, it was noted that there were two openings at the proximal oesophagus and so a Barium contrast study was subsequently organised to better evaluate his anatomy. The contrast study showed irregular oesophageal contours along its full length, as well as an area of contrast pooling suggestive of a leak. A subsequent CT scan showed that this was not a leak, but instead there was an anterior oesophageal diverticulum at the level of T2.

A repeat OGD was performed a year later; upon intubating the oesophagus, 18cm from the incisors, a second opening was again seen. The macroscopic appearance of the oesophageal mucosa in general was consistent with eosinophilic oesophagitis, with circular rings in the distal oesophagus. There were also diffuse openings seen throughout the oesophageal mucosa indicative of diverticulae. A neonatal endoscope was inserted into one of these diverticulae, finding a blind-ending pouch. Biopsies were taken from the diverticulum, as well as the rest of the oesophagus. The histology was diagnostic of eosinophilic oesophagitis and he was therefore diagnosed with both oesophageal intramural pseudodiverticulosis and eosinophilic oesophagitis.

Discussion: This is the first time a paediatric case of EIP with associated EoE and T1DM has been described. The combination of EIP and EoE has been relatively well established in adult literature, but the reason for this association to occur so early in life is not clear. In terms of the pathophysiology of EIP and the role that EoE and T1DM could play, the exact nature of events is not understood. The chronic inflammatory nature of EoE is one likely mechanism, but there are so few reported cases of EIP that it is likely to be multifactorial. The role of T1DM is even less clear and could be to do with generalised oesophageal dysmotility and increased luminal pressures.

Our case highlights the need to be aware of EIP as a possible diagnosis in children, especially with the rise of EoE cases being diagnosed. The presence of EIP is likely to represent a more severe case of EoE and treatment in such cases should not be delayed. More research is needed to investigate the factors that lead to the progression of diffuse EIP and assess its clinical significance.

A challenging presentation of glucose-galactose malabsorption

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Introduction: Glucose-galactose malabsorption is a rare autosomal recessive metabolic disorder caused by mutation in the SLC5A1 gene resulting in life-threatening diarrhoea due to malabsorption of glucose and galactose. Diagnosis is made by excluding glucose and galactose in the diet and introducing fructose as the sole carbohydrate source resulting in the diarrhoea resolving. Dioralyte is not normally tolerated due to its glucose content.

Subjects and Methods: A 19 day old infant admitted to a childrens hospital with diarrhoea and irritability on a standard infant formula. He is the second child of consanginuous parents. On admission he had metabolic acidosis and hypernatraemic dehydration with failure to thrive. The diarrhoea was observed to stop when he was kept nil by mouth or on dioralyte only. Glucose-galactose malabsorption was initially considered however ruled out as when placed on dioralyte at 200ml/kg at the start of his admission he passed one formed stool a day. With a patient with glucose-galactose malabsorption we would expect diarrhoea on this volume of dioralyte. Parenteral nutrition was started and home parenteral nutrition was discussed to ensure growth and manage symptoms. Multiple stool samples were positive for reducing substances as well as showing fat malabsorption, therefore a range of formulas were trialled.

Feed	Reducing substances	Fat globules
SMA Lactose Free	Not done	++
Aptamil Peptijunior	Positive	++
Hydrolysed Whey modular feed with 60% MCT	Negative	+++
Hydrolysed Whey modular feed with 65% MCT	Positive	++
Amino acid modular feed with fructose and 65% MCT	Negative	None seen
Amino acid modular feed with glucose and 65% MCT	Positive	+
Galactomin 19	Negative	None seen

Results: Two months after admission the diagnosis was revisited. Endoscopy was normal and we restarted the protracted diarrhoea protocol. He again tolerated dioralyte at 150ml/kg (1.8% glucose) but when given an oral solution containing 7% glucose his diarrhoea returned. He was subsequently challenged with 7% fructose feeds, diarrhoea resolved and he gained weight. Galactomin 19 was started and once established parenteral nutrition was stopped. The loose stools resolved, he gained weight and was discharged home. Fat malabsorption resolved and stool reducing substances were negative on Galactomin 19. Patient has thrived since discharge, taking 180ml/kg Galactomin 19. The patient tolerates weaning foods containing up to 2g CHO per 100g which is higher than normal for this group.

Summary: Diagnosis of glucose-galactose malabsorption was made by exclusion of glucose and galactose in his diet and symptoms resolving. We are awaiting results of genetic testing to determine if he has the SLC5A1 gene mutation.

Conclusion: This was an atypical presentation of a rare condition, even though a diagnosis may be ruled out initially we need to be aware that these conditions may not always have textbook presentations. Persistent fat malabsorption is not usually a feature of glucose-galactose malabsorption and was assumed to be secondary to rapid gut transit once a diagnosis was made. Tolerance of dioralyte and fat malabsorption delayed diagnosis.

A pilot study to investigate the prevalence of abnormal nutritional bloods in exclusively enterally fed neurologically impaired children

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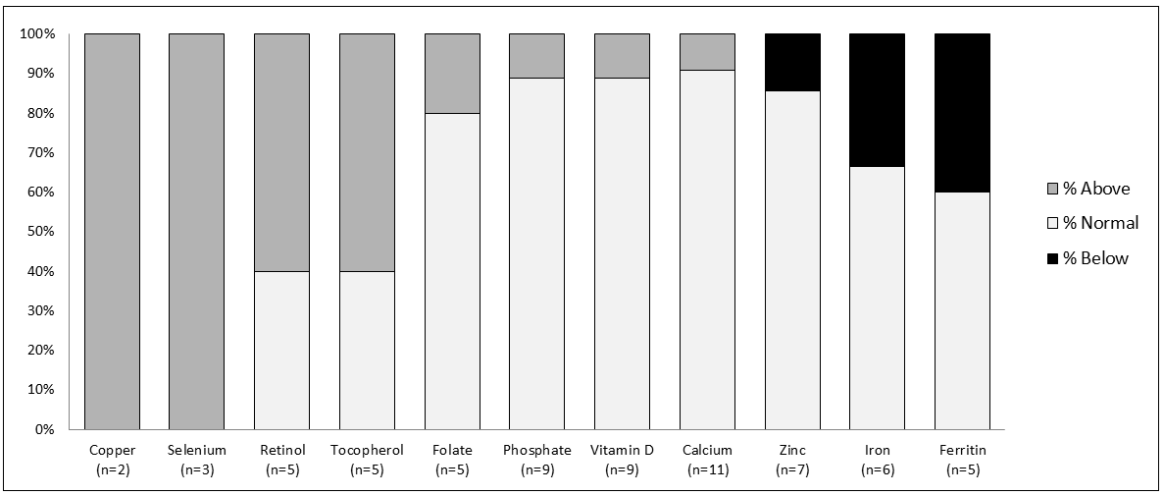
Introduction: The 2017 ESPGHAN statement for the evaluation and treatment of gastrointestinal and nutritional complications in children with neurological impairment (NI) recommends: (1) The use of standard DRI's for micronutrients in typically developing children and (2) The assessment of micronutrient status (including vitamin D, iron, calcium, phosphorous) as part of nutritional assessment. In our centre full nutritional blood screening for exclusive enteral feeding patients has been in place for over 3 years.

Aims and Objectives: Our aim was to describe the prevalence of abnormal micronutrient status from routine assessment data in a group of neurologically impaired children on exclusive enteral nutrition.

Subjects and Methods: From a dietetic home enteral feeding database we identified children with a NI diagnosis who had been on exclusive commercial enteral feeds for >1 year. Prescribed volumes of enteral feed were reviewed and nutrient content compared to the individual child's requirement adjusted for age and sex. Children whose prescribed volumes met all the UK reference nutrient intakes for the following nutrients (copper, selenium, retinol, tocopherol, folate, phosphate, vitamin D, calcium, zinc, iron, ferritin) were included and those failing to meet any were excluded. Nutritional bloods requested as part of routine assessment were then collated for these patients and the data tabulated.

Results: We identified 11 children (9M 2F) mean age 6.9 years (range 2.9 years to 14.8 years) who met our inclusion. Prevalence of either above, normal or below the biochemical reference ranges for each of the 11 nutrients is shown below in graph form where n= the number of available results for each nutrient.



Summary: Despite theoretical delivery of sufficient nutrients this pilot study identified 1 patient with low zinc, 2 patients with low iron and 2 with low ferritin. All other nutrients investigated showed either normal or high results. Despite our centres protocol for all 11 nutrients to be requested only calcium was successfully reported for all patients limiting assessment.

Conclusion: This pilot study supports the recommendation of routine micronutrient assessment. Even in patients hypothetically receiving their requirements based on typically developing children there was biochemical evidence of low levels. Possible reasons for this include inherent limitations of nutritional biomarkers and uncertain actual consistent delivery of prescribed volume of enteral feed in the home. Successful achievement of all the nutritional blood results was poor; commonly due to insufficient blood sample volume. Anecdotally repeating bloods for specific micronutrients was unpopular with both community medical teams and parents/carers. This pilot study is limited by a small sample size but warrants further work due to the very limited data on micronutrient levels in this group.

A Single-Centre Audit of Children with Autoimmune Hepatitis in the West of Scotland

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Introduction: Autoimmune hepatitis (AIH) is the most common of the autoimmune liver diseases. It is characterised by the presence of autoantibodies attacking the liver resulting in inflammation and fibrosis. Epidemiological data on AIH is limited, but prevalence rates in children have been reported to be between 2-17 per 100,000 children worldwide. There is currently limited data on the diagnosis, management and outcomes for children with AIH.

Aims and Objectives: The aim of this audit is to retrospectively analyse how children with AIH in our department initially presented, were investigated and subsequently managed. We are in the process of partnering with centres throughout Scotland to make this a national audit in the hopes of getting valuable epidemiological data on AIH with a captive denominator.

Subjects and Methods: A patient list was generated from our prevalent population between 2013 and September 2018. Patient data was obtained from electronic patient records. Information on diagnosis, initial presentation, investigations, management and outcomes were recorded and analysed.

Results: 18 patients were included (10 female). 8 (44%) patients were referred following presentation to A+E, 7 (38%) were referred from the community and 3 (16%) were referred post diagnosis. Median time from referral to first appointment was 0 days (range 0-42 days). Median follow-up was 32 months (range 2- 119 months). Presentations included jaundice n=9 (50%), transaminitis n=5 (27%, fatigue n=5 (27%), abdominal pain n=4 (22%), weight changes n=3 (16%) and organomegaly n=1 (5%). Median time from start of symptoms to diagnosis was 6 weeks (range 3 days- 72 weeks). 3 patients had a diagnosis of AIH with primary sclerosing cholangitis overlap. 4 patients had a family history of autoimmune diseases and 7 had a significant co-morbidity. Median values for albumin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), bilirubin, immunoglobulin G (IGG) platelets and spleen size-z score at diagnosis were 34g/L (range 26-38), 454 IU/L (range 74-1713), 417 IU/L (range 46-2308), 283 IU/L (range 158-471), 32 umol/L (range 6-194), 79 IU/L (range 21-158), 26.3 g/L (range 8.11-86.3), 119 $x10^9$/L (range 49-399) and 4.93 (range 0.75- 11.27), respectively. 15 (83%) patients tested antibody positive: ANA n=12 (66%), Anti-SMA n=7 (38%), Anti-MPO3 n=2 (11%), Anti-mitochondrial n=1 (5%), or Anti-cytosol-1 n=0. All patients were treated with oral corticosteroids, 14 (77%) required treatment with Azathioprine, and 9 (50%) were treated with ursodeoxycholic acid. 3 (16%) patients had a disease flares requiring an increase in oral steroids, 3 (16%) had flares requiring resumption of maximum dose of oral steroids and 6 (33%) had flares requiring IV steroids (median course length= 6 days). No patient had more than 2 flares. 2 (11%) patients underwent liver transplantation.

Summary: We audited the clinical course of 18 children with AIH under the care of the paediatric gastroenterology, hepatology and nutrition department at the Royal Hospital for Children, Glasgow. The majority of these children were diagnosed after several weeks of symptoms and with deranged blood investigations at the time of diagnosis. These children were managed with corticosteroids in the first instance and azathioprine as second line therapy. This has been mostly successful with few disease flares requiring inpatient hospital admissions.

Conclusion: The management of AIH in children with corticosteroids and azathioprine provides good outcomes, with few disease relapses or deteriorations requiring inpatient hospital stays. Despite this some cases still remain difficult to manage and result in the need for liver transplantation.

Acquisition of paediatric gastroscopy competence: How many endoscopies do trainees actually need to do?

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Introduction: In paediatric gastroscopy training, the minimum procedural numbers required to safeguard competency are unknown. To quality assure training in paediatric endoscopy, training programmes use minimum procedure count thresholds as one of several measures for certification, before enabling independent practice. These thresholds vary worldwide, with 100 procedures recommended by the Joint Advisory Group on Gastrointestinal Endoscopy (JAG) in the UK. It is important to correctly define these thresholds, as setting them too low may compromise endoscopy quality and patient safety whilst setting them too high may not be attainable during training.

Aims and Objectives: We aimed to conduct learning curve analyses on a national training cohort to identify when trainees develop procedural competency for paediatric gastroscopy.

Subjects and Methods: This nationwide study analysed data from paediatric gastroscopy procedures prospectively entered into the UK endoscopy training e-portfolio between 2014 and 2018. Moving average and learning curve cumulative summation (LC-Cusum) analyses were performed to identify procedural numbers required to achieve competency, as defined using the unassisted second part of duodenum (D2) intubation rate threshold of ≥95%. Factors associated with D2 intubation were assessed using a multivariable binary logistic regression approach.

Results: 8929 procedures performed by 61 trainees were identified. By moving average analysis, 95% D2 intubation was achieved at 79 procedures. By LC-Cusum analysis 81.6% of trainees were competent after 100 procedures. Multivariable factors associated with unassisted procedural completion included: lifetime procedure count ($n<0.001$), higher trainee seniority ($p<0.001$), patient age ($p=0.002$), outpatient status ($p<0.001$) and attendance of the JAG Basic Skills OGD course ($p=0.011$).

Summary: This study demonstrates that, on average, 79 procedures in paediatric gastroscopy are required to attain the competency outcome of ≥95% D2 intubation rates. By 100 procedures, 81.6% of our sample had achieved >95% D2 intubation.

Conclusion: The minimum procedural count of 100 set by the UK and international training programmes can be used alongside existing objective assessment measures to safeguard competency within a training cohort.

Adherence to biopsy guidelines in children diagnosed with Eosinophilic Oesophagitis

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Introduction: Eosinophilic oesophagitis (EoE) is an emerging clinic-pathological entity characterised by symptoms of oesophageal dysfunction and eosinophil-predominant inflammation. Previous studies have shown that biopsy guidelines for EoE are followed inconsistently in adults and children, which could lead to under-recognition of EoE.

Aims and Objectives: The aim of this study was to determine the adherence to evolving guidelines for oesophageal biopsies in patients newly diagnosed with EoE in a single tertiary Paediatric Gastroenterology centre in the UK.

Subjects and Methods: Guidelines by Liacouras et al (2011) recommended at least 2 mucosal biopsy specimens of the proximal and distal oesophagus in suspected EoE should be taken (minimum 4 biopsies in total from different levels). Updated EPSGHAN guidelines by Lucendo et al (2017) proposed at least 6 biopsies in total from different levels of the oesophagus. Bearing in mind the above recommendations, we looked retrospectively at all the diagnostic gastrointestinal endoscopies (OGD) performed on new EoE patients in our department from July 2011 to June 2018. The number and location of biopsy specimens obtained were reviewed.

Results: We identified 72 patients with a new diagnosis of EoE in the studied period. 56 out of 72 patients were diagnosed prior to the 2017 guidelines. 40/56 (71.4%) had adequate sampling as per the 2011 guidelines. 16 out of 72 patients were diagnosed following the 2017 guidelines. Only 2/16 (12.5%) were biopsied following the most recent recommendations, indicating that the newer recommendations have not yet been transferred to clinical practice. However, 13/16 of these (81.5%) met the 2011 guideline recommendation.

The minimum number of biopsies as proposed in the 2011 guidelines was not met in 19/72 (26.4%) children overall. Of these, 10/72 (13.8%) patients were investigated for symptoms other than oesophageal dysfunction and had normal macroscopic findings. 5/72 (6.9%) patients had both symptoms of oesophageal dysfunction and abnormal macroscopic findings suggestive of EoE. 3/72 (4.2%) patients had oesophageal dysfunction with normal macroscopy. Only 1/72 patient (1.4%) had no symptoms of oesophageal dysfunction (presented with fatigue and a positive coeliac screening) but abnormal macroscopic findings suggestive of EoE. Of the 11 patients who did not have symptoms of oesophageal dysfunction, 8 had non-specific symptoms with known potential association with EoE (abdominal pain, weight loss/failure to thrive).

Summary: Adherence to the 2011 recommendations has improved with time, but the 2017 recommendations have not yet been endorsed in clinical practice. A quarter of the patients with newly diagnosed EoE did not have adequate number of biopsies obtained. Suboptimal sampling could have been avoided in about 85% of cases if

guidelines were followed. More than two thirds of the patients with suboptimal sampling had normal macroscopic findings.

Conclusion: Changing guidelines, normal macroscopy and non-specific symptoms were linked with poor adherence to the recommended biopsy sampling in EoE, which could have led to missed diagnosis and potential long-term consequences from delayed treatment.

Advancing the use of trans-anal irrigation systems for the treatment of functional constipation.

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Introduction: Functional constipation (FC) is a common childhood condition, with a prevalence of 5-30%. Management options vary from dietary advice to trans-anal irrigation (TAI) systems and antegrade colonic enemas (ACE) with varying degrees of success. Managing FC can be frustrating for patients, parents and clinicians due to the paucity of published information on the average duration of treatment – see table.
Aims and Objectives: To identify adoption and success rates, duration of treatment and subsequent treatments after TAI failure. Review published outcomes of TAI in purely functional constipation and faecal incontinence (FFI).
Subjects and Methods: Retrospective case note review of all patients who used a trans-anal irrigation system between January 2010 and April 2018 with a diagnosis of functional constipation. All structural causes of FC were excluded. Data on demographics, medical history, duration of use of TAI and outcomes were collected. Literature was reviewed regarding use of TAI limited to FC and or FFI.
Results: 82 patients (54 males, 28 females) with FC were offered treatment with TAI during the study period. Of these, 6 were lost to follow up and were removed from the study population. 62/76 (82%) adopted TAI (continued to use after 4 weeks). 42/62 (68%) patients responded to TAI, reporting a significant improvement in symptoms. 54/62 patients continued oral laxative use while using TAI. 5/76 (6.5%) of adopters reported complications, including PR bleeding, balloon issues and perianal irritation.
Median age at start of TAI treatment was 9 years, with a median duration of treatment of 23 months. 11/62 (18%) patients were successfully weaned from TAI with a median duration of use of 18 months.11/62 (18%) patients went on to have an antegrade colonic enema (ACE) stoma formed due to a lack of response in symptoms.

Author	Year	*n*	Diagnosis	Outcome
Jorgenson	2017	72	Functional faecal incontinence (FFI)	73% complete remission from FFI
Koppen	2017	67	FC	67% continue to use
Johnson	2018	82	FC	68% symptomatic improvement

Summary: 1. TAI has a high rate of adoption in FC (82%); 2. TAI has a good success rate in FC (68%) with a low complication rate (6.5%)
Conclusion: 1. All reports of TAI in children are retrospective and most include structural causes of constipation and faecal incontinence. (NICE Medical technologies guidance [MTG36], February 2018)

2. Progress in the use of TAI, particularly in FC, can now only be achieved with a randomised controlled trial (RCT).
3. We propose a feasibility study to randomise treatment of childhood FC to medical management (NICE Clinical guideline [CG99] 2010) or medical management plus TAI.

All-in-one Parenteral Nutrition: A national survey

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Introduction: Parenteral Nutrition (PN) is historically administered to babies and children as split- phase, with seperate lipid and aqueous infusions. Errors in the infusion rate of one or both phases can occur, including 'rate switch' errors when lipid is infused at the rate intended for aqueous PN and vice versa. A 2017 alert from NHS Improvement (NHSI) highlighted that serious adverse effects have occurred due to overly-rapid infusion of PN in babies and children. All-in-one (AIO) PN is presented as one product combining lipid and aqueous phases. Theoretically this seems safer than split-phase PN, as only one infusion rate is required, but there is scant evidence in literature. A group of specialist pharmacists has been working towards procurement of national standardised paediatric PN for the last 2-3 years, and further refinement of formulations is required in light of recent European guidelines. Local rate switch incidents, the NHSI alert and a desire to provide national standardised PN in a manner that is safe and relevant to current practice are the drivers behind this survey.

Aims and Objectives: To gather details about the current usage of AIO PN for children 0-18 years in the UK, reasons that organisations have switched to using AIO PN and benefits that occurred from switching. For organisations not using AIO PN, the aim is to find out if they have plans to use it in the future and why/not. The ultimate aim is to determine whether AIO PN should be used locally and/or nationally via standardised paediatric PN to improve patient safety.

Subjects and Methods: A survey monkey® was designed and circulated to members of the Neonatal and Paediatric Pharmacists Group (NPPG) via email. Members were asked to respond on behalf or their organisation if they provided PN to babies or children. The survey included 10 questions/fields, withs discrete choices such as yes/no/don't know or 'select all that apply'.

Results: 51 organisations responded. Close to 50% were using AIO PN for inpatients. Organisations using AIO PN: 70% used both AIO and split-phase PN. AIO PN was used mainly for larger children: adolescents/children >40kg (64% of organisations); children 30-39.9kg (60%); and children 20-29.9kg (48%). Nurse preference/ease of administration (45%), addressing a local safety concern (25%) and responding to the NHSI safety alert (21%) were the most common reasons for using AIO PN. AIO PN was perceived as having a positive impact including: improved patient safety (42% of organisations); improved local aseptic unit capacity (38%); and improved nurse satisfaction (29%). Methods of providing AIO PN included: locally prepared-licensed multi-chamber bag with additions (54%); externally prepared-as bespoke/scratch (39%); licensed multi-chamber bag without additions (39%); externally prepared-standard bag (12%); externally prepared-licensed multi-chamber bag with additions (12%); locally prepared-as bespoke/scratch either using a compounder or via other method (8% each). Organisations used a wide variety of commercially-available products.

Organisations not using AIO PN: 43% of organisations were not planning to use AIO PN in the future or didn't know and 15% were planning to start in the future. 42% selected 'other' and provided comments which were primarilly reasons for avoiding

AIO PN for neonates, e.g. need to use neonatal network PN (split-phase) or prefer flexibility to stop lipid in case of adverse effects. Eleven organisations gave specific comments under 'why are you thinking of using AIO PN?' – examples included releasing aseptic unit capacity, reducing administration errors/improving safety and the long shelf life of triple-chamber AIO bags.

Summary: Half of organisations provided PN as AIO, mainly for larger children, and most organisations not using AIO did not plan to use it in the future or were unsure. Comments implied that organisations preferred split-phase PN for neonates. Nurse preference, enhancing patient safety and improving aseptic unit capacity were commonly cited as drivers for using AIO PN, and using AIO PN had a positive impact in these areas. Around half AIO PN was provided as a multi-chamber bag with local additions.

Conclusion AIO PN appears to be an appropriate and safe for local use and should be taken into account in national standard paediatric PN formulation design

Anastomotic Ulcers: A tertiary centre experience of novel endoscopic techniques

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Introduction: Improvements in neonatal care and surgical advances, has led to an increased prevalence of children with small and large bowel anastomoses. Ulceration at the site of anastomosis is a rare, but well recognised phenomenon, with no clearly understood pathogenesis. Paediatric case series have been reported in the literature, but there is no reported experience with novel endoscopic techniques in their management. Anastomotic Ulcers (AU) may develop after a latent period of many years following the primary operation. The most common clinical manifestations include pain, diarrhoea and iron deficiency anaemia. There is no clear effective treatment.

Aims and Objectives: To evaluate the different management strategies used for AU including novel endoscopic techniques such as Argon Plasma Coagulation (APC) and clips.

Subjects and Methods: We performed a retrospective case note review of AU identified at our trust during August 2011 and June 2017. A service evaluation was conducted during June 2017 and approved by the trusts governance committee. Patients were identified via our primary method of coding, and directly by endoscopist or surgeon recall of AU patients. Information was obtained regarding the following: patient age at the time of data collection, sex, past medical and surgical history; it included the primary pathology requiring resection, subsequent treatment and any follow up symptoms.

Results: 10 patients (6 males and 4 females) with AU were identified. Median age of diagnosis of AU was 5.5 years (range 1-16 years). Three patients had an underlying diagnosis of Inflammatory Bowel Disease (IBD). Other diagnosis (non IBD) included gastroschisis, necrotising entercolitis, Hisrchprungs disease, and volvulus. Non IBD patients presented with rectal bleeding, while the IBD patients had abdominal pain, weight loss and mucous in stools. Aminosalicylates was the first line treatment tried in all patients. Two patients (non IBD) who were transfusion dependent, underwent both APC and endoclipping, but as their symptoms did not resolve, they subsequently required surgery. Three patients (non IBD) who were not transfusion dependent, but were iron deficient, had APC. All 3 responded to this and at follow up were asymptomatic. In the IBD group, all had optimisation of medical treatment resulting in symptomatic resolution.

Summary and Conclusion: Novel therapeutic treatment was used in 71% of the non IBD group. All IBD patients with AU had resolution of clinical symptoms with optimisation of immunosuppressant medications. Although our numbers are small our results from the non IBD related AU, suggest that endoscopic interventions can be an effective management strategy especially in the non-transfusion dependent sub

group who were not in the severe end of the spectrum. Larger multicentre prospective studies are needed to confirm our initial results and validate the trends we have identified.

Annual Endoscopy re-audit in a tertiary Paediatric endoscopy service to facilitate quality improvement.

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Introduction: Paediatric Global Rating Scale (p-GRS) is an endoscopy quality improvement tool, developed jointly by British Society of Paediatric Gastroenterology, Hepatology and Nutrition (BSPGHAN) and the Joint Advisory Group (JAG). An integral part of this is carrying out an annual endoscopy audit demonstrating adherence to quality and safety indicators and also includes measuring patient experience.

Aims and Objectives: Re audit of the endoscopy service to ensure adherence to quality and safety indicators as recommended by p-GRS and measure patient experience. This audit was first carried out in 2016/2017.

Subjects and Methods: Data was collected retrospectively for all endoscopies performed during a 2-week period using electronic records in April 2018. A patient/parent questionnaire was distributed within the same period of time by team members. All data was inputted and analysed with Microsoft Excel and results compared to the previous audit.

Results: During the study period 54 patients underwent endoscopies. 96% of these were elective procedures with only 1 emergency case; an Upper Gastrointestinal Bleed and 1 scheduled urgent case for banding of oesophageal varices. The patient with Upper GI Bleed was assessed and received an endoscopy within 24 hours of admission.

We achieved 100% compliance for documenting two-stage consent (Signed initial consent form and checking of consent marked in preoperative notes). Indication for endoscopy was clearly documented in 100% of case notes, 98% had a documented indication which complied with ESPGHAN guideline, illustrating procedure appropriateness.

14 of the 15 patients (93%) who underwent colonoscopy had adequate bowel preparation and of these terminal ileal intubation was achieved in all patients (100%). One patient had inadequate bowel preparation which affected procedure completion.

10 patients were deemed to be an anaesthetic high risk on the endoscopy booking form but only 70% (n=6) of patients had documented evidence of referral to an anaesthetist prior to procedure. Following anaesthetic review, 3 patients had pre-booked HDU beds before the procedure.

There were no post-operative complications such as bleeding, perforation or unexpected ventilatory requirement. One of the 3 patients admitted to HDU required ventilatory support but this was a child with a complex background and home non-invasive ventilation.

There were no unplanned admissions within 8 days and there were no deaths within 30 days of procedure.

11 patient feedback questionnaires were returned within the 2-week period. Overall experience was rated 'excellent' by 91%(n=10) and one respondent rated the experience as 'good'. There were no suggestions made for improvement from the feedback.

Summary & Conclusion: The endoscopy unit consistently complied with several standards. Areas to be developed further include a robust pre-anaesthetic pathway and ensuring all team members document procedure indications clearly. Overall patient experience improved from the previous audit (100% vs 78%).

Are children and young people with vertically acquired chronic hepatitis C infection and whose mothers have a history of injecting drug use, accessing and receiving successful treatment?

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Aims: To describe the demographics and social situation of children and young people with vertically acquired chronic hepatitis C infection (HCV) and whose mothers have a history of injecting drug use, who are cared for by a supraregional specialist children's liver centre since 1994
To identify how many children have accessed treatment and the outcomes of that treatment.
Method: A retrospective case note review undertaken as part of a Trust approved clinical audit
Results: 44 children and young people with a vertically acquired chronic hepatitis C infection and whose mothers had a history of injecting drug use, made up 33% of the total number of children and young people with a chronic hepatitis C infection. 40 (91%) children were Caucasian and 4 (9%) were mixed race; 2 Caucasian/Pakistani and 2 Caucasian/Afro-Caribbean.
25 (57%) children were genotype 1, 4 (9%) were genotype 2, 11 (25%) were genotype 3 and 4 (9%) were not genotyped prior to spontaneously seroconverting.
10 (23%) children lived with their mother, meaning that 34 (77%) children did not live with their mother. Of these children, 14 (31.8%) had been adopted, 10 (22.7%) lived with a family member in either a special guardianship or foster care agreement, 9 (20.5%) lived with a foster carer and 1 (2.3%) lived in a residential placement.
26 (59%) children and young people had received treatment for their chronic hepatitis C infection and 25 (96%) of these had achieved a sustained viral response to treatment. 16 with Pegylated Interferon and Ribavarin: 10 achieved SVR, 3 non-responders, 1 relapser, 1 stopped treatment due to side effects. Of the 6 that did not achieve SVR, 5 have gone on to be treated with DDA; 4 within paediatric treatment studies and 1 since transitioning to adult oriented services and they all achieved SVR. 10 treatment naïve children have also been treated through DDA treatment studies and all have achieved SVR.
Of the 18 children not treated, 4 spontaneously seroconverted, 4 are currently three years of age or under and are currently too young to be treated, 3 were offered treatment but their family/carer have refused offer at this point, 3 are awaiting treatment, 3 have moved geographically and now under care elsewhere, 1 young person died following an accidental overdose.
Conclusions: Children and young people with a vertically acquired chronic hepatitis C infection and whose mothers have a history of injecting drug use make up one

third of the children with chronic hepatitis C that the service cares for and just over three-quarters of these children no longer live with their mother. Once referred to the service, children have good access to successful treatment which is achieved through complex collaborative working with children and their families and where required foster carers, social workers and Looked After Children teams.

Discussion: It is imperative that children with a hepatitis C infection are identified so that they can be referred to specialist children's services where they can receive appropriate health monitoring in collaboration with their local teams and be offered treatment with the aim of clearing their infection during childhood so that they minimise any long-term damage to their liver and do not have the burden and stigma of growing-up with a blood-borne virus. The early detection of the virus in children warrants further discussion about implementing universal antenatal hepatitis C testing in pregnancy.

Audit of medical staff knowledge of how to support mothers to initiate and to continue providing breastmilk for infants on the neonatal unit.

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Introduction: The UK has amongst the lowest breastfeeding rates in Europe. The WHO/UNICEF Baby Friendly Initiative (BFI) sets evidence-based standards of practice for healthcare units that aim to protect, promote, and support breastmilk provision. This has potential significant health benefits for the infant, with preterm and/or sick infants standing to benefit the most. A lack of awareness of these standards of care and false beliefs surrounding breastfeeding advice can affect a doctor's ability to provide the correct support.

Aims and Objectives: Use the UK BFI audit criteria to assess junior medical staff awareness of key areas: current local and national breastfeeding rates; risk factors that influence breastfeeding continuation; the benefits of breastfeeding and skin-to-skin for the infant and the mother; knowledge of correct (and incorrect) advice to mother's who intend to provide EBM and breastfeed on the neonatal unit; and how to provide general support for parental involvement in the care of their infant on the neonatal unit.

Subjects and Methods: 16 paediatric trainees based at a tertiary neonatal unit were invited to complete a 10-point questionnaire, composed of a variety of questioning styles, without learning aids and without a time limit for completion.

Results: There were 14 respondents (4 x level 1, 6xlevel 2, 4 x level 3 trainees). Areas of strength included the knowledge of benefits of breastfeeding and skin-to-skin, awareness of the influence of social background on risk of premature discontinuation of breastfeeding, knowledge of what advice to give regarding expressing breast milk, and approaches to involve parents in the care of their infant on NNU. Areas of weakness included a lack of awareness of breastfeeding rates, understanding the potential impact of mother's health on the likelihood of continuing breastfeeding, pervading false beliefs surrounding safe provision of breastmilk, knowing how to identify risk factors that indicate the need for extra support, and a knowledge of available breastfeeding support services.

Summary: This audit of knowledge reflecting the evidence-based standards of practice set by the UK BFI revealed a lack of awareness and knowledge in several key areas, and even identified pervading false beliefs. The results are being used to initiate quality improvement processes, including informing the development of a multi-faceted training package to ultimately improve support of mothers providing breastmilk to infants admitted to the neonatal unit.

Conclusion: We have identified areas of knowledge that can impact on a professional's ability to provide good support to mothers providing breastmilk to their infants on the NNU. This highlights the importance of a need for tailored, medical based education for practitioners in this subject area, delivered at important time points throughout under- and post-graduate training. The results have been presented locally to key stakeholders with multi-disciplinary engagement to facilitate quality improvement processes and to inform the development of an educational package, to ultimately improve quality of care.

Benefits of intra-sphincteric botulinum toxin in children with medically refractory chronic idiopathic constipation

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Introduction: Chronic idiopathic constipation (CIC) is a major health problem in children. While most patients are managed by paediatricians, those with refractory symptoms and soiling, warrant surgical referral. In this cohort, anal intra-sphincteric botulinum injection (botox) is in widespread use, particularly when appropriate bowel management strategies (ie. rectal therapies) are not tolerated. There is, however, a paucity of literature regarding botox efficacy. This study has assessed short- and intermediate-term outcomes following botox treatment in this patient group.

Aims and Objectives: To assess short- and intermediate-term outcomes in children with refractory CIC treated with intra-sphincteric botox. Primary outcomes were: effect on soiling; and patient/family perception of botox efficacy at first follow-up. Secondary outcomes were; dependence on botox; requirement for abdominal surgery; and discharge from surgical care, at 2 and 4 year intervals.

Subjects and Methods:

A 10 year (2008-18) retrospective cohort study of botox treatment in refractory CIC in a tertiary paediatric centre was undertaken. Medical records of 138 children who underwent intra-sphincteric botox treatment were evaluated. Those with diagnoses other than CIC (n=34) or inadequate data (n=46) were excluded. The study group was 58 children. Outcomes after botox treatment were assessed at first follow-up (median 2 months); and then at 2 and 4 year intervals. Chi squared tests were used to assess statistical significance ($p<0.05$; CI 95%).

Results:

Mean age at first botox treatment was 6yrs (range 1-14yr, male 31, female 27). 10/58 (19%) children had an existing diagnosis of autism spectrum disorder (ASD; M:F=9:1). Outcomes at first follow up were; no longer soiling 25/58 (43%), soiling improved 13/58 (22%), soiling unchanged 18/58 (31%) and worsening soiling 2/58 (4%). Parental perception of a treatment benefit was found in 38/58 (66%). At 2year follow-up (n=47/58); 9/47 (19%) were discharged from surgical care, 5/47 (11%) remained under surgical care but were managed by laxatives alone, and 18/47 (38%) were botox-dependent. Surgical escalation was required for 15/47 (32%) who underwent either colostomy (n=10) or anterograde colonic enema (n=5). In children with 4year follow-up (21/58); 5/21 (24%) were discharged from surgical care, 6/21 (28%) were managed by laxatives, and 5/21 (24%) were botox-dependent. 5/21 (24%) had underdone abdominal surgery. Children with ASD were significantly more likely to require colostomy/ACE ($p=0.015$).

Summary and Conclusion: Most patients with refractory soiling due to CIC will benefit from anal botox therapy. In the short-term, cessation or improvement in soiling can be seen in up to 65%. However, 1/3 of patients may go on to require colostomy/ACE formation, especially those with ASD. NICE guidelines for CIC lack clarity with respect to the role of rectal therapies, intra-sphincteric botox, and surgical escalation. Further studies are needed to reinforce the evidence base.

Can constipation kill?

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Introduction: Childhood constipation is common and most patients are successfully managed without complications.

Aims and Objectives: We present a patient with long standing constipation who presented in extremis secondary to abdominal compartment syndrome from accumulation of faeces. We wish to highlight the need to be aware and vigilant of the dangers of longstanding, under treated or neglected constipation.

Subjects and Methods: A 7-year old girl presented to Paediatric A+E with massive abdominal distension, in shock, unresponsive. (pulse -158/min, SaO2 = 90% in 10L oxygen, BP = 60/32mmHg, pH 6.91, lactate 12.1). She needed resuscitation including ventilation and inotropic support. Clinical examination revealed a hugely distended abdomen with a massive fecaloma occupying the entire abdomen and x-ray showed dilated large bowel with huge faecaloma. The diaphragm was raised causing lung compression bilaterally. Initially surgical team did needle decompression of her abdomen with temporary improvement in her condition. She had cardiac arrest on arrival in theatre, needing CPR for 10 minutes. Following stabilisation, she underwent emergency laparotomy and the huge fecaloma (7 kg) was evacuated from the colon via a sigmoid colotomy. This was closed and a defunctioning ileostomy fashioned. She was extubated after 7 days, and commenced on TPN. Her weight and height were < 0.4th centile.

Results: She had a background history of long-standing constipation that was initially treated by Paediatricians, was lost to follow-up and was under the GP's supervision. She had possible delay in passing meconium at birth and a rectal biopsy as a neonate was normal.

Further investigations and follow-up over a period of months revealed malnutrition, anaemia and severe recurrent iron-deficiency. Subsequent investigations included a rectal biopsy (normal), transit studies (global slow colonic transit) and a video-capsule endoscopy (ileal Crohns disease). Currently, with appropriate management of her Crohn's disease she is thriving. The family wish stoma reversal.

Summary: We present a patient with long-standing constipation who presented in extremis and needed resuscitation and emergency bowel decompression. The history and findings of this case show that the slow and progressive deterioration of the clinical condition was missed in the community and the patient presented in a decompensated state, needing life-saving interventions.

Conclusion: Long-standing constipation can deteriorate over a period of time and the severity can pass undetected especially in the Community/GP practice setting. This case report highlights the need for vigilance and timely intervention, including referral to Paediatricians, when chronic constipation does not respond to standard interventions. Similar cases with mortality are not unknown in the literature.

Capsule Endoscopy Service in a Major Tertiary Centre: Review of the last 5 Years

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Introduction: Capsule endoscopy has been used increasingly in children as a means of visualising the small bowel since its approval for use in children over the age of 2 years by the US Food & Drug Administration in 2009. It provides a means for diagnostically evaluating the small bowel in children for several conditions by direct visualisation and without resorting to the use of ionising radiation. Limited paediatric-specific data exist on the utility of this investigation, with completion rates of 86.0% reported in children[1].

Aims and Objectives: Complete review of all capsule endoscopy data accrued over 5 years in a major tertiary centre. Outcomes sought included: age at capsule, reason for capsule; was it launched endoscopically or swallowed; time in small bowel; and completed capsules (Defined as seen entering caecum/stoma bag before end of imaging).

Subjects and Methods: Retrospective review of capsule endoscopies performed between August 2014 and September 2018. All patients who underwent Capsule endoscopy between August 2014 and September 2018 were identified via the RAPID™ reader software by Medtronic. Since all capsules are downloaded to this software, patient accrual was 100%. Electronic medical records of identified patients were then reviewed. The type of capsule used during this timeframe was the Pillcam™ SB3 by Medtronic.

Results: During the study period, a total of 101 (59 male) capsules were performed on 85 patients. Of these, 69 capsules were complete and 32 incomplete. There were 78 (54 complete) endoscopically placed capsules and 23 (15 complete) swallowed capsules. There was a median age of 12 years (range 17 months to 18 years). The median weight was 43kg (range 10.8kg to 97.5kg). Median gastric transit time for swallowed capsules was 47 minutes (range 1-155 minutes)The commonest indication for capsule endoscopy was to assess for small bowel Crohn's Disease (66.33%) followed by assessment for GI bleeding (25.7%). The median small bowel transit time of completed capsules was 257 minutes (range 37-654 minutes).

Year	Number	Male: Female	Complete: Incomplete	Endoscopic:Swallowed	Endoscopic complete	Swallowed complete
2014*	11	4:7	8:3	6:5	4:2 (66.6%:33.3%)	4:1 (80%:20%)
2015	23	12:11	16:7	19:4	14:5 (73.7%:26.3%)	2:2 (50%:50%)
2016	20	11:9	11:9	18:2	10:8 (55.6%:44.4%)	1:1 (50%:50%)
2017	29	20:9	21:8	19:10	14:5 (73.7%:26.3%)	7:3 (70%:30%)
2018*	18	12:6	13:5	16:2	12:4 (75%:25%)	1:1 (50%:50%)
All	101	59:42	69:32	78:23	54:24 (69.2%:30.8%)	15:8 (65.2%:34.8%)

Conclusion: We have shown that completion rates for capsule endoscopy in our centre are fairly consistently below that reported from the published literature, but do not appear to vary between endoscopically placed or swallowed capsules. This should probably become a facet of consent for capsule endoscopy. Swallowed capsules are therefore an appropriate undertaking in all children who can comfortably accommodate this method of deployment.

References:

1 Cohen SA, et al. Techniq Gastrointest Endoscopy 2013; 15: 32-35.

Copper deficiency: A rarely considered complication of prolonged jejunal feeding.

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Introduction: Provision and delivery of nutrition in paediatric patients is of paramount importance. Unfortunately, diagnoses such as gastro-oesophageal reflux disease, gut dysmotility, pulmonary aspiration and post-operative gastroparesis can present challenges to this, and it is becoming increasingly common for patients to be fed jejunally. Despite this increasing trend, the association between jejunal feeding and trace element deficiencies including copper is often unrecognised in clinical practice. We report 2 cases of copper deficiency in children on long term jejunal feeds.

Aims and Objectives: To raise the awareness of acquired copper deficiency in patients receiving long term exclusive jejunal feeds.

Subjects and Methods: Patient 1, a 7 year old with extreme short bowel syndrome (17cm, no ileocaecal valve) secondary to complex gastroschisis, underwent a small bowel and liver transplant due to intestinal failure associated liver disease and parenteral nutrition dependence. Post operatively he quickly transitioned to enteral feeding by the nasojejunal route due to gastroparesis. Patient 2, a 2 year old with X-linked myotubular myopathy requiring non-invasive ventilation and with significant gastro-oesophageal reflux disease, underwent a roux-en-y jejunostomy and commenced jejunal feeds at 5 months of age.

Results: Patient 1 developed pancytopenia (haemoglobin 69 g/L, platelets 15, white cell count 0.78, neutrophils 0.18) and impaired renal function due to high gastric/stoma losses 5 months post-transplant. Nutritional screening revealed a significantly low serum copper level of 1.7µmol/L (reference range 11-22 µmol/L). His levels were normal pre-transplant. Patient 2 was found to have anaemia and neutropenia (haemoglobin 61 g/L, neutrophils 0.58) when he was admitted with an episode of respiratory distress. His copper level was 0.4µmol/L.

There are no published guidelines or treatment regimens regarding the most appropriate dose, duration, route and form of copper supplementation. Both of our patients were supplemented with intravenous Peditrace (1ml/Kg, max 15ml; 4.725 µmol of copper in 15 ml). Patient 1 received this daily for 2 weeks and patient 2 received this on alternate days for 2 weeks. Patient 1 was also given paediatric Seravit (10g thrice daily) via gastrostomy. This was not possible in patient 2 due to the risk of aspiration and the need for continuous non-invasive ventilation. In both patients, the serum copper level normalised. Patient 2 also had resolution of his anaemia and neutropenia.

Summary: Copper is an important trace element which is essential for the function of multiple enzymes, principally in the neurological and haematological systems. The site for its absorption is the stomach and proximal duodenum. It has been reported

that copper deficiency causes anaemia and neutropenia with eventual progressive myelopathy which, if unrecognised by the time cytopenias develop, is irreversible.
Conclusion: Case reports describing jejunally fed patients consistently report that copper deficiency manifests with haematological disturbances, predominantly leukopenia. As jejunal feeding bypasses the site of copper absorption these patients are at risk of copper deficiency and its associated complications. As there are no published guidelines, it is important to raise awareness of this association. Our cases highlight the need for regular monitoring of trace elements to enable early detection and prevention of complications. We recommend routine blood monitoring at the start of jejunal feeding, at 3 months and thereafter at least 6 monthly. Every attempt should be made to try and revert to gastric feeding as tolerated.

Culture yield of Helicobacter Pylori-positive gut biopsies in paediatric patients.

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Introduction: The acquisition of Helicobacter Pylori (H. Pylori) occurs early in life and tends to persist over time. H. Pylori infection is associated with peptic ulcer disease and antral nodularity as well as an increased risk of developing atrophic gastritis, gastric cancer and mucosal-associated-lymphoid-type (MALT) lymphoma. The management of H. pylori infection in the paediatric population critically depends on a successful biopsy culture. Isolation of the pathogen enables strain-specific treatment resulting in improved eradication rates and reduction of inappropriate antibiotic use.

Aims and Objectives: The aim of our study was to evaluate and critically appraise H. Pylori-positive biopsy processing in our centre and propose an improved pathway to ensure best possible culture outcomes.

Subjects and Methods: We retrospectively reviewed electronic patient records and pathology reports to establish children and adolescents with histology confirmed Helicobacter gastritis diagnosed between March 2017 and September 2018. For each patient, one antral biopsy was transferred into a container with Normal Saline and stored in 4 degrees C before sending to the reference laboratory.

Results: Fifteen patients with H. Pylori-associated gastritis were identified from a total of 438 patients who underwent oesophago-gastro-duodenoscopy (OGD) within the 18-month period. The median age was 12.3 years (IQR: 11.5-14.75). Ninety-three percent (14/15) were diagnosed with H. Pylori and one (6.7%) with H. Heilmannii associated gastritis. Antral nodularity was seen in 47% (7/15) of cases of whom 71.4% (5/7) had gastric biopsies sent for culture. In 47% (7/15) of cases, H. Pylori was identified in children with normal mucosa of whom 28% (2/7) were sent for culture (previously unsuccessful eradication and positive H. Pylori stool antigen).

From the histology-positive cases, 47% (7/15) were sent to our reference laboratory of which 57% (4/7) were cultured successfully. Biopsies from four patients were processed with 48hrs of sampling and were cultured successfully whereas biopsies from further three patients were processed within 144hours all of which failed.

Conclusion:

Nodular antral gastritis was highly suggestive of H. Pylori infection. Biopsies processed within 48hrs of sampling were cultured successfully whereas a delayed transit time led to culture failure. Other factors such as transport medium, number of biopsies taken, storage conditions and concomitant use of proton pump inhibitors are likely to affect successful culturing.

Daily intravenous Octreotide to control high output gastrostomy losses in intestinal failure

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Introduction: Octreotide is a synthetic octapeptide derivative of naturally occurring somatostatin. It inhibits secretion of hormones produced within GEP endocrine system and can reduce gastrointestinal secretions. Octreotide may be useful as a potential therapy in intestinal failure (IF) caused by intestinal dysmotility (Ref). Current experience of the potential role of octreotide in paediatric patients on home total parenteral nutrition (TPN) in the UK is limited.

Aims and Objectives: We assessed the use of octreotide to reduce gastrointestinal fluid loss
(gastric drainage and stool) in children with IF caused by bowel dysmotility.

Subjects and Methods: We prospectively studied children with excessive and uncontrollable GI loss who required large daily volumes of TPN in order to maintain fluid and electrolytes and support growth. Octreotide was given as a short (20 to 40 minute) infusion via CVC twice daily. Initial dose was 0.5 microg/kg/dose, increased to >1 microg/kg/dose depending on response.

Results: We studied 4 children requiring TPN. (Median age 6 yr (range 4-14 yr), 3 male: 1 female). All had intestinal dysmotility and one also had short bowel syndrome. Octreotide doses ranged from 0.5-1.32 microgr/kg/dose twice daily as intravenous infusions. Gastrostomy drain output decreased from between 600ml – 2200 ml daily before treatment to 100 ml – 500 ml daily after 4-8 weeks of treatment (Figure1, t-test $p<0.05$)).

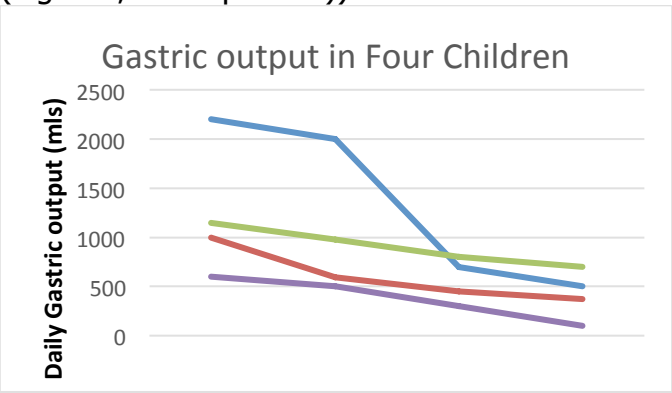

Figure 1

A = prior to treatment
B = 1 week treatment
C = 2 to 4 weeks treatment
D = 4 to 8 weeks treatment

PN volume decreased significantly in one patient from 3700 ml to 2600 ml per day. Time on PN daily was 13 – 18 hrs (median 15 hrs) before treatment and decreased to 13-14 hrs (median 13.5 hrs) by 4-8 wks after treatment commenced. Two families reported significant improvement in quality of life. One further patient reported some improvement in quality of life and one patient reported no improvement. No significant side effects were observed.

Summary: Our study shows that all patients showed a significant decrease in daily gastric losses which improved quality of life in three families by making TPN fluid management simpler.

Conclusion: Twice daily octreotide given by short infusion reduces gastrointestinal fluid loss in children reliant on TPN whose management is compromised by excessive gastric losses. Further long term evaluation of therapy is required, but we have found this to be a very useful short term treatment in a particularly problematic group of patients.

Ref: Ambartsumyan, L et al. Utility of Octreotide in Advancing Enteral Feeds in Children with Chronic Intestinal Pseudo-Obstruction. Pediatric Drugs (2016) Volume 18

Does the use of pH/impedance monitoring inform management choices?
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Introduction: pH/impedance monitoring can be used to diagnose and determine the severity of acid and non acid reflux in children. It can be performed both on and off treatment.
Aims and Objectives: To compare the practice at our centre with the ESPGHAN guidelines for pH/impedance studies in children. To determine how many procedures were carried out, how many failed and for what reason, and in how many children the impedance study informed further management.
Subjects and Methods: The paediatric gastroenterology department in our centre began performing pH/impedance studies in January 2016. Prior to this the paediatric surgeons were the only department performing these investigations. This was a retrospective review of all children who had a pH/impedance study between January 2016 and July 2018. Investigations were requested from a variety of specialties (gastroenterology, respiratory, general paediatrics and general surgery).
Results: 49 patients (22 males, 27 females) had a pH/impedance study during the study period. The ages ranged between 5 months and 16 years (median age 2 years and 4 months). Indication for procedure was as follows: suspected reflux 25, ARFID 3, recurrent vomiting 7, apnoeic episodes 4, others (EE, dysmotility, food allergy) 10. All patients were on acid suppression. 26 patients had an upper GI endoscopy performed at the same time. There were 11 failed procedures: 2 probes coiled, 4 were displaced and 5 did not record. Recording time varied between 7h 22m and 47h 22m (median 23h 44m)

pH/impedance results

	Number	Abnormal pH (reflux index, RI)	Abnormal impedance
<1 year	8	n=2 (RI>10%)	N=4 (>100 events)
>1 year	30	n= 13 (RI>3%)	N= 24 (>70 events)

Symptom diaries from parents showed a <50% correlation with events in 32 patients.
Summary: pH/impedance monitoring helped to inform the decision for fundoplication in 7 patients. It prevented fundoplication in 8 patients in whom it was being considered. None of these patients with normal pH/impedance monitoring have gone on to have a fundoplication. 1 patient was diagnosed with rumination syndrome.
Conclusion: pH/impedance monitoring can be helpful when diagnostic uncertainty exists and symptoms need to be correlated with events. It can be helpful to inform a decision for fundoplication if there is uncertainty as to the severity of reflux.

Drainage of a complex pancreatic pseudocyst with an endoscopic ultrasound-guided metal stent

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Introduction: Pancreatic pseudocysts that are persistent, complex and symptomatic may require drainage. Options range from endoscopic internal trans-gastric drainage, percutaneous (direct or trans-gastric) drainage or surgical drainage.

Aims and Objectives: We report a case of a 12-year old boy with acute pancreatitis secondary to anti-epileptic medication who developed duodenal obstruction due to a large, complex and persistent pancreatic pseudocyst. This was drained with a trans-gastric endoscopic ultrasound-guided metal stent with resolution of symptoms.

Subjects and Methods: A 12-year old boy with autism, tuberous sclerosis and epilepsy was admitted with history of being unsettled, abdominal discomfort and bilious vomiting. His abdominal X ray ruled out bowel obstruction and perforation. Chest X-ray showed bi-basal atelectasis. Blood results showing raised serum amylase of >1000U/L and normal liver function tests led to a diagnosis of acute pancreatitis. After initial improvement with supportive management, 6 weeks later, he developed duodenal obstructive symptoms again necessitating commencement of TPN. A CT scan revealed a complex pancreatic pseudocyst with two large cysts measuring 8.3cm and 8.8cm on long axis between stomach and pancreas with mass effect. He underwent insertion of a metal stent by Adult Gastroenterologist with improvement in his symptoms. Four weeks later this was swapped for a plastic stent.

Results: Further CT and Ultrasound scans showed resolution of cysts. Patient remained in hospital for total 4 months and was discharged on naso-jejunal feeding. At subsequent endoscopy 3 months later to remove the plastic stent it was not found – probably passed through the GI tract. Naso-jejunal feeds were stopped 2 months after discharge and at follow-up (18 months) he is well with normal amylase.

Summary: A persistent complex pancreatic pseudocyst causing duodenal obstruction, necessitating the use of TPN, was successfully managed by endoscopic ultrasound-guided insertion of a metal stent with drainage of the pseudocyst into the stomach with relief of symptoms.

Conclusion: Complex, persistent, pancreatic pseudocysts that are causing secondary problems can be drained endoscopically with the help of metal stents inserted with ultrasound guidance. This is best performed by adult gastroenterologist colleagues given their experience/expertise in this area as this scenario is very uncommon in paediatric practice. Endoscopically placed trans-gastric metal stents are well suited for this and can relieve the obstruction leading to earlier recovery.

Duodenal displacement and acquired intrathoracic stomach in an extreme premature baby on jejunostomy feeds

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Introduction: An extreme premature neonate on prolonged nasojejunal feeds developed duodenal displacement and acquired intrathoracic stomach which eventually needed a laparotomy. The clinical presentation and radiological findings are discussed.

Aims and Objectives: To discuss the clinical presentation and course of this baby from neonatal period to infancy.

Subjects and Methods: A premature neonate (23 weeks of gestation) experienced repeated episodes of vomiting with dependency on parenteral nutrition. Initial management with nasojejunal feeding was unsuccessful; vomiting persisted until the age of 4 months when she was changed to a hydrolyzed formula (still naso-jejunal). Only then did she establish full enteral feeds and wean from parenteral nutrition.

Results: In the meantime serial radiological investigations demonstrated progressive downwards and medial displacement of the duodenum, and progressive herniation of her stomach into her chest. At the age of five and a half months, she underwent a laparotomy to reduce her intrathoracic stomach and repair the oesophageal hiatus. An open gastrostomy with trans-pyloric jejunal extension was placed at the same time. The duodenum and overlying right colon were noted to be mobile, but the small bowel mesentery was normal; malrotation was not present.

Discussion: The anatomical abnormalities were acquired postnatally in a small premature baby with flimsy connective tissue that progressively stretched, failing to fix and retain the gut in the normal anatomical position. The continued presence of a relatively stiff transpyloric jejunal tube led to progressive displacement of the distal duodenum. The retching forces arising from repeated activation of the vomiting reflex due to milk intolerance caused progressive displacement of her stomach into the thorax.

Summary: This is a rare presentation of a premature neonate with recurrent vomiting, managed with jejunal feeds who developed progressive herniation of her stomach into the chest necessitating a surgical procedure.

Conclusion Milk intolerance should be considered early as a cause of recurrent vomiting. Repeated/persistent displacement forces can lead to acquired abnormalities in the position of the foregut in premature neonates.

Efficacy, Growth, and Safety Outcome of Teduglutide in Children with Short Bowel Syndrome Associated Intestinal Failure (SBS–IF): a Phase 3 Study

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Introduction: A 24-week study (NCT02682381; EudraCT 2015-002252-27) in children with SBS–IF treated with teduglutide found clinically meaningful reductions in parenteral support (PS) volume including a subset of patients who achieved enteral autonomy.

Aims and Objectives: We report the secondary results from this study.

Subjects and Methods: Patients aged 1–17 years and their legally authorised representatives chose to receive teduglutide or standard of care (SOC) for 24 weeks; teduglutide patients were double-blind randomised to receive 0.025 or 0.05 mg/kg teduglutide once daily. Endpoints included PS volume/calories/days per week, citrulline levels, and growth parameters. Efficacy data from patient diaries are reported using descriptive statistics.

Results: All 59 enrolled patients completed the study (0.025 mg/kg, n=24; 0.05 mg/kg, n=26; SOC, n=9). At Week 24, teduglutide was associated with decreased PS volume, calories, and infusion days per week and increased plasma citrulline levels in both teduglutide cohorts; the SOC cohort showed little changes in these parameters

(Table). Z scores for body weight, height, and mass index were stable. Based on highest severity, severe treatment-emergent adverse events were reported in 20.8%, 34.6%, and 0% of patients in the 0.025-, 0.05-mg/kg teduglutide, and SOC cohorts, respectively.

Summary: Teduglutide was associated with clinically meaningful reductions in PS volume and calories. The safety profile was consistent with prior experience in children and the underlying disease.

Conclusion: The stable growth parameters indicate that the PS reductions implemented in teduglutide-treated patients corresponded to improved intestinal absorption without jeopardizing nutritional needs.

Table. Change in Efficacy Endpoints

Parameter, mean ± SD	Teduglutide 0.025 mg/kg n=24	Teduglutide 0.05 mg/kg n=26	SOC n=9
PS volume at baseline, mL/kg/day	56.8±25.24	60.1±29.19	79.6±31.12
Change at Wk 24, %	–36.2±30.65	–41.6±28.90	–10.2±13.59
PS calories at baseline, kcal/kg/day	43.3±21.10	43.3±16.52	44.6±22.53
Change at Wk 24, %	–42.5±29.15	–44.3±31.28	+1.9±17.58
PS days per week at baseline	6.5±1.10	6.6±0.79	6.6±1.33
Change at Wk 24, %	–16.0±31.34	–21.3±34.09	0
Citrulline at baseline, μmol/L	17.9±12.64	16.0±11.54	12.6±8.43
Change at Wk 24, μmol/L	+7.7±8.50	+12.0±12.00	+0.1±7.79

Epidermolysis bullosa acquisita in a child with ulcerative colitis.

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Introduction: Epidermolysis bullosa acquisita (EBA) is an autoimmune blistering disease of the skin and mucous membranes caused by IgG autoantibodies directed against the 145□kDa noncollagenous amino□terminal (NC□1) domain of collagen VII.[1] Ulcerative colitis (UC) is also associated with autoantibodies against type VII collagen and with EBA, although with a lower frequency than for CD.[2,6]

Aim and objectives: Case report on a rare association of ulcerative colitis and EBA.

Subjects and methods: 15yr old boy presented with urticarial lesions on his legs which then blistered. On examination he had urticarial erythema with superimposed tense blisters particularly on his upper thighs. Direct immunofluorescence on skin biopsy specimen demonstrated linear deposition of C3 at basement membrane zone. Serology showed 1:800 titres of circulating autoantibody against basement membrane confirming the diagnosis of EBA. He was treated with steroids and doxycycline. Azathioprine was started in view of persisting symptoms. He reported symptoms of diarrhoea on and off ongoing over a couple of years prior to skin manifestations with waxing and waning symptoms. His fecal calprotectin was significantly elevated.

Results: He underwent colonoscopy which demonstrated pancolon oedema, granular ulcerations with bleeding points.Terminal ileum was normal. Biopsy showed distorted crypt architecture, focal ulceration, cryptitis and crypt abscesses and inflammatory infiltrate limited to the lamina propria indicating ulcerative colitis. He was started on aminosalicylates.

Summary: EBA is very rare, with an estimated incidence of 0.25 new cases/million inhabitants/year,[3] and usually affects elderly people.[4] Only a few cases of childhood onset of EBA have been reported.[4,5] Epidermolysis bullosa is associated with many systemic disorders including IBD(30%).[2]However the association with ulcerative colitis is very rare, only 4 reported cases in the literature.[2]

Conclusion: To the best of our knowledge, this is one of the few cases of EBA in a young boy affected by ulcerative colitis. It confirms that EBA is frequently associated with IBD and should always be considered in the differential diagnosis of skin manifestations associated with IBD.

European Paediatric Non-Alcoholic Fatty Liver Disease (EU-PNAFLD) Registry: design and rationale

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Introduction: Non-alcoholic fatty liver disease (NAFLD) is the most common liver disorder in children and has the potential to progress to advanced fibrosis/cirrhosis, end-stage liver disease and hepatocellular carcinoma. However, the natural history of the condition is poorly understood and there are no approved treatments.

Aims and Objectives: Primary aim: Establish a European clinical research registry & bio-bank for children with NAFLD to act as a "back-bone study" for further studies
Secondary aims: (i) Describe the impact of paediatric NAFLD on survival (liver- and non-liver related mortality), Clinical hepatic complications (transplant-free survival, progression of liver histology, development of decompensated liver disease, hepatocellular carcinoma), and Cardio-metabolic disease burden (coronary heart disease, cerebrovascular disease, peripheral vascular disease); (ii) Evaluate the efficacy of existing biomarkers and non-invasive imaging techniques fibrosis, steatohepatitis, and risk-stratification; (iii) Explore novel biomarkers and imaging

techniques in relation to long-term clinical outcomes, (iv) Assess whether novel monogenic disorders underlie a group of children with severe NASH or 'lean NAFLD'

Subjects and Methods:

The European Paediatric Non-Alcoholic Fatty Liver Disease Registry (EU-PNAFLD) is a multi-centre registry of paediatric NAFLD that will serve as a prospective, observational, natural history study and provide a tractable back-bone to support recruitment into subsequent interventional trials. Collection of samples into a bio-repository will facilitate translational studies, including genome sequencing and metabolomics. Total recruitment is aimed at 2000 children, with 500 biopsy-proven NAFLD. EU-PNAFLD will work closely alongside the existing adult European NAFLD Registry to obtain data on clinical outcomes after 20-30 years.

Summary: Through an international, well-characterised large-scale cohort, EU-PNAFLD will address the key questions in paediatric NAFLD and benefit patients with the condition.

Conclusion:

EU-PNAFLD is an ambitious international registry that aims to tackle the key questions in paediatric NAFLD through collaboration between specialist and non-specialist centres.

Experience of Gastro-jejunal Tube placement in children intolerant to gastrostomy feeding

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Introduction: While the indication of gastric feeding in children is well established by percutaneous endoscopic gastrostomy (PEG), there is limited evidence on optimising feeding in children not tolerating PEG feeding. Conversion to jejunal feeding (PEG-J) can be arranged as an extension from gastrostomy (Freka® or Corflo® PEG) or replacement by a Gastro-Jejunal tube(GJ).
Aims and Objectives: To review the outcome of PEG-J feeding, to measure the frequency of unplanned PEG-J change and to assess the reason for unplanned PEG-J change.
Subjects and Methods: Systematic electronic record review of all patients receiving PEG-J placement within 1 year. Analysis of indication, co-morbidities, outcome, frequency and reason for unplanned tube changes.
Results: N=92 patients had a PEG-J in situ in 2017 (inserted between 2010-2017). N=24 patients were excluded due to incomplete information. N=68 patients were included. Mean age of insertion was 4.66years. Most common underlying conditions were neurological, gastroenterology and genetic. N=65 patients received GJ and n=3 had Freka-Jej extensions. N=33 patients had more than 1 indication for PEG-J insertion (see Table 1). 91% of patients reported to have symptomatic improvement. 39 patients required 88 unplanned PEG-J changes. 30/88 changes required hospital stay ranging from 1 - 6 days (average =1.9days). Notably, 52% of patients required an unplanned tube changed within 2 months; 23% between 3-4 months; 18% between 5-6 months and 5% after more than 6 months. 5 patients required unplanned inter-hospital transfer for PEG-J change.

Table 1: Indications for PEG-J insertion Table 2: reasons for unplanned PEG-J change.

Indications:	No. of Pt
Vomiting	32
Reflux	25
Aspiration	16
Faltering Growth	9
Retching	7
Abdominal Pain / Distension	4
Leaking / Sore PEG site	4
Previous NJ feeds	3
Large Gastrostomy Output	2
D3-4 Compression.	1

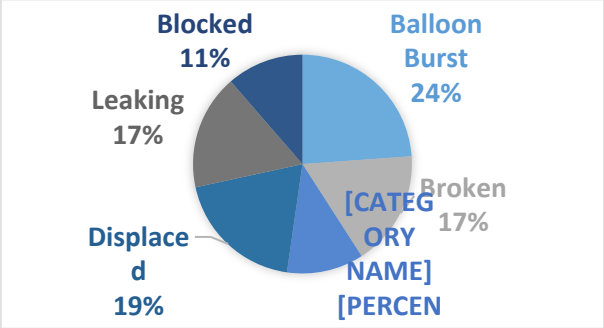


Table 2 illustrates the reasons for unplanned PEG-J change, indicating significant technical and functional problems. 91% of patients' symptoms improved with PEG-J insertion. Vomiting and reflux were the commonest indication for jejunal feeds. 66% of changes occurred as day case by using an agreed pathway.

Summary: Over a 7 years, the conversion of PEG to PEG-J has increased leading to substantial symptom improvement in over 90%. However, 65% of patients required semi-urgent PEG-J changes and majority were arranged as day case with a close collaboration between gastroenterology and radiology was pivotal to minimise the need for admission and length of stay.

Conclusion: In our experience, PEG-J is an effective feeding method in gastric feed intolerance patients. Although we find that frequent unplanned tube changes are required (with significant resource implications for interventional radiology), a pathway with clearly defined inter-departmental coordination leads to excellent patient care and can be managed in the majority as day case procedure.

Health Play Specialist Pathway in Children with Functional Constipation and Faecal Incontinence

Shea T, Health Play Specialist; Athanasakos E, Lead Paediatric Clinical Scientist; Dalton S, Clinical Nurse Specialist; McDowell Clinical Nurse Specialist S; Blakeley K, Clinical Paediatric Psychologist; Rawat D, Consultant Paediatric Gastroenterologist; Cleeve S, Consultant Paediatric Surgeon.

Introduction: Children with Functional Constipation (FC) and Faecal Incontinence (FI) have often had repeated and invasive treatments and clinical diagnostic tests. With potentially traumatic past medical procedures, awake high anorectal manometry (AHARM) can difficult in this patient group. There is no evidence documented of a pathway to identify, prepare and support these patients with AHARM.

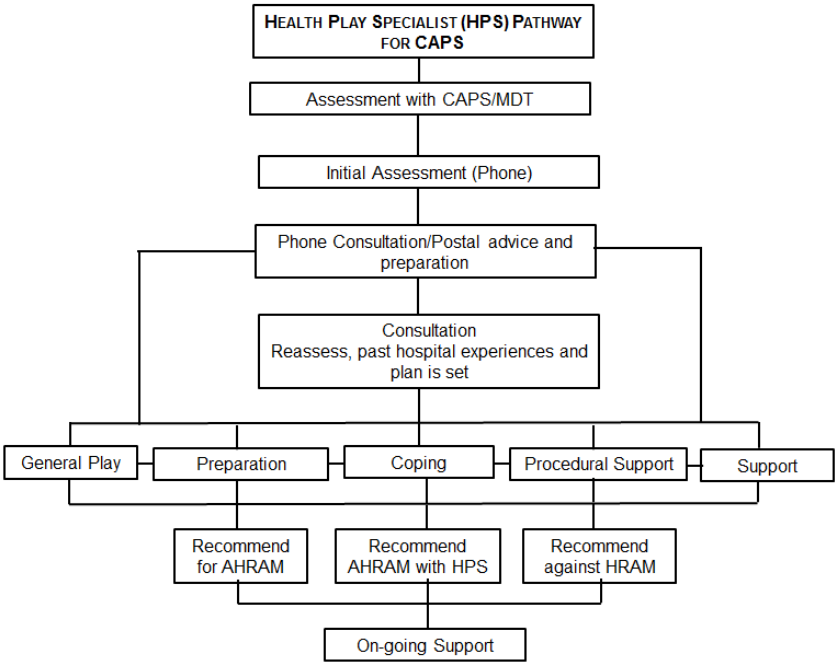
Aims and Objectives: Design a pathway for the therapeutic input provided by Health Play Specialists (HPS) in managing children with severe FC and FI requiring awake high resolution anorectal manometry (AHRAM).

Subjects and Methods: Development of a HPS pathway was established as part of the Children's Anorectal Physiology Service (CAPS) to undertake AHRAM. The service is part of specialist MDT, consisting 7 specialists: HPS, clinical psychologist, paediatric clinical scientist, clinical nurse specialists, paediatric gastroenterologist, paediatric surgeon and paediatric radiologist. The need for HPS input is assessed in clinic by a clinician +/- HPS.

Results:

Over a consecutive 9 month audit period, 70 patients were referred for AHRAM. 44 awake, 9 general anaesthetic (GA) and 13 were on the waiting list. Referrals were made to HPS based on need for further support before AHRAM was able to be booked. All patients referred were put on HPS pathway (Figure 1). HPS input was required in 24/70 (34%) of our patients. The median age of patients seen by HPS was 7 years (17 months to 14 years). HPS recommended 22 of the 24 (92%) patients for AHRAM from pathway results, of these patients 21/22 (95%) completed the test successfully and one withdrew before test began.

Summary: Figure 1: Health Play Specialist Pathway in Children with FC/FI



Conclusion: HPS support is shown to be crucial for identifying patients who need procedural support, preparation, coping and desensitisation play to aid in successful AHRAM and on-going support. Our findings suggest that HPS is an integral part of MDT and management in these children.

Home Stool Collection During IBD Treatment: Interim Results From An Observational Cohort Study

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Introduction: Achieving early remission is a key clinical priority following the diagnosis of inflammatory bowel disease. Identifying patients who are responding inadequately to first-line therapy as early as possible in the treatment course allows for timely treatment escalation. The utility of faecal calprotectin monitoring in this regard has not been established.

Methods: We are conducting a multi-centre prospective observational study looking at the dynamic of FC during the first 8 weeks after initiation of treatment for newly diagnosed inflammatory bowel disease. The objective is to provide normative data on FC during the early phase of treatment to determine whether early change in calprotectin might usefully guide management decisions. The primary pre-specified analysis is to determine the predictive value of change in FC from baseline to 2 weeks after treatment initiation on achievement of remission after 8 weeks. Participants collect stool specimens at home and post them (anonymised) to a central laboratory for processing. Clinical progress is monitored by fortnightly telephone review.

Interim Results: 33 children with newly-diagnosed IBD have been enrolled to the study, of a target population of 100. Overall, FC was elevated at baseline (pre-endoscopy median FC 1020 ug/g (inter-quartile range 364-1645) and fell during treatment (day 14 FC, 307 (96-750) $p=0.01$ (paired t-test compared to baseline); day 28 FC, 175 (32-501) $p<0.001$; day 42 FC, 80 (43-479) $p=0.001$; d56 FC, 167 (38-651) $p=0.001$). There was substantial heterogeneity in FC trajectories between participants.

Future Plans: Recruitment at four tertiary centres will continue through 2019 and full results are expected in early 2020.

Funding: Funded by a Crohn's & Colitis UK/BSPGHAN Start-Up Grant, and supported by the NIHR

Honest to GORD: an audit of how gastro-oesophageal reflux disease is managed in the paediatric outpatient setting.

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Introduction Gastro-oesophageal reflux disease (GORD) is a common condition, which can cause distress to both the child and their parents. Difficulty in distinguishing physiological from pathological reflux results in significant variation in how the condition is managed. In 2015, NICE published comprehensive guidelines for managing GORD in children. While previous audits have reported on adherence to these guidelines in the inpatient and A&E settings (Table 1), no published audits to date have focused on the outpatient setting, where most children with GORD are managed.

Table 1. Previous audits on the management of GORD in children

Audit	Setting	Guideline Used	Findings
Lant 2016	A&E	NICE	Feeding and growth not routinely reviewed Medication started without indication
Greig 2017	Inpatient	NICE	Good documentation of red flags Variable management of specific red flags (i.e. dysuria, projectile vomiting)

Aims and Objectives: This audit aimed to determine whether GORD in children is managed according to NICE guidelines in the general paediatric outpatient department of a large central London teaching hospital. Guideline adherence was considered under three headings: 1) history & examination, 2) diagnosis & investigation, and 3) treatment.

Subjects and Methods: Paper and electronic records were reviewed for 35 paediatric outpatients diagnosed with GORD in clinic between 2016 and 2018. Documented management was compared to the NICE NG1 guidelines and QS112 quality standards. Patients with GORD who were seen in clinic for reasons other than reflux symptoms were not included in this audit.

Results: The age of patients when first seen in clinic ranged from 2 weeks to 18 months. None had risk factors for GORD, such as neurodisability or current prematurity. Under history & examination, 42% of breast-fed, 40% of bottle-fed, and 29% of mixed-fed infants had a feeding history recorded. Documentation of red flags ranged from 97% for the child's general state, to 25% for the presence/absence of bile in vomits. Under diagnosis & investigation, 91% of children diagnosed with GORD met the NICE criteria, and none received inappropriate investigations. As for treatment, advice given to parents about conservative feeding changes was documented in 58% of cases. Ranitidine or omeprazole (i.e. acid-suppressing drugs) were also prescribed before a Gaviscon trial in 62% of infants not previously on medication.

Summary: GORD is diagnosed and investigated appropriately in this outpatient department. However, detailed feeding histories and the presence/absence of certain

red flags (e.g. bile in vomits) are not routinely recorded. There is room for better documentation of the advice given to parents, and in contrast to NG1 guidelines, acid-suppressing drugs are often prescribed before Gaviscon. The results are consistent with audits in other settings (Table 1), and support the likely benefit of a dedicated clinic for optimising GORD management in primary and secondary care.

Conclusion: In response to these findings, three simple interventions have been developed: 1) a 7-day feeding diary to be completed by parents to facilitate the feeding history, 2) a clinical pro-forma for red flag documentation, and 3) a leaflet to increase parental confidence with feeding changes at home. These interventions may be best implemented as part of a dedicated reflux clinic. Further studies could look into which factors, such as parental anxiety or individual clinician preferences, lead to the prescription of acid-suppressing drugs prior to Gaviscon.

How do Children Rate Awake Anorectal Physiology Compared to Routine Venepuncture?

Athanasakos E, Lead Paediatric Clinical Scientist; Shea T, Health Play Specialist; Dalton S, Clinical Nurse Specialist; McDowell Clinical Nurse Specialist S; Blakeley K, Clinical Paediatric Psychologist; Rawat D, Consultant Paediatric Gastroenterologist; Cleeve S, Consultant Paediatric Surgeon.

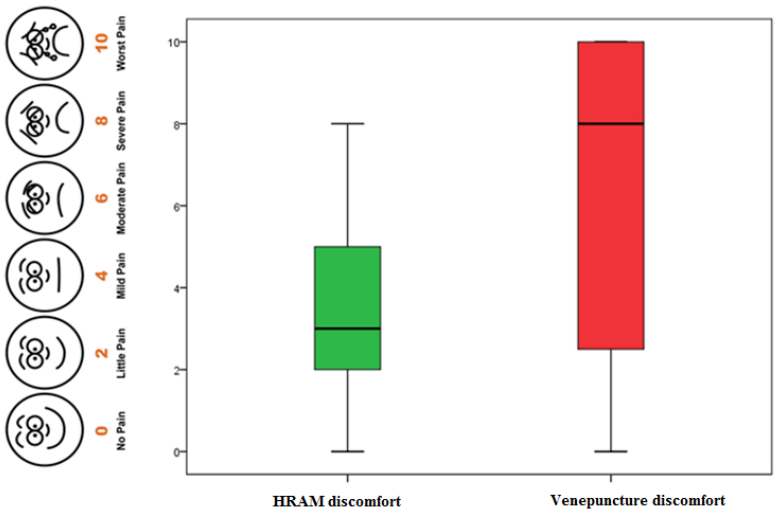
Introduction: Children with chronic conditions often have repeated and invasive investigations or treatments e.g. venepuncture (VP), lumbar puncture, videourodynamics or rectal medications. Clinicians must balance the discomfort of procedures with benefit. Performing awake high anorectal manometry (AHARM) can be perceived as challenging to undertake in children. There is sparse evidence documented regarding the tolerability of AHRAM in children.

Aims and Objectives: We aim to assess children's perception of discomfort when undergoing AHRAM compared to routine VP. All children had chronic constipation (CC) and faecal incontinence (FI) for more than 2 years and were discussed by a multidisciplinary team.

Subjects and Methods: As part of service evaluation of the Children's Anorectal Physiology Service (CAPS) over 6 months consecutive audit period, children with CC/FI undergoing AHRAM were asked to complete a questionnaire regarding their discomfort perception of AHRAM compared to routine VP, using a visual-analogue scale (VAS) [0 – no discomfort to 10 – maximum discomfort].

Results: The study comprised 18 patients, 11 females, median age of 11 years (range: 3-15). A play specialist enabled AARP in 22% (4/18). The median discomfort threshold for AHRAM was 3 (range: 0-6) compared to routine VP with a median of 8, (range: 3-15). AHRAM was demonstrated to have significantly lower discomfort threshold compared to routine VP ($r = .517$; $p = 0.02$) (Figure 1).

Summary: Figure 1: Level of Discomfort – Awake HRAM versus Venepuncture



Conclusion

This pilot study demonstrates that children report less discomfort from AHRAM compared to routine VP. AHRAM is a well-tolerated investigation in children. This information is useful in:

i) Planning/discussing investigations with children with CC/FI and their parents.
ii) Reassures clinicians that AHRAM does not subject children to undue discomfort.
iii) AHRAM avoids the risk, cost and time of general anaesthesia, as well as, providing additional physiological information (rectal sensitivity, squeeze pressure, endurance squeeze, push and cough reflex).

AHRAM is acceptable to children and it is reasonable to offer as an investigation in children with CC and FI.

In Children with Eosinophilic Oesophagitis, High Rates of Symptom Resolution do not Correspond with Endoscopic or Histological Improvement

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Introduction: Eosinophilic esophagitis (EoE) is a chronic, local immune-mediated condition characterized by symptoms relating to oesophageal dysfunction and histologically by eosinophil-predominant inflammation.

Aims and Objectives: We aim to describe symptomatic, endoscopic and histological response to treatment in children with EoE treated at a tertiary paediatric gastroenterology centre.

Subjects and Methods: Retrospective analysis of all children (age <18yrs) diagnosed with EoE from 1/1/12 to 6/1/17 with ≥1-year follow-up. Diagnosis was based on the presence of ≥15 eosinophils/high powered field (eos/hpf) in endoscopic oesophageal biopsies. Children with mucosal eosinophilia elsewhere in the gut were excluded. Histological review was carried out by an independent pathologist. Data was analysed using SPSS 21 (Armonk, NY, USA) and Prism 7 (San Diego, CA, USA). Significance was two-tailed and defined as $p<0.05$.

Results: Of the 25 children who met the criteria, the median (range) age at diagnosis was 5.8 (0.8 – 17.2) yrs with a mean [SD] symptom duration of 16.4 [13.1] months, and a mean [SD] eos/hpf count of 26.3 [14.4]. The commonest presenting symptoms were vomiting and abdominal pain. All patients received a PPI, 22 were prescribed dietary therapy, 16 topical steroids and 14 both concurrently.

Despite the above treatments, there was no significant difference between eos/hpf at diagnosis and follow-up endoscopies (mean 26.3 [14.4] versus 22.8 [18.5]). Overall, 17/25 (68%) still had an eos/hpf count of >15. Only 20% had macroscopically and histologically normal mucosa at follow up endoscopy. However, patients still experienced a high rate of symptomatic improvement, with 18 children denying any gut symptoms at latest follow-up. Even within this group there was no significant fall in eos/hpf count (mean [SD] 22.2 [12.0] versus 16.7 [16.5]). None of the children had a stricture at diagnosis or developed one during follow up.

Summary:

Despite a high rate of symptom improvement, in only a small minority did the eos/hpf count fall below the diagnostic level. Normalization of endoscopic appearance was also less common than has been reported elsewhere.

Conclusion: **I**t has been proposed that persistent eosinophilia leads to fibrotic tissue remodelling and disease progression. Longer term studies with larger cohorts are needed to confirm this hypothesis. Until then it will remain unclear whether more aggressive intervention is indicated in asymptomatic patients.

Incidence of paediatric eosinophilic oesophagitis in Bristol: a 10-year population-based study

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Introduction: Eosinophilic oesophagitis (EoE) is defined as a chronic, local immune-mediated oesophageal disease which presents with symptoms of oesophageal dysfunction and histologically with an eosinophil predominant inflammation (≥15 eosinophils per high power field). There is no published data on the incidence of EoE in children in the United Kingdom (UK).

Aims and Objectives: The aim of this study was to determine the incidence of EoE in the local paediatric population of Bristol, UK and define the patient characteristics.

Subjects and Methods: Endoscopy records from the department of paediatric gastroenterology in the Bristol Royal Hospital for Children were analysed to identify patients newly diagnosed with EoE from 1st July 2008 to 30th June 2018. On the basis that all children in the Bristol area would be referred to the Bristol Royal Hospital for Children and using population data of children less than 16 years of age for the Bristol area, an annual EoE incidence could be estimated. Patient characteristics, including age, gender, initial clinical presentation and atopic history were also examined.

Results: 26 patients who met the above criteria were included in the study. The median age of diagnosis was 8.4 years (range 9 months- 15.8 years, males 74.1%). The mean calculated incidence was 3.17 per 100,000 over the study period. The average incidence from July 1st 2008 to June 30th 2013 was 3.05 per 100,000 per year and from July 1st 2013 to June 30th 2018 was 3.30 per 100,000, showing a slight increase (p=0.32, 95% CI 0.78 to 1.08). The majority of patients (65.4%) presented with reflux, vomiting or regurgitation. Other common presentations were abdominal pain (42.3%) and heartburn (26.9%). Less common complaints were food refusal, loose stools, dysphagia, food impaction and failure to thrive. Of note, in 26.9% of the cases, EoE was an incidental finding. 50% of the patients had documented history of atopy (eczema, asthma or hay fever).

Summary: The incidence of paediatric EoE in Bristol, UK was 3.17 per 100,000 during the studied period.

There were three times as many males diagnosed with EoE compared to females. There was documented atopic history in half of the patients included in this study.

Conclusion: The incidence of paediatric EoE in a local UK population is comparable to that of paediatric inflammatory bowel disease internationally. This indicates that paediatric EoE carries a significant disease burden and highlights the need for standardised diagnostic and treatment approaches.

Introducing Gastro-CAP meeting: changing practice in a tertiary Paediatric Gastroenterology centre

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Introduction: In our practice in a tertiary paediatric gastroenterology centre we are encountering a number of children with complex needs and/or with unexplained symptoms requiring significant input but failing to progress. To address this, in 2016 we introduced a regular multi-disciplinary team (MDT) meeting which we called Gastro-CAP (**C**omplex care **A**nd **P**erplexing presentations) for all relevant professionals involved in each case, to share information and determine the direction of the management plan, in an effort to support, as effectively as possible, our patients and their families.

Aims and Objectives: To review our patient characteristics and outcomes of all patients brought to the Gastro-CAP meeting in our department.

Subjects and Methods: Electronic patient records including minutes from each meeting were reviewed from its introduction in March 2016, until October 2018. Reasons for referral, diagnoses, safeguarding concerns and/or social services involvement, and outcomes were examined. Feedback on the meeting process and function from the team members was also sought.

Results: 19 patients were discussed in the Gastro-CAP meeting in this time period. 10 (53%) had complex needs (CN) and 9 (47%) had mainly perplexing presentations (PP). The most common diagnosis was intestinal failure requiring home parenteral nutrition in 5 patients (26%, 3 of which in the PP group), followed by presumed multiple food mediated-reactions in 4 patients (21%, 3 from PP group), and restrictive feeding disorder in 2 patients (11%, both in CN group), whereas the remaining patients carried multiple GI and non-GI diagnoses.

There were safeguarding concerns and/or social services involvement in 11 cases (58%), 6 from CN group, 5 from PP group. In 5 children (26%) there was improved functioning or we are working towards optimal functioning as a result of our joint systematic approach (3 from CN group). 4 children (21%) were officially referred to social services (2 from each group), as an outcome of the meeting. 3 children (16%), all from the CN group, were signposted to relevant services to optimise support. One child (5%) was discharged with a clear decision for no further investigations (PP group). Overall, there was progress in the care of 13 patients (68%), whereas in 6 patients (32%) concerns remain (4 from PP group – 44% of PP group vs. 20% of CN group).

After some initial scepticism about the added value of yet another MDT meeting, the Gastro-CAP meeting is now well attended. Core team members have said they find it extremely helpful, especially in regards to safeguarding concerns, and that they feel supported and more confident in taking appropriate action where needed. Suggested improvements included the regular presence of a safeguarding nurse and social worker.

Summary: In more than two thirds of the children discussed, progress was achieved as a result of our joint approach. There were high rates of safeguarding concerns and/or social services involvement in both groups. Concerns remained in a higher proportion of the patients in the PP group compared to the CN group. The

Gastro-CAP meeting is well received by core team members as an effective means to support our patients and their families, as well as the staff involved.

Conclusion: The Gastro-CAP meetings have resulted in improvement of the quality of care for patients with complex needs and perplexing presentations. However, the need for additional resources was identified, including but not limited to safeguarding and social services representatives.

Investigating Coeliac Disease. Reviewing practice at a tertiary Paediatric Gastroenterology Centre and discussing the decision to Biopsy vs combined HLA DQ2/8 and IgA-EMA testing to confirm diagnosis in those with significantly raised IgA-TTG.

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Introduction: In 2013 BSPGHAN published guidance on the investigation of childhood Coeliac disease. This provided a framework on which to base practice. In those with an IgA-TTG >10x upper limit of normal, it provided two options for diagnostic confirmation with no preference suggested. One being duodenal biopsy; and the other, less invasive blood testing (combining IgA-EMA status and HLA DQ2/8 typing). We reviewed practice over a 6-month period in a tertiary paediatric gastroenterology centre to review adherence to BSPGHAN guidance and determine preference in relation to this.

Aims and Objectives: To review current practice within our institute in relation to the investigation of Coeliac disease.

To compare to BSPGHAN standards; identify short fallings and explore reasons for this.

To discuss choice of duodenal biopsy vs IgA-EMA and HLA DQ2/8 typing to confirm a diagnosis in those with IgA-TTG > 10x upper limit of normal and discuss the relative pros and cons of each.

Subjects and Methods: List compiled of all IgA-TTG's sent over a 6-month period in paediatric patients aged 0 to 16. Highlighted all those with positive IgA-TTG results (or IgG-TTG, if total IgA low). Reviewed whether those with a positive screen had further investigations as per guidance. Explored preference in relation to confirmatory testing and discussed rationale and implications of this.

Results: From July 2017 to January 2018, there were 695 IgA-TTG samples sent. 9% (65) of these were positive. 44 of those were <10x upper limit of normal, necessitating a duodenal biopsy. 93% (41) in this subgroup received their biopsy. Individual reasons for the three omissions were described.

21 patients were >10x upper limit of normal; 18 underwent duodenal biopsy; 18 had EMA testing and only 3 patients had HLA DQ2/8 typing (all these patients also had a biopsy and EMA testing). 3/21 (14%) of patients had neither biopsy or combined EMA/ HLA DQ2/8 typing and therefore did not meet this standard, specific reasons for these omissions were also described.

Summary: Our institution showed high percentage adherence to BSPGHAN guidelines. There was some room for improvement and in each case of non-adherence the reasons have been explored. In confirmatory testing for those with an IgA-TTG >10x upper limit of normal, where BSPGHAN guidance allows for clinician choice; our results showed a preference for Duodenal Biopsy with a notable underuse of HLA DQ2/8 typing. We discussed the implications of each approach as a department. For Duodenal biopsies, we considered the relative time and cost burdens

along with the invasive nature of the procedure. Additionally, we reviewed literature on the relative sensitivities and specificities of IgA-EMA and HLA typing comparatively to biopsy. Whether these factors merit a change in practice remains a source of ongoing debate within the department.

Conclusion: Timely diagnosis of Coeliac disease is important to maintain good health and development in affected children. In this study we demonstrated good overall adherence to BSPGHAN guidance. Where the guidance allows for clinician choice in relation to further investigation of patients with an IgA-TTG >10x upper limit of normal; we demonstrated a preference for Duodenal Biopsy. There are multiple factors to consider regarding this decision; we have explored these and advise taking a case by case approach and incorporating patient/family preference. We wait with interest to see whether future BSPGHAN guidance provides further clarity on this matter.

Is bowel lengthening a step towards enteral autonomy?

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Introduction: Bowel lengthening procedures (longitudinal intestinal lengthening and tailoring –LILT procedure and serial transverse enteroplasty procedure – STEP) are one of the treatment options for children with short bowel syndrome but precise indications, timing and outcomes are still the subject of debate.

Aims and Objectives: The aim of the study was to review our centre experience in terms of decreasing the proportion of Estimated Average Requirement (EAR) given by PN/nights on PN post-bowel lengthening surgery (LILT and STEP procedures).

Subjects and Methods: We collected data retrospectively from electronic and paper case notes of paediatric patients on home PN that underwent a bowel lengthening procedure over a 17 year period (2001-2018). The timing of different procedures was documented and we calculated the proportion of EAR delivered by PN/nights on PN pre-bowel lengthening, 1-year post procedure and at the present time.

Results: 10 children (7 males) with a median (range) age of 10.3 years (3.7 - 17) underwent a bowel lengthening procedure. They were born at a median (range) gestational age of 34+2 weeks (27.2 - 40). The cause for short bowel was gastroschisis in 7/10 with 1 case of NEC and 2 of bowel atresia. The median (range) initial bowel length was 17.5 cm (10 - 30); none had ICV or full colon although 9/10 had a partial colon. The PN was started at a median (range) of 2 days of of life (1 - 29). The general approach to bowel lengthening was to consider when further adaptation seemed unlikely and there was no progress with advancing enteral feeds (some patients were also symptomatic, e.g. abdominal pain, bloating). 3 patients underwent a LILT procedure (2 of whom also had later STEP), 9 underwent a first STEP procedure at a median (range) age of 2.6 years (0 - 11.5), 3 patients underwent a second STEP (1 had a LILT previously) and one patient underwent a third (duodenal) STEP at the age of 10.7 years. The median (range) bowel length pre first STEP was 27 cm (17 - 60), after the first procedure the median (range) was 55 cm (26 - 90) and for the ones who had a second procedure 108cm (85-125). Only one patient came off PN (6 months after a STEP procedure); his % EAR derived from PN before procedure was 80%, with 7 nights PN per week; however, before surgery he was off PN for a total of 14.7 months over 5 different periods between 2002 and 2006 and always restarted due to poor weight gain. One patient underwent a combined liver and small bowel transplant, one due to end stage liver disease and one patient had isolated small bowel transplant due to loss of venous access at 7 and 9.3 years of age respectively; both are off PN, one still on IV fluids. One patient died age 7 months from end stage liver disease having had a STEP aged 6 days and was on full PN at the time of death. The median (range) % EAR derived from PN before surgery was 82.8% (34%-105%; n=8), and the median (range) days of PN were 7days/week (2-7). 1 year post last procedure undertaken, the PN % EAR decreased to 48.8% (median of 3.5 nights/week; n=8) and currently the EAR given by PN (excluding the transplanted and death patient) is 42.5 % (4 nights/week; n=7). In

one patient the symptoms improved post lengthening but this was confounded by social issues.

Summary: Only 1/10 child who had bowel lengthening came off PN after surgery in our centre and he had good enteral tolerance at the time of surgery but could not grow when PN was stopped. The rest of the patients that are alive and have not undergone small bowel transplant (n=6) are still PN dependant although the % EAR from PN/nights on PN have slightly reduced. It is difficult to know if this was due to the surgery or further bowel adaptation.

Conclusion: The precise indications, benefits and long term complications of bowel lengthening procedures remain unclear. It is possible that only patients who are close to full enteral autonomy should be considered for this surgery

Liver abscess in a 9 year old child

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Introduction: Liver abscess (LA) is extremely uncommon in children, particularly in developed countries. Worldwide, 80% of LA are pyogenic in origin, while 20% are amoebic. LAs are associated with granulocyte dysfunction and congenital/ acquired immunodeficiencies. We report a rare case of LA in a 9 year old boy, with associated complete portal vein thrombosis, causing subsequent secondary haemophagocytic lymphohistiocytosis (HLH). While there have been case reports of secondary HLH in children caused by zoonotic disease and viral infections, ours appears to be the first in literature reporting secondary HLH caused by LA.

Aims and Objectives: To raise awareness of liver abscess being a potential diagnosis in children having prolonged pyrexia and the importance of continuous monitoring of a child whose fever is not responding to antibiotic therapy.

Subjects and Methods: A previously fit 9-year old child presents with 5-weeks of fever, weight loss, with 2-weeks of abdominal pain. There was no travel history. The child was pyrexic, pale and displayed right upper-quadrant tenderness, hepatosplenomegaly with no jaundice. Initial blood tests showed: Hb 62, MCV 68, WCC 20.8, CRP 232, GGT 90, ALT 41, Albumin 24, PT 18.2, INR 1.5. Abdominal ultrasound (USS) and computed tomography (CT) scan led to a diagnosis of a liver abscess and complete portal vein thrombosis. IV tazocin, metronidazole, gentamicin, and dalteparin anticoagulation were commenced. The LA was then aspirated via ultrasound guidance. However, the patient remained pyrexic, despite various combinations of vancomycin, fluconazole, meropenem, flucloxacillin, teicoplanin, and amphotericin B. He subsequently developed pancytopaenia. A bone marrow aspirate was then performed.

Results: Abdominal USS revealed an ill-defined hypodensity and portal vein thrombosis. CT-scan confirmed a liver abscess measuring 5cm x 3.5cm in Segment-VI. There was also complete portal vein thrombosis (PVT) with collateralisation, splenomegaly measuring 13x10cm with perfusion defects, and mesenteric lymphadenopathy, suggestive of possible malignant or subacute process leading to the development of the LA. Abscess fluid revealed Gram-positive cocci on microscopy but a negative report on final culture. Liver biopsy showed inflammatory changes. Blood cultures, done repeatedly, were negative. Thrombophilia screen returned negative. Bone marrow aspirate revealed secondary (HLH). The child then improved with commencement of dexamethasone chemotherapy. He remains under ongoing hepatology follow-up for his portal vein thrombosis.

Summary: This is a rare case of LA occurring in a previously fit 9 year old boy. The PVT with evidence of collateralisation seems to suggest that the LA was secondary to the PVT, however it cannot be ruled out that the aspirate culture was negative due to IV antibiotics being commenced prior to aspiration of abscess.

Conclusion: Having an index of suspicion for LA as a possible cause for prolonged or unexplained pyrexia helps prevent delays in diagnosis. Close vigilance of a child

not improving on antibiotic treatment is crucial, as it can help in early detection of potentially fatal conditions.

Longitudinal trace element (TE) levels in home parenteral nutrition (PN) paediatric patients over a 5-year period.

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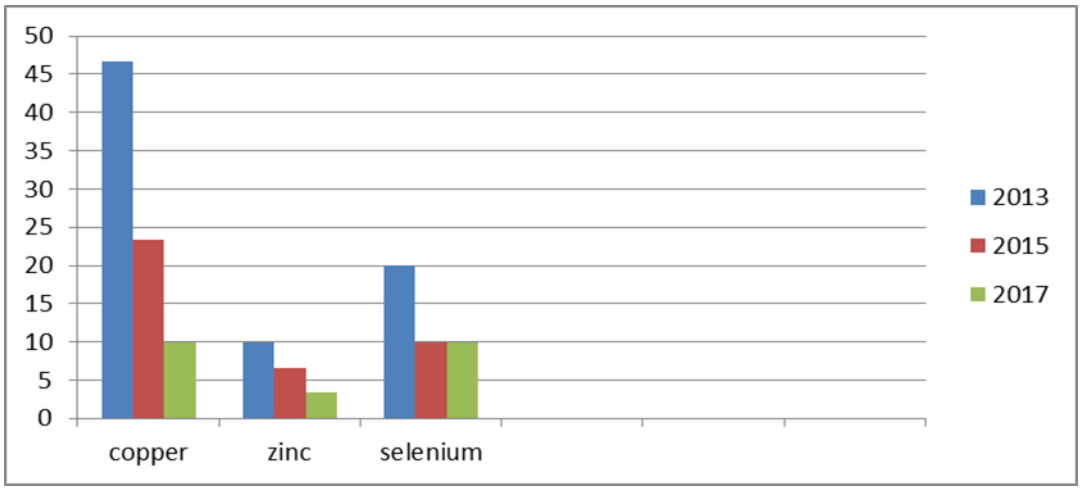
Introduction: Home PN patients depend on commercially prepared intravenous TE formulations and their follow up should include measuring levels

Aims and Objectives: Our aim was to analyse longitudinal changes in TE levels in our paediatric home PN cohort over a 5 year period.

Subjects and Methods: Retrospective review of children with intestinal failure (IF) established on home PN with peditrace supplement for at least 12 months prior to December 2013. TE levels were categorised as deficient (when the mean value in 6 months was > 10% below the normal range) or normal, based on the mean of levels obtained in 6 months. Patients were followed up after 2 and 5 years. Five children weaned off PN, 2 transitioned to adult care and 1 died (related to underlying disease). The study was approved as an audit. Two tailed Fisher's exact test was used to calculate p values.

Results: 30 patients (16 male) diagnosed with motility disorders in 12(40%), short bowel syndrome SBS in 7(23%), mucosal disorders in 11(37%).

Fourteen children were copper deficient in 2013(46.67%), 7(23.33%) in 2015 and 3(10%) in 2017 (p=0.0034, i.e. significantly less deficient cases in 2017 compared to 2013). Three cases were Zinc deficient in 2013, 2(6.66%) in 2015 and 1(3.33%) in 2017(p=0.299, not statistically significant). Six (20%) children were deficient in selenium in 2013 and 3(10%) in 2015 and 2017 (p=0.476 not statistically significant). Patients were asymptomatic.



% Prevalence of trace element deficiencies in long term home PN patients

Summary: Children with IF are at risk for different micronutrient deficiencies while receiving PN for a long time**.** We reviewed our home PN cohort to look for trace element deficiencies over a 5 year period and we found suboptimal levels were common initially, with incidence decreasing over a period of time due to regular monitoring and tailor-made prescriptions**.**

Conclusion:
Suboptimal TE levels were present in children with IF on home PN with incidence decreasing with time with significantly less cases of low copper levels with time. Our results emphasise the importance of routine surveillance of TEs and the need to prescribe home PN according to individual requirements**.**

Lysosomal acid lipase deficiency presenting as apparent GORD and failure to thrive

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Introduction: A female Asian infant first presented to paediatric services at just 13 days of old with the very common complaint of poor weight gain. At the age of 3.5 months, after 4 further attendances with worsening symptoms and new features she was diagnosed with severe lysosomal acid lipase deficiency, a rare autosomal recessive metabolic condition that results in abnormal deposition of cholesterol esters and triglycerides, and without treatment, multi-organ failure and death.

Case Summary: She initially presented at 13 days of age with poor weight gain despite adequate bottle feeding and vomiting 2-3 times per day, and was discharged home, but returned 2 weeks later with just an 80g weight gain. She was diagnosed with gastro-oesophageal reflux disease (GORD) and commenced on treatment. She returned a week later with a static weight despite adequate calorie intake (270ml/kg of formula).She was investigated for growth failure and an ultrasound (USS) performed due to maternal concerns of abdominal distension was also normal. She was discharged home on a high calorie milk. A week later despite taking 200kcal/kg she was losing weight and was therefore admitted. Her mother was felt to be a difficult historian and the infant a fussy eater. However she was found to have a metabolic acidosis (pH 7.28, bicarbonate 18) with a normal anion gap (9). She was also mildly hypokalaemic (3.1).

At this point renal tubular acidosis or chronic diarrhoea were considered as differential diagnoses as both can present with growth failure, normal anion gap acidosis and hypokalaemia. On further questioning, her grandmother reported intermittent watery loose stools, but no distension or perianal rash/excoriation. It was also learned that her mother had learning difficulties and had had a miscarriage previously, at which point metabolic disorders entered the differential. Stool electrolyte testing found a very high osmolar gap indicating osmotic diarrhoea. Stool chromatography was sent to rule out lactose intolerance or a monosaccharide transport defect and a focussed history taken to rule out laxative poisoning (due to the intermittent nature of the diarrhoea). Stool microscopy had found fat globules, but a faecal elastase and sweat test were normal. On a trial of (lactose-free) neocate her symptoms settled and she was discharged home, but did not attend medical follow up.

She next presented acutely unwell at 3.5 months of age with vomiting, lethargy and abdominal distension. She was anaemic (Hb 87), had a high CRP (139) with a normal white cell count and a transaminitis (ALT 152) without jaundice and with a normal albumin. She had a full septic screen and was commenced on broad-spectrum antibiotics, An abdominal x-ray showed thickened bowel wall and adrenal calcification, thought to be due to neonatal haemorrhage. Clinical examination the following day found hepatosplenomegaly which was confirmed on repeated USS, along with bilateral adrenal calcification. A white cell enzyme assay was sent the next working day which confirmed the diagnosis of LAL deficiency and she was transferred to a metabolic unit on a low fat diet, to commence enzyme replacement.

Learning points: When there is a history of faltering growth despite adequate calorie intake, particularly in the context of consanguinity and maternal miscarriages, a metabolic cause must be considered. Vomiting is a common presentation of a metabolic condition. It is very easy to label all vomiting as GORD but in the context of only a few daily vomits careful evaluation for other causes must be done.
Normal anion gap metabolic acidosis is due to bicarbonate loss from the kidneys or gut, caused by either a renal tubular acidosis or chronic diarrhoea. Both of these are potential causes for faltering growth.
Adrenal calcification with bowel thickening and hepatosplenomegaly is pathognomonic of the infantile presentation of LAL deficiency. Adrenal calcification is difficult to detect by USS beyond the neonatal period and was picked up on the abdominal x-ray.

Management of low profile balloon gastrojejunal feeding tubes in children: a single centre experience

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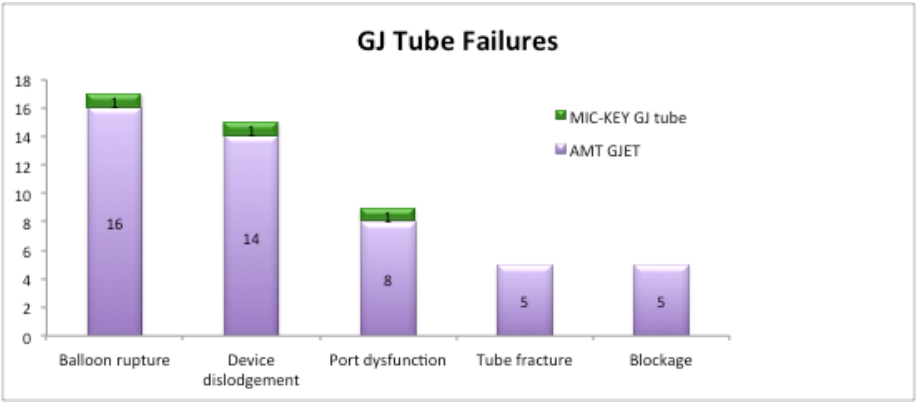
Introduction: There is a growing population of children and young people for whom we cannot maintain nutrition with gastric feeds. Trans-pyloric feeding may be beneficial for those with severe gastro-oesophageal reflux or intestinal dysmotility. Trans-pyloric access options include low profile balloon gastrojejunal (GJ) tubes that may be placed radiologically or endoscopically. GJ tube placement issues and device failures are well recognised.

Aims and Objectives: To review the management of low profile balloon GJ tubes in a large tertiary children's hospital in the UK over a 12-month period.

Subjects and Methods: A retrospective review of all children receiving a low profile balloon GJ tube (14Fr AMT G-JET® or 16Fr MIC-KEY GJ tube) placement from 01/2017 to 12/2017. Information obtained from medical records: trans-pyloric feeding indication; placement mode; placement issues; device longevity; device failure; discontinuation of GJ tube. Children with alternative devices were excluded. All children were established on trans-pyloric feeding prior to the study date.

Results: 125 GJ tube placements were performed in the population of 53 children, 31 male (58%). Age range 10 months - 18 years (median 4 years). 113 AMT G-JET and 12 MIC-KEY GJ tubes were used. 79% of devices were placed under fluoroscopic guidance and 25% of these children required sedation. The duration of device placement was 4 - 266 days (median 77 days). System of main diagnosis: neurodisability 53%, gastrointestinal 17%, cardiac 13%, renal 7%, respiratory 6%, autoimmune 4%. Indication for trans-pyloric feeding: gastro-oesophageal reflux 64%, intestinal dysmotility 28%, other 8%. Placement issues occurred in 9 procedures (4 children): 8 GJ tube dislodgements within 72 hours of placement, 1 small bowel perforation 48 hours following radiological placement.



51 GJ tubes failed (41%) with 24 of these failing within 3 months of placement (48% of GJ tube failures). GJ tubes were discontinued in 10 patients.

Summary and Conclusion: This study is one of the largest on the use of balloon GJ tubes in children in the UK. GJ tubes can be used to provide nutritional support for an increasing number of children with chronic illness or neurodisability. GJ tube provision is resource intensive, requiring trained clinician placement and support for troubleshooting device issues. Regular GJ tube replacement may reduce device failures by at least 52%, but may impact on long-term sustainability.

Mayo PSC Risk score: A prognostication tool for Biliary Atresia outcomes in adulthood.

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Introduction: Native liver survival (NLS) for Biliary Atresia (BA) into adulthood, has been reported as 14-44% worldwide. Complications in adulthood, including portal hypertension (PHT) and cholangitis are common, leading to liver transplantation (LT) rates of up to 25%. Prognostic data for young people (YP) with BA, entering adulthood with their native liver, is scarce. Model for End Stage Liver Disease (MELD) and UK End Stage Liver Disease (UKELD), are scoring systems, validated for evaluating chronic liver disease severity, and, organ allocation. The revised Mayo PSC risk score (MPSCrs) is a validated severity stratification model, developed specifically for Primary Sclerosing Cholangitis (PSC), which is a fibro-inflammatory biliary disease, like BA. Utility of these models in YP with BA, has not been investigated.

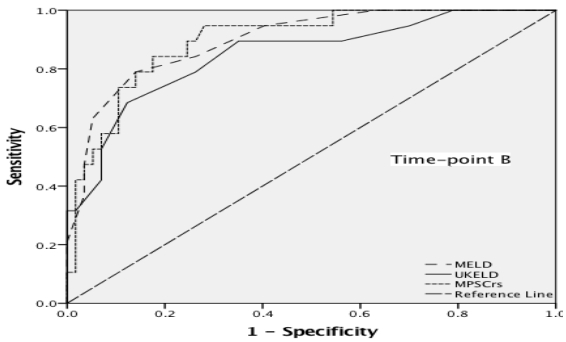
Aims and Objectives: To assess the utility of validated severity scoring models for chronic liver disease and PSC, in prognosticating subsequent LT, in 16-year BA native liver survivors.

Subject and Methods: Single-centre retrospective analysis of 397 patients, who underwent Kasai Portoenterostomy (KP) at our centre between 1980-96. Of this cohort, 111 (28%) had their native liver until at least 16 years of age. At latest follow up, 67 still had their native liver >16 years of age (Group 1) and 22 required LT >16 years of age, with the remainder being lost to follow up. Laboratory and clinical data was collected at time-point A (median ages 12.2 years) and time-point B (median age 16.06 years). MELD, UKELD and MPSCrs at time-point B, and, the change (delta) in the three 3 scores between time-points A and B were calculated.

Results: Univariate cox regression analysis revealed MELD (HR 1.73 $P<0.01$, UKELD (HR 1.62, $p<0.01$) and MPSCrs (HR 9.8, $p<0.01$), at time-point B, as significant risk factors for LT >16 years of age. Area under the receiver operator characteristic (AUROC) was ≥ 0.75 for MELD (0.9), UKELD (0.84) and MPSCrs (0.9) at time-point B (see graph). A cut-off for MPSCrs ≥ -0.87 at time-point B, revealed optimal predictive accuracy (85% sensitivity, 82% specificity) for LT>16 years of age. No specific cut-off values for MELD or UKELD, held optimal predictive accuracy (see table). Univariate cox regression analysis for delta MELD (HR 1.4, $p<0.09$) and MPSCrs (HR 5.6, $p<0.01$), but not UKELD (HR 1.07, $p=0.6$), are associated with increased risk for LT > 16 years of age.

Summary and Conclusions:

There is a potential role for validated chronic liver disease prognostic scoring models, to predict clinical outcomes in adolescent BA native liver survivors. Furthermore, MPSCrs, demonstrates superiority to MELD and UKELD in predicting outcomes, highlighting more relevant parameters in this biliary-specific disease model.



Scoring model	Cut--off	Sensitivity (%)	Specificity (%)
MELD	≥ 8.5	84	73
UKELD	≥ 47.5	79	73
MPSCrs	≥ -0.87	85	82

Microbiome data is a promising future biomarker for Paediatric IBD

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Introduction: The gut microbiome is a sensitive ecosystem which is altered in paediatric IBD. This dysbiosis may be a cause of IBD, or be secondary to mucosal inflammation. There is emerging evidence that microbiome data could be used as a biomarker for diagnosis, disease activity, or predicting clinical outcomes.

Aims and Objectives: This systematic review of studies reporting clinical applications of microbiome data aims to evaluate efficacy of current strategies and identify approaches which are most promising.

Subjects and Methods: A structured search of Medline, Biosis, and Pubmed Central was performed in June 2018. Included studies used gastrointestinal microbiome data to attempt diagnosis, measure disease activity, or predict a clinical outcome. Results were tabulated and subject to narrative analysis.

Results: Ten studies met inclusion criteria (Table 1), this comprised four case control studies and six prospective cohorts which ranged in size from ten to 445 patients. In all studies a machine learning approach was used to create a model for clinical application. Reported accuracy of the model ranged from 0.66 to 0.87 for diagnosis, 0.72 to 0.79 for disease activity, and 0.67 to 0.92 for predicting clinical outcome. All ten studies included patients with CD, four also included patients with UC. There is a trend towards lower accuracy in studies combining CD and UC data. Analysis was performed on stool samples in eight studies, mucosal biopsies in three studies, and mucosal washings in one study. There was no apparent difference in accuracy according to sample type. Eight studies used 16S sequence for phylogenetic classification, two performed shotgun metagenomic sequencing (MGS) and these reported the highest accuracies. Validation in an external cohort was attempted in five studies and successful in one (Papa et al, 2012).

Summary: Existing studies are heterogenous in design, sample choice, sample handling, and analysis. Reported accuracies are good, but most models do not perform well in external validation.

Conclusion: Microbiome data holds promise as a biomarker for paediatric IBD, however complex modelling will be required. At present performance is cohort specific. Defined best practice guidelines are required for sample collection, handling, analysis, and open-access data publication. This will promote study homogeneity and allow in-silico meta-analysis of data; facilitating creation of more robust and generalisable models for clinical application.

Study	n	Cohort	Application	Sample	Analysis	Accuracy (AUC)
Papa et al, 2012	67	Est IBD	Diagnosis	Stool	16S	IBD vs control: 0.83
Gevers et al 2014	445	New CD	Diagnosis	Both	16S	Stool: 0.66, Ileal M: 0.85
Lewis et al, 2015	86	Est CD	Diagnosis	Stool	MGS	CD vs control: 0.87
Wang et al, 2016	60	New CD	Diagnosis	Both	16S	Stool: 0.84, Ileal M: 0.81
Douglas et al 2018	20	New CD	Diagnosis	Biopsy	16S	CD vs control: 0.84
Papa et al, 2012	67	Est IBD	Activity	Stool	16S	High clinical activity: 0.72
Quince et al, 2015	23	CD EEN	Activity	Stool	16S	High Calprotectin: 0.79
Mottawea et al 2016	86	New IBD	Activity	M wash	16S	Severe disease: 0.74
Gevers et al 2014	305	New CD	Outcome	Biopsy	16S	Sustained response: 0.67
Kolho et al, 2015	62	Est IBD	Outcome	Stool	MA	Treatment failure: 0.85
Dunn et al, 2016	10	New CD	Outcome	Stool	16S	Sustained remission: 0.8
Shaw et al, 2018	17	New IBD	Outcome	Stool	16S	Response: 0.75
Douglas et al 2018	20	New CD	Outcome	Biopsy	MGS	Induction response: 0.92

Table 1: Key results from systematic review. Est = established diagnosis, EEN = patients starting exclusive enteral nutrition, M = mucosal, MA = phylogenetic microarray

Multicentre trials suggest HLA typing is not needed in symptomatic patients with high tTG. Is the alternative workable?

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Introduction: The multicentre proCeDE trial in 2017[1] suggested that HLA typing does not contribute to diagnosis of coeliac disease in symptomatic patients with tTG greater than 10 times normal and positive anti-endomyseal antibodies. We currently get anti-endomyseal antibody result in all samples with positive tTG, which in theory means we might diagnose on a single blood test. However we feel it is important to have two samples for confirmation of this lifelong diagnosis.

Aims and Objectives: To look at a cohort of symptomatic patients diagnosed via blood testing alone in our centre to confirm HLA was non-contributory. Then to look at whether our proposed alternative of repeating the tTG and / or antiendomyseal antibodies without doing HLA is a workable alternative.

Subjects and Methods: We reviewed 80 patients from our database from 2014 (all) 2015-2017 (some) and 2018 (all). We included only patients diagnosed on blood testing alone. The database records were incomplete for the intervening years hence not all patients included. We reviewed HLA status, along with tTG results. We then looked at all 25** patients diagnosed in 2018 by blood testing alone and reviewed the initial and repeat tTG and antiendomyseal antibody results. All of these patients still get HLA tested at present.

Results:

1) HLA typing results (79 pts from 2014-2018):-

DQ2.5 = 59 pts (74%), DQ8 = 5 pts (6%), DQ2.5 and DQ8 = 7 pts (9%), DQ 2.2 = 3 pts (4%) not found 6 (4 from 2018) = 7%

2) Results of repeat tTG testing from 2018 (our lab normal range is <4):-

1st tTG		**2nd tTG** One pt had no second recorded	
>128	**tTG under 128**	**>128**	**<128**
20pts	123,85,74,73,70	15pts	127,113,102,81,69,63,47 35 (endo +) 18 (endo +)

Interval 4 wks or less	Interval 5 -12 wks	Interval >12 wks	Interval unknown
7	11	4	2

Summary and Conclusions:

1) Our data confirm that in our centre HLA did not contribute to diagnosis of coeliac disease in symptomatic patients with high tTG and positive anti-endomyseal antibodies, as in all patients (where we could locate the HLA result) it was consistent with coeliac disease

Of note anti endomyseal antibodies were positive in all symptomatic children with tTG more than 10 times normal

2) Our alternative of tTG and / or anti-endomyseal antibodies repeated is a workable alternative which ensures each patient has two blood samples confirming this lifelong diagnosis. Only 2 patients had repeat tTG under 10 times normal and both of these had positive anti-endomyseal antibodies on repeat bloods.

3) If repeat tTG is less than 10 times normal, biopsy should be considered depending on anti-endomyseal antibody result and clinical situation

**up to Oct 2018 – rest will be added at end of year

[1]Accuracy in Diagnosis of Celiac Disease Without Biopsies in Clinical Practice; proCeDE study group; Gastroenterology 2017;153:924–935

Neurological syndrome in a child with short bowel syndrome (SBS)

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Introduction: Short bowel syndrome is the main cause of intestinal failure especially in children. D-lactic acidosis is a rare but distinctive complication that occurs in short bowel syndrome (SBS). The unabsorbed carbohydrates are fermented by colonic bacteria to form D-lactic acid among other organic acids. They usually present with altered mental status and high anion gap metabolic acidosis. We present a case of an eight-year-old girl with SBS who presented with recurrent episodes of D-lactic acidosis despite continuous cycling antibiotics treatment.

Case report: An eight-year girl with a complex gastroschisis underwent multiple bowel surgeries within few months of life eventually leading to 50 cm of small bowel, no ileo-caecal valve and lleo-colonic anastomosis. At 2.5 years of age she was described to have unsteady gait, ataxia, with episodes of vomiting and metabolic acidosis. In view of clinical suspicion of small intestinal bacterial overgrowth (SIBO), she was started on monthly antibiotic gut decontamination. She was fully weaned off PN at 4 years of age but demonstrated poor growth due to severe malabsorption. At 6 years of age she presented with ataxic gait, vomiting, feeling sleepy, miserable and slurred speech. An extensive evaluation was performed excluding hyperammonaemia, exocrine pancreatic insufficiency, diabetic ketoacidosis, vascular, brain parenchymal injury, ethylene glycol intoxication, and thiamine and cobalamin deficiency. A blood gas suggested metabolic acidosis (pH 7.17, PCo2 3.41, HCO3 11.6, BE -17.5, Lactate 1.6) with high anio
n gap of 45, D lactate of 10254 mmol/L confirming diagnosis of D lactic acidosis. D-lactate is normally undetectable, considered pathological levels above 3mmol/L. On each occasion she responded well within hours of IV fluid resuscitation, correction of the acidosis with sodium bicarbonate and carbohydrate restriction. Various treatment modalities ensued since with continuous, rotating antibiotic regimen, avoidance of "refined carbohydrates", and a trial of modular feeding with amino acid based protein including periods of discontinuing enteral feeds. She underwent surgical tapering of dilated bowel loops (STEPP) to help reduce stasis and overgrowth. The long-term management has been challenging and currently remains on 5 nights of home parenteral nutrition, with mixture of D-lactate free probiotics, prebiotics, rotating antibiotic regimen aiming to alter the bacterial flora on which she remains clinical asymptomatic with normal D lactate levels.

Conclusion: Consider D-lactic acidosis in a patient presenting with neurological symptoms with background of SBS. Small intestinal bacterial overgrowth (SIBO) is an independent negative factor for deteriorating adaptation of the small intestine in children after bowel resection. Rotating or continuous antibiotics has not been successful, resulting in use of other therapies. This case also demonstrates the complexity of management of SBS and its subsequent complications. The safety and efficacy of many treatment modalities have not been demonstrated clearly enough in clinical studies to recommend routine use.

NICE Guidelines for prolonged neonatal jaundice – Cross-sectional survey of investigations performed in the NHS hospitals in England

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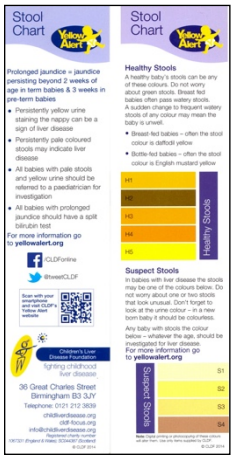
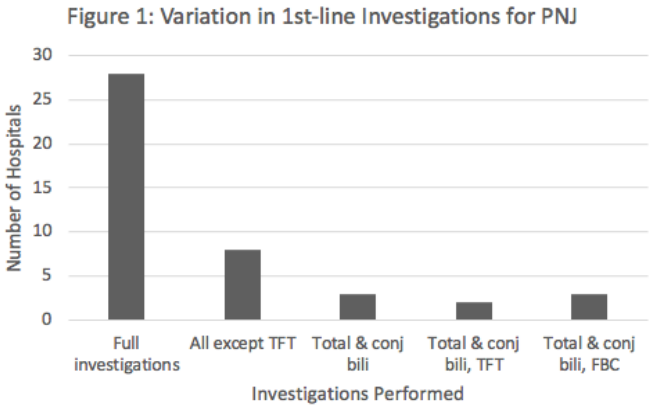
Introduction: In 2010, NICE published guidelines for managing jaundice in neonates. Prolonged neonatal jaundice [PNJ] defined as jaundice lasting >14 days (term) and >21 days (preterm) babies. It recommended an extensive set of investigations: conjugated bilirubin, FBC, blood group, Coombs' test, urine culture and ensuring that routine metabolic screening (e.g. congenital hypothyroidism) was performed. Literature review, local audit and anecdotal experience reveals that a large number of otherwise well breastfed babies [OWBB] get investigated with a significant number of neonates being recalled to repeat investigations for issues such as insufficient samples, borderline abnormal results, and contaminated urine samples.

Aims and Objectives: To explore how different hospitals in England are investigating PNJ as per NICE recommendations, to ascertain current practice and to facilitate better implementation/modification of the guidelines.

Subjects and Methods: Cross-sectional survey via telephone, emails or through available protocols [issued 2017 or later]. Data collected in an electronic database. Project was registered as an outcome audit with our hospital.

Results: 44/166 responses were available. 42/44 had a published trust protocol/guideline. 21/44 had a dedicated PNJ clinic, 9/44 used a stool colour chart in their assessment. 28/44 did full set of investigations [FBC, total & conjugated bilirubin, TFT, blood group & DAT]. Figure-1 highlights variation in investigations conducted for PNJ. 20/44 did urine culture as part of their first-line investigations. Some units included specialist liver investigations as their first-line: 6/44 G6PD screen, 5/44 full LFTs, 3/44 blood film, 2/44 GAL1PUT, 1/44 α-1 antitrypsin. 5/14 who didn't do TFTs would specifically ask for newborn blood spot screen results.





Summary: Survey showed that 63.6% of units are fully adhering to the NICE recommendations; others would ensure a total and conjugated bilirubin is done for consideration of biliary atresia.
Conclusion: Most units are adhering to the NICE guidelines. A large number of OWBB would get referred for PNJ and undergo extensive investigations possibly causing heightened parental anxiety and uncertainties. Simple tools such as stool colour card from the Children's Liver Disease Foundation can be very useful for objective assessment of stool colour. This may help in early detection of biliary atresia and let clinicians concentrate on targeted investigations, whilst at the same time help limit investigations in OWBB. There is need for consideration of modification in the NICE guidelines to reflect this.

Outcomes of children with borderline tTG in Hampshire

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Introduction: Measurement of serum tissue transglutaminase level (tTg) is the commonest serological test used in diagnosis of Coeliac disease with levels > 10 times upper limit of normal (ULN) highly predictive of coeliac disease. Management of children with non-specific gastrointestinal symptoms and raised tTG < 3ULN can be a clinical dilemma.

Aims and Objectives: To describe the outcome of investigations in children symptomatic of coeliac disease and tTg < 3 times ULN and identify predictors of positive diagnosis.

Subjects and Methods: Patients were identified from the laboratory database between September 2016-2018 with a raised tTG <3 ULN, under 16 years of age and not known to have coeliac disease. Retrospective review of the electronic patient records was performed to record demographic features, presenting symptoms, investigations performed and outcome.

Results: 23 patients were included of which 15 were females. All children presented with abdominal pain and associated symptoms included constipation (8), tiredness with iron deficiency anaemia (2), diarrhoea (1) and multiple food allergies (1). None had a positive family history of CD. The median tTG was 7.3 u/ml (ULN 4) with normal IgA. 4 Children underwent HLA testing HLA DQ 2 was positive in 2. All children underwent Anti EMA testing, it was positive in 10 children. 22/23 children underwent gastroscopy 10 had final diagnosis of CD and are better on a gluten free diet. Other diagnoses included constipation in 6, better on laxatives, Cow's milk protein allergy in 1, 4 children continue to have on-going symptoms and are being monitored.

	Patients with CD (N=10)	Patients without CD (N=13)	P value
tTG median (range)	7.3 u/ml (4.2-9.9)	6.2 u/ml (4.6-9.9)	0.06
EMA positive	6	4	
HLA DQ positive	2		

Summary: Abdominal pain was the predominant in symptom (100%), Coeliac disease was the final diagnosis in 10 children (43%), followed by constipation in 6 children (26%). Less than 50 % of symptomatic cases with abnormal tTG < 3 ULN had coeliac disease. Positive anti-endomyseal antibodies were not helpful in further identifying cases with CD.

Conclusion: Management of children with borderline tTG can at times be a clinical dilemma and there is paucity of evidence regarding the outcome in this sub-group of children. Serological, genetic testing and endoscopy may be required to evaluate these patients. In the absence of a final diagnosis continued monitoring will be required to manage these patients.

Paediatric BRBNS – Presentation with Refractory Iron Deficiency Anaemia and No Cutaneous Lesions: A Diagnostic Challenge

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Introduction: Blue rubber bleb nevus syndrome (BRBNS) is rare, particularly amongst the paediatric population.[1] Its' diagnosis is based on the presence of venous malformation in the skin and symptoms relating to their presence in visceral organ(s).[1,2,3] Gastrointestinal tract (GIT) is the most commonly affected location with presentation ranging from fatal haemorrhage to secondary iron deficiency anaemia (IDA), [2,3] with the latter being potentially the only symptom in some cases.[1]

Aims & Objectives: A 14 year old boy [63kg (75-91st centile), 172cm (50-75th centile)] presented with an 18 months history of refractory IDA, no cutaneous stigmata and via capsule endoscopy (CE) a solitary GIT vascular lesion was identified and together with histological findings; a diagnosis of BRBNS made. Owing to its rarity, our aim is to raise awareness of BRBNS, highlight the diagnostic challenge posed by the absence of skin lesions and emphasise the importance of performing CE.

Subjects & Methods: He initially presented to the local district hospital with an isolated presyncopal episode, haemodynamic instability and severe anaemia (Hb 4mg/dL, ferritin unmeasured); he received 4 red cells units, commenced on iron supplementation and tertiary gastroenterology referral made. Repeated investigations showed IDA (Hb 12g/dL, ferritin 11mg/dL), inflammatory markers (CRP, ESR, faecal calprotectin), platelets, coagulation, coeliac and thalassaemia screen were normal.

Results: Upper and lower endoscopy demonstrated no abnormalities but CE revealed an isolated congested vascular lesion within the small bowel with no active bleeding, see figure 1. It was not malleable to enteroscopy but resected via laparotomy with histology demonstrating transmural vascular malformation. There were no post-operative complications, at the 12 weeks follow-up IDA resolved and supplementation stopped. Haemoglobin has been monitored and remains stable.

Summary & Conclusion; To our knowledge there are no reported paediatric cases of BRBNS presenting solely with refractory IDA secondary to a solitary GIT lesion without any cutaneous manifestations. However, cases of BRBNS with multiple GIT malformations with no skin lesions are reported.[1,4] Children presenting with refractory IDA of unknown aetiology can be challenging; it is key to have a high index of suspicion of BRBNS and other rarer differentials to ensure they are not missed[2]; thus a thorough skin examination is paramount. The absence of cutaneous lesions in BRBNS poses a greater diagnostic difficulty which can result in delayed diagnosis[1], as seen here.

There is no gold standard imaging modality for investigating GIT lesions in BNBS. Non-invasive modalities have been reported to lack sensitivity[3] and endoscopy is most commonly used.[1,4] In our case endoscopy failed to detect the GIT lesion. CE is non-invasive, enables direct visualisation of the entire GIT, especially the small bowel, the main location of BRBNS malformations. CE is recommended in its diagnosis.[1,2] In accordance with other studies we suggest evaluation of refractory IDA requires a full endoscopic assessment include CE.[1]

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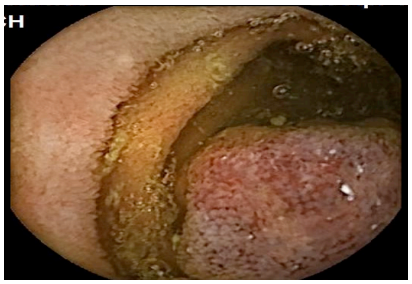
Figure 1: Capsule Endoscopy

Within the proximal third of small bowel transit time, proximal to the D-J junction a single, large broadbased sessile polyp occupying 75% of the bowel was seen.



Paediatric enteral feeding in the home: an analysis of patient safety incidents

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Introduction: Increasing numbers of children with severe chronic illnesses and neurodisability are surviving, many of whom are reliant on enteral feeding devices. Parents provide the day-to-day care for these children, with support from community healthcare professionals. Providing care at home has benefits for the child and for the family but also involves risk. Very little is known about patient safety in the home care setting.

Aims and Objectives: This study analyses patient safety incidents relating to care in the home for children with enteral feeding devices. The aim is to characterise the problems in care, the underlying causes and the impact on patient outcomes.

Subjects and Methods: We undertook an analysis of incident data relating to paediatric nasogastric, gastrostomy or jejunostomy feeding from England and Wales' National Reporting and Learning System (NRLS) between August 2012 and July 2017. The reports were filtered by location to identify incidents occurring at home (n=347). Manual screening by two authors identified 268 incidents which met the inclusion criteria. Each report was analysed using content analysis to identify the problems in the delivery of care, the contributory factors and the patient outcome.

Results: The most common problems were faulty and broken equipment (n=62), family members not receiving the required training or information (n=28), administration of incorrect feeds or feeding regimes (n=14), equipment not available (n=13) and inadequate handovers from hospital to community teams (n=13). Contributory factors included staffing pressures, similar names of feeds and the complexity of the child's condition. Of the 268 incidents, 52 (19%) involved a clearly stated harm to the child and 216 (81%) incidents involved potential harm. Common harms included hospital admission (n=17) and skin damage, pain or distress relating to the gastrostomy site (n=12).

Summary: This study uses existing data to document a range of safety concerns relating to feeding devices used at home. Further consideration needs to be given to the training and information needs of parents, the co-ordination of care between hospital and community services and the design and durability of equipment.

Conclusion: Children with enteral feeding devices are at risk of unsafe care. Incident data severely underestimates the scale of harm so this data represents only a tiny proportion of the total problems occurring in the community. Future studies ought to explore parents' perspectives on safety problems in the home.

Parenteral Support Volume and Calorie Requirements in Children With Short Bowel Syndrome–Associated Intestinal Failure (SBS–IF): Analysis of 2 Phase III Studies

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Introduction: Two phase III studies, TED-C13-003 (NCT01952080; EudraCT 2013-004588-30) and TED-C14-006 (NCT02682381; EudraCT 2015-002252-27), evaluated teduglutide treatment in children with SBS–IF (1–17 years) requiring parenteral support (PS).
Aims and Objectives: We report body weight-normalized PS volume and calorie requirements from both studies.
Subjects and Methods: The open-label TED-C13-003 study evaluated SBS–IF children who received standard of care (SOC) or 0.0125, 0.025, or 0.05mg/kg teduglutide once daily for 12 weeks. In TED-C14-006, the patient or their representative chose to receive SOC or teduglutide; patients were randomised in a double-blind fashion to receive teduglutide 0.025 or 0.05mg/kg once daily for 24 weeks. In both studies, PS volume and calorie requirements were body weight-normalised using mL/kg/day and kcal/kg/day calculations, respectively. Data for the end of treatment visit were summarised using descriptive statistics.
Results: 40/42 enrolled patients completed TED-C13-003 (0.0125mg/kg, n=7/8; 0.025mg/kg, n=14/14; 0.05mg/kg, n=14/15; SOC, n=5/5). All 59 enrolled patients completed TED-C14-006 (0.025mg/kg, n=24; 0.05mg/kg, n=26; SOC, n=9). At Week 12 of TED-C13-003, teduglutide was associated with decreased PS volume and calories in all teduglutide cohorts. In TED-C14-006, PS volume and calories were reduced with teduglutide at Week 12; effects were maintained at Week 24. These parameters changed minimally in the SOC cohorts (Table). The safety profile was favourable in both studies.
Summary: Both studies showed clinically meaningful reductions in PS volume and calorie requirements with teduglutide versus SOC.
Conclusion: Response to teduglutide was observed within 12 weeks of treatment initiation and maintained over 24 weeks.

Table. Percentage Change in PS Volume and Calorie Requirements

	Parameter*					
	PS volume, mL/kg/day†			PS calories, kcal/kg/day§		
	n; baseline, EOT	Baseline	% Change‡	n; baseline, EOT	Baseline	% Change‡
TED-C13-003 (12-week study)						
0.0125 mg/kg n=8	7,7	55.3±23.98	–12.1±21.51	8, 7	49.5±25.57	–14.0±25.33
0.025 mg/kg n=14	14,12	74.2±29.73	–41.4±26.61	14, 13	47.6±20.97	–35.6±39.58
0.05 mg/kg n=15	14,12	66.4±27.41	–42.3±33.15	15, 14	47.5±16.01	–37.0±53.80
SOC n=5	5, 4	79.6±15.22	5.1±11.43	5, 5	60.8±19.01	0.54±6.80
TED-C14-006 (24-week study)						
0.025 mg/kg n=24	20, 24	56.8±25.24	–36.2±30.65	24, 24	42.1±20.30	–34.3±32.65
0.05 mg/kg n=26	25, 26	60.1±29.19	–41.6±28.90	26, 26	42.3±15.83	–45.1±30.69
SOC n=9	9, 9	79.6±31.12	–10.2±13.59	9, 9	43.2±21.44	0.8±10.52

EOT=end of treatment

*Data are mean ± SD values; †Patient diary data (prescriber data was consistent with patient diary data); ‡From baseline to EOT; EOT was Week 12 for TED-C13-003 and Week 24 for TED-C14-006; §Prescribed data.

Paroxysmal head drops with ataxia like symptoms presenting as Sandifer syndrome in a three year old.

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Aims and Objectives: We report an interesting case of a three year old girl with a history of recurrent paroxysmal head drops associated with ataxia like symptoms and recurrent falls sustaining a clavicular fracture on one occasion.

Results: She was initially referred by local Paediatrician with suspicion of abnormal neurological movements similar to atypical seizures. She was seen by the Paediatric Neurologist and investigated for abnormal movements and drops. Physical examination, EEG, MRI brain, EMG single fibre study and blood tests including autoimmune screen, Creatine Kinase, coeliac, thyroid function tests, were all normal. The reason for these paroxysmal head drops remained elusive. With the history of hiccups and choking like episodes she was referred to the speech and language therapist (SALT). SALT assessment did not reveal indications of swallowing impairment or clinical indications of possible aspiration. A barium swallow later showed small amount of reflux into the distal oesophagus. This together with the history of previous reflux as a baby prompted a trial of Lansoprazole by Neurologist and she was referred to the Gastroenterologists. Endoscopy and oesophageal manometry were essentially normal with no evidence of hiatus hernia. However, the pH impedance study revealed severe gastro-oesophageal reflux disease (GORD) and frequent episodes of air swallowing. She continued with Lansoprazole and her symptoms resolved. Her symptoms return every time Lansoprazole is stopped .This was strongly suggestive of Sandifers' syndrome with abnormal movements mimicking seizure secondary to GORD.

Conclusion: Sandifer syndrome is not commonly associated with children beyond infancy. Older children with Sandifer syndrome are often misdiagnosed as seizures and initially referred to the neurologist. They undergo expensive and unnecessary investigations. We suggest that suspicion of Sandifer syndrome should be considered in patients presenting with atypical movements even in children beyond the infantile age group. Early diagnosis allows prompt treatment and relief of symptoms.

Radiological Management of a Complex Congenital Porto-Systemic Shunt

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Introduction: Congenital Porto-systemic Shunt (CPSS) is a rare venous vasculature abnormality that causes portal blood flow to bypass the liver directly to the systemic venous system. CPSS can be managed by surgical closure, interventional radiological methods, liver resection or liver transplant. We present a case of young girl with complex CPSS with managed by multiple interventional radiological procedures.

Case: An 8 year old girl presented at birth with cutaneous haemangiomata and congenital blue skin lesions. An ultrasound scan (USS) revealed an intrahepatic vascular abnormality and she remained under follow up by her local paediatricians. She was referred to our centre at 5 years of age due to persistent appearances on ultrasound scan. Magnetic resonance imaging (MRI) demonstrated 2 large focal nodular hyperplasia lesions (FNH), a large 5.2 X 4.3cm intrahepatic varix arising from the right branch of the portal vein (PV), a hypoplastic left PV and mild splenomegaly. She was clinically asymptomatic with normal serum ammonia levels. Development and school performance was normal.

Subsequent portal venography revealed complete shunting from the PV into the hepatic veins (HV) via a large intrahepatic shunt with minimal flow into the other intrahepatic portal venous branches. Occlusion of the lesion was not deemed feasible due to its size and lack of suitable occlusion devices. It was also anticipated that occlusion would lead to severe portal hypertension. A year later, a large mobile thrombus developed within the varix and she was placed on anti-coagulation therapy. A repeat venography detailed 3 large shunts arising from the PV connecting to a right hepatic venous aneurysm (the previously described varix). Thus a plan for staged closure of the shunts was made.

The first shunt was occluded with a 12mm Amplatzer vascular occluder (AVO).

3 months later the right lobe of the liver demonstrated intrahepatic portal vein radicles. A second shunt was therefore was occluded with 10mm AVO. Follow up USS showed a collateral flow around the recently placed AVO and low forward flow at left portal vein. 4 months later the remaining shunt was occlusion tested demonstrating only a minor increased in PV pressure to 13mmHg and thus was embolised. 6 months later, venography demonstrated adequate intrahepatic portal venous system development in both lobes of the liver. Occlusion test was performed and PV pressured remained at 10mmHg. The aneurysm was embolised with multiple coils by inserting a 32mm Penumbra caging coil to create scaffolding within and around the entry point into the IVC. The scaffold was then packed with multiple coils ranging from 32mm to 4mm in diameter. A total of 48 Penumbra and Concerto coils (approximate total combined length of 16metres) were used. Post embolization, the PV pressure remained stable. Warfarin was discontinued. Follow up USS reveals good left portal vein flow and no evidence of portal hypertension.

Conclusion: This case has demonstrated that careful, staged embolization of CPSS can allow intrahepatic portal venous systems to develop prior to final closure /occlusion of CPSS without the development of severe portal hypertension.

Rectal bleeding in children – predictors of organic pathology during endoscopic assessment: a regional cohort study.

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Introduction: Rectal bleeding in children is a common source of referral to paediatric gastroenterology services. In many centres long waiting times for both outpatient clinics and endoscopy lists mean these children may be triaged directly to colonoscopy based on this perceived 'red flag' symptom. However, the macroscopic and microscopic findings at colonoscopy are often normal.

Aims and Objectives: We aimed to identify potential predictors of pathology in children with rectal bleeding based on initial assessment and investigations.

Subjects and Methods: Retrospective chart and electronic medical record review of children <18yrs with rectal bleeding who underwent elective colonoscopy in a tertiary paediatric gastroenterology centre (serving a defined geographical region) between 01.01.2013 and 31.12.2017 was performed; patients were followed for a minimum of 10 months. Patients were excluded if they had a known organic cause of rectal bleeding, presented as an emergency requiring urgent endoscopy or if they had previously undergone colonoscopy for rectal bleeding. Patient demographics, history of presentation, examination, initial blood and stool investigations and final colonoscopy result were recorded. Statistical analysis was performed using SPSS software.

Results: 474 elective colonoscopies were performed over 5 years; 132 children met the inclusion criteria. Age range of patients was 2-17yrs (median 10.5; IQR 6.7-13.9) with 76/132 (58%) male. Overall 68/132 (51%) had pathology detected; inflammatory bowel disease 37/132 (28%), polyp 16/132 (12%), other (e.g. infective colitis, rectal prolapse, threadworms and non-specific colitis) 15/132 (11%). Symptoms predictive of pathology included bleeding duration ≤3 months (p=0.007), bleeding frequency at least once weekly (p=0.025), diarrhoea (p=0.008), nocturnal stooling (p=0.002) and weight loss (p=0.002). Initial blood tests predictive of pathology included abnormalities in haemoglobin (p=0.015), platelet count (p=0.006), ESR (p=0.032) and CRP (p=0.005). A reported history of constipation was the only predictor protective of pathology (p=0.007). Faecal calprotectin (FC) ≥200µg/g was the most useful predictor (OR 186, 95% CI 21-1635; p<0.001); PPV 97.7% and NPV 81.2%. This proved clearly superior to a full set of normal symptoms (PPV 62.11%, NPV 75.68%), blood tests (PPV 74.4%, NPV 56.8%) or both (PPV 64.1%, NPV 80.0%).

Summary & Conclusion: Rectal bleeding should not be considered a 'red flag' symptom in children, with almost half having no organic cause identified at colonoscopy. FC should be provided at the time of referral to assist triaging of patients. Those children with FC <200µg/g, without compelling clinical context (history, exam), should not be booked directly to colonoscopy and require initial outpatient assessment to further investigate other useful predictors of pathology based on symptoms and blood tests. This will allow time for reassurance, potential management of any underlying constipation and planned colonoscopy if clinically appropriate.

Renal tubular acidosis associated with Microvillus Inclusion Disease

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Introduction: Microvillous inclusion disease (MVID) is a congenital defect of the intestinal epithelial brush border leading to severe intractable diarrhoea of infancy. It is caused by mutations in MYO5B gene that encodes the molecular motor protein myosin Vb which is expressed in all epithelial tissues. Proximal renal tubular acidosis (pRTA) is caused by an impaired ability to reabsorb bicarbonate in the proximal tubule resulting in urinary bicarbonate wasting. Depending on the degree of epithelial dysfunction the reabsorption of other substances can be compromised (electrolytes, phosphate, urate, glucose and aminoacids); such a generalized defect is recognised as Fanconi Syndrome.

MVID and Fanconi have been reported to be associated, however, to establish whether the tubular epithelial cell dysfunction is primary (as in the intestine) or secondary to the chronic metabolic acidosis commonly caused by stool losses is challenging.

Aims and Objectives: The objective of our case report is to raise awareness of this severe extraintestinal manifestation seen in patients with MVID.

Subjects and Methods: We present the case of a female infant with MYO5B mutation (c. 3046C>T (p.Arg1016Ter)) diagnosed with pRTA at 13 months of age after investigation for persistent acidosis.

She was born at 36^{+2} weeks gestation in poor condition due to meconium aspiration, and required ventilation for 5 days. Genetic analysis for MYO5B mutation was sent on first day of life due to a family history (two siblings affected with MVID, both dead). She received formula feeds from birth but developed voluminous diarrhoea and metabolic acidosis by the end of the first week of life, following which parenteral nutrition was instituted. MVID was genetically confirmed; intestinal mucosal biopsy was not performed due to her clinical instability. Average intestinal fluid losses were initially estimated at around 100mL/kg/day requiring up to 200mL/kg/day of PN fluids. Liver dysfunction was present early in life with conjugated hyperbilirubinemia and raised transaminases, but corrected at around 9 months of age after fat restriction.

Results: Renal function has remained fairly stable however in early life a persistent high urea with a maximum peak of 20 mmol/L suggested a state of chronic hypovolaemia. An abdominal ultrasound (US) performed at 3 months of age showed renal calculi in the right kidney and one month later she passed some small stones with haematuria and decrease in urine output. At 6 months of age she was found to have moderate proteinuria (protein/creatinine ratio of 165.5 mg/mmol [0.1-13]) and also worsening metabolic acidosis requiring increased added acetate to PN (4mmol/kg/day) until aged 9 months when she was stable and discharged home (PN volume 250 mL/kg/day). At 12 months she was found to be severely acidotic (bicarbonate 13mmol/L) despite PN fluid volume now being 265 mL/kg/day**.** After

bladder catheterisation, stool losses were found to be 172 ml/kg/day. Renal assessment showed moderate proteinuria (predominantly tubular), generalised aminoaciduria and hypercalciuria, which in the context of persistent metabolic acidosis established the diagnosis of pRTA. Acetate intake was progressively increased in the PN to a maximum of 8mmol/kg/day allowing serum bicarbonate concentrations to remain within the normal range (≥20.0 mmol/L).

Summary: Persistent acidosis lead to the diagnosis of pRTA in a patient with MVID, adding to the challenges in management and possibly contributing to poor growth.

Conclusion: Studies have shown that MYO5B mutations exert divergent effects on the apical membrane system and structural polarity of kidney and intestinal epithelial cells[1]. The possibility of pRTA should therefore be considered in these patients and excluded or confirmed by appropriate investigations so that appropriate treatment can be given.

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Role and Identity Perceptions of Mothers Who Tube-Feed Their Child – an Interpretative Phenomenological Analysis

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Introduction: Mothers place great value on feeding their child. They view feeding as a nurturing experience, fundamental to their mothering role. Mothers' qualitative accounts indicate that uncertainty about tube-feeding arises due to concern that tube-feeding removes a sense of normality and reflects their failure as a mother. However, these accounts focus largely on the decision for a tube to be inserted. Gastrostomy and jejunostomy feeding can be a long-term solution for persistent feeding difficulties, with some children becoming dependent on tube-feeds, despite being deemed medically safe to feed orally. Mothers' long-term experiences of tube-feeding, particularly how they view their maternal role and identity in relation to these experiences, had not been investigated.

Aims and Objectives: The aim of this study was to understand mothers' long-term experiences of tube-feeding their chid. The study aimed to gain an understanding of how mothers' experiences relate to their maternal identity and perception of their maternal role.

Subjects and Methods: Interpretative Phenomenological Analysis (IPA) is an idiographic approach which utilises small samples to gain an in-depth account of individual experiences. One-to-one, semi-structured interviews were carried out with four mothers of children aged 1 to 7, who had been gastrostomy or jejunostomy fed for at least 6 months. Interviews were audio-recorded and transcribed verbatim. The data were analysed to make meaning of participants' experiences.

Results: Four superordinate themes were identified: (a) idealised perceptions of feeding (b) conceptualisations of tube-feeding (c) discrepancy between ideal maternal role and current role (d) finding meaning in maternal role. Mothers expressed mixed conceptualisations of tube-feeding – while it provides certainty of their child's nutrition, it lacks the interactive and instinctive benefits of feeding a child orally. Nevertheless, all mothers felt that tube-feeding had become a normalised part of their daily life. Some mothers expressed their desire for their current role to change, to meet their idealised perceptions of feeding. Other mothers were protected from this, seemingly due to their individual conceptualisations of tube-feeding. All mothers' accounts reflected a search for meaning in their current role.

Summary: This study discusses mothers' experiences of long-term tube-feeding and their perception of their maternal role in the context of these experiences. Some mothers may experience dissatisfaction in their role as their experiences do not meet their idealised perceptions of feeding. However, others are protected from this feeling, due to their experiences of feeding their other children, or because they did not develop expectations of motherhood before having their child.

Conclusion: Mothers who tube-feed their child may experience some dissatisfaction in their role as a mother due to the discrepancy between their idealised and their actual role in feeding their child. However, this appears to be contingent on factors

such as their conceptualisation of tube-feeding and the value placed on their idealised perceptions of feeding. Open discussions regarding how mothers feel in their role should be encouraged for those who tube-feed. This may involve encouraging mothers to discuss their expectations of motherhood and how their current experiences relate to these expectations. These discussions may help to identify whether mothers are experiencing some dissatisfaction in their role and whether they may benefit from support.

Scientific Solution to a Complex Problem: Physiology and Multidisciplinary team improve understanding and outcome in Chronic Constipation and Faecal Incontinence

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Introduction: Currently there is a lack of diagnostic credibility and scientific evidence to direct focused management for children with chronic constipation (CC) and faecal incontinence (FI). The Children's Anorectal Physiology service (CAPS) was set up to improve our scientific understanding and the way in which we manage these patients with CC/FI.

Aims and Objectives: To assess i) patient impact in using novel scientific investigations and specialist multidisciplinary team (MDT) to guide direct management and ii) the pathophysiological and psychosocial mechanisms involved in children with CC/FI.

Subjects and Methods: Prospective data was collected for all patients: demographics, diagnoses, questionnaires, investigations, symptoms, outcomes and satisfaction. Bowel assessments were undertaken (St Mark's Incontinence Score [SMIC], Cleveland Constipation Score [CCS]). Diagnostics: awake high resolution anorectal manometry (AHRAM), endoanal ultrasound and transit marker studies. Psychosocial assessment was also assessed. Referrals and management was discussed at the CAPS MDT.

Results: Audit consisted of 112 patients (112/137 (82%): 66 males (59%); median 9 years (17 months to 16 years). 89 (79%) patients had functional CC/FI, 9 (8%) Hirschsprungs disease, 12 (11%) anorectal malformation and 2 (2%) trauma. SMIC was abnormal in 91 (81%) and CCS in 101 (90%). All patients had high resolution anorectal manometry: 94 (84%) awake and 18 (17%) under anaesthesia (combined with surgical procedure). Health play specialist input was needed in 37 (33%) patients.

AHRAM was abnormal in 65 (58%) revealing multifactorial pathophysiological triggers. Risk of distress (using the Paediatric Index of Emotional Distress questionnaire) was found in 38% and poor quality of life in 55%. Abnormal bowel scores correlated with poor quality of life (p=0.02). Management was multimodal in 40% (toileting/medical modification, surgery, irrigation, biofeedback, intersphincteric botulinum toxin injection, psychological and neuromodulation). Patient/parent satisfaction with their management improved significantly (p= 0.05). Potential phenotypes have been postulated (Table 1) from these audit findings.

Summary: Table 1: Summary of Phenotypes

Phenotype	Normal Physiology	Abnormal Physiology	**TOTAL**
Normal Psychology	30%	33%	63%
Abnormal Psychology	14%	23%	37%
TOTAL	44%	56%	100%

BS
Ab

Conclusion: Scientific investigations combined with MDT improve management, patient satisfaction and reduces patient self-report illness severity. We are working towards novel phenotypes in childhood CC and FI. A complex problem requires a scientific solution.

Scurvy during home parenteral nutrition

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Introduction: Degradation of ascorbic acid due to oxygen presence in parenteral nutrition (PN) is well documented[1]. Although patients on home parenteral nutrition (HPN) are routinely monitored for some vitamin deficiencies, plasma vitamin C is rarely measured in this population.

Aims and Objectives: We report a case of clinical vitamin C deficiency in a patient with severe dysmotility for whom the only source of nutrition was parenteral nutrition with continuous infusion over 24 hours.

Subjects and Methods: A 6 years old girl with severe gastrointestinal dysmotility following a fundoplication tolerated no enteral feed and could not have time off PN due to hypoglycaemic episodes. She presented with gingival bleeding and epistaxis and also complaining of pain on her arms and shoulders. A clotting was requested which showed prolonged INR and she was treated with IV vitamin K. An x-ray of her wrist and shoulder showed osteopenia but no other abnormalities. Vitamin C measurement was requested**.**

Results: Plasma vitamin C was low at 3.5umol/L (26.1-84.6) which confirmed the diagnosis of scurvy. She was treated with 3 doses of Pabrinex® over 3 days (providing total of 450mg vitamin C). 100mg of ascorbic acid were also added to her PN, providing double the baseline amount. Plasma vitamin C measured after two weeks had risen to normal at 45umol/L. Her bleeding and pains resolved over a few days. During the next year plasma vitamin C was measured every three months and remained within reference range. She remained clinically well with no recurrence of bleeding.

Due to methodology limitations, the amount of vitamin C in the PN bag could not be tested. Therefore we decided to measure plasma vitamin C in two other patients that had PN as the only source of nutrition and given over 12h. In both cases the result was within the reference range at 58.7 and 38umol/L respectively.

Published literature[2] suggests that temperature contributes to vitamin C degradation. The PN fluid would have been at room temperature for around 24h for the patient that developed scurvy, compared to half this time in the other two.

Summary and conclusions: This case highlights that there is a significant risk of vitamin C degradation due to the oxygen present within the PN bag. However, the fact that for the other 2 patient's plasma vitamin C was normal suggests that presence of oxygen alone might not be enough to cause vitamin C insufficiency. Temperature might be a contributing factor to vitamin C degradation, as has been shown with enteral feed[3].

From these cases we concluded that measurement of vitamin C during HPN would be indicated not only if there were suggestive symptoms, but should also be added in to routine monitoring in any patient with a 24 h infusion time and extremely restricted enteral intake.

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Service innovation: New dietitian led cow's milk allergy and reflux specialist clinic

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Introduction: The demand for appointments for treatment for milk allergy (CMA) &/or reflux (GOR) is large. While babies with minor symptoms can be managed in primary care, still large numbers require secondary or tertiary care. Referrals were being received by the paediatric dietitians, consultant paediatricians and consultant gastroenterologists, accounting for 720 new appointments per year. Some babies were being sent appointments for the same condition in multiple clinics. As waiting lists increased, demand had increased in the children's emergency department. We decided to design a new clinic pathway in order to maximise resource and shorten waiting lists.

Aims and Objectives: To channel all secondary and tertiary referrals to one clinic for the dietitian to assess and triage to dietitian only, or combined with consultant (MDT) or consultant only/onward referral eg.allergy

This would have the effect of:

To maximise consultant and dietitian resource, to minimise appointments required and to release more clinic slots to consultants therefore generate more gastro contacts.

Subjects and Methods: Following business case submission and approval by the chief executive, extra dietetic funding was agreed. We redesigned a weekly gastro clinic to contain 2 dietitians and one consultant, thus double patients seen in a clinic (728 per year), with the intention that only those that need to be seen by a consultant (364 per year) would still attract an MDT tariff.

All babies with symptoms referred to secondary and tertiary care, which could be due to cow's milk allergy &/or reflux put in one clinic and initially seen and assessed by a highly skilled and experienced paediatric dietitian. A pathway was agreed with red flag criteria by dietitians and consultant gastroenterologists to indicate when a consultant may be needed, but where possible further management would be provided by dietetic service (dietitian tariff only).

Results: The waiting list has been reduced to dietitian and consultant clinics, and reduced appointments. Dietitians assess including SPTs where needed & aim to manage both CMA and GOR with dietetic management including milk free diet, earlier weaning for reflux, thickeners, changing feed volumes and frequency. If a dietitian only follow up is required, they are moved to another clinic.

Annually, 176 consultant slots have been freed. Consultants are involved in a maximum of 50% of cases, but time is minimised as dietitian has taken detailed history.

Summary: In summary, the new clinic model allows for consultant input where needed, but this is minimised, freeing up consultant slots for the additional cost of dietetic resource and creates a designated milk allergy pathway. In future, we aim to

further upskill the dietitians including a PGD for medications and abdominal assessment for constipation.

Conclusion: Dietitians are skilled at taking a history assessing for red flags and can be capable of channelling appropriate referrals to consultants. Otherwise capable of managing the large number of babies with cow's milk allergy &/or reflux referred for secondary and tertiary care, freeing up valuable consultant slots and saving cost. The clinic has become popular for teaching nurses, dietitians, medical students and registrars. Feedback by medical staff has been very positive. This clinic model has been used for a dietitian led coeliac clinic, and could be used for a nurse led constipation clinic and a nutrition clinic in the future

Single center experience with Budd-Chiari syndrome at Birmingham Children's Hospital.

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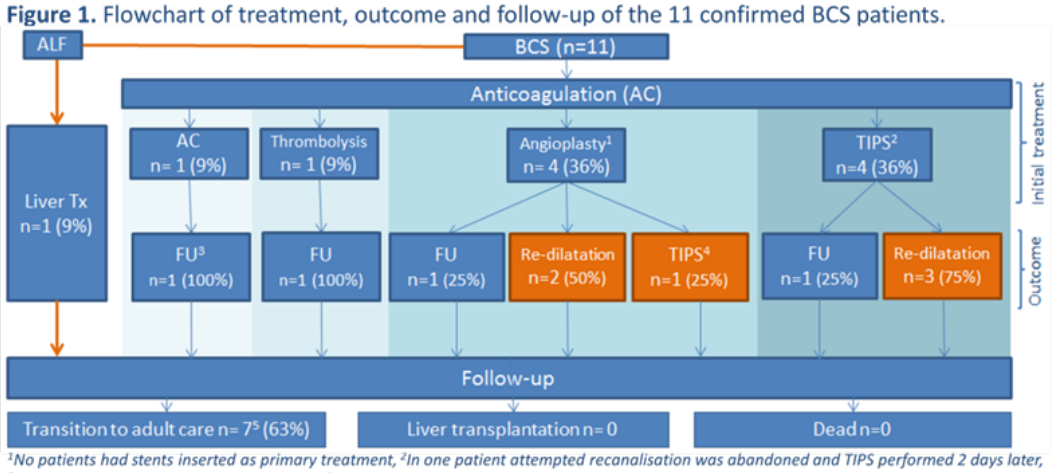
Introduction: Budd-Chiari Syndrome (BCS is more commonly seen in the Asian subcontinent and there are very few reports in the western literature. No long term studies regarding outcome are available.

Aims and Objectives: To review experience in diagnosis, management and the natural history of children with BCS at Birmingham Children's Hospital.

Subjects and Methods: Retrospective review of children aged 0-18 years diagnosed with BCS between 1996 and 2016. The diagnosis of BCS was made on the basis of occlusion of 2 or more hepatic veins (HV) or occlusion of HV with supra-hepatic inferior vena cava (IVC) occlusion by ultrasound and confirmed by CT angio/ hepatic venography. Data regarding their mode of presentation, signs and symptoms diagnosis, medical management and therapeutic interventions and follow-up outcome were analysed.

Results: 11 children (5M: 6F) were diagnosed with BCS over 20 year period. Median age at diagnosis was 10 years (range: 2-15 years). The most common symptom at presentation was abdominal distension (11/11; 100%) and hepatomegaly (11/11; 100%) followed by abdominal pain (10/11; 91%), splenomegaly (10/11; 91%), and refractory ascites (8/11; 73%). Other risk factors for dehydration such as vomiting and diarrhoea were not noted in this cohort. One child (12.5 years) presented 38 days after onset of symptoms with acute liver failure and underwent liver transplantation. Initial investigation with USS doppler was diagnostic of BCS in all cases but followed by CT angiography in four patients to visualise vascular anatomy prior to radiological intervention. The most common aetiology was positive thrombotic screen in 7 (64%) patients with protein C and S deficiency of which three patients also had Leiden factor V deficiency and one patient had antithrombin III deficiency. Myeloproliferative disorder was found in 1 patient including JAK-2 mutation. Five children (45%) had a block in all three HV and 4 children had obstruction in two of HV. In 2 patients (18%) supra-hepatic IVC thrombus was seen in conjunction with one hepatic vein. Treatment and outcome of the 11 children are shown in figure 1. All 11 patients are still alive with a median follow-up time of 13.8yrs (range 2.1-23.5 years).

Figure 1. Flowchart of treatment, outcome and follow-up of the 11 confirmed BCS patients.



[1]No patients had stents inserted as primary treatment, [2]In one patient attempted recanalisation was abandoned and TIPS performed 2 days later, [3]Developed portal hypertension and varices, [4]One patient had improved radiological appearance but no improvement in pressure measurements after balloon dilatation. TIPS was performed 28 days after angioplasty, [5]Three children still under paediatric follow-up, one patient lost to follow-up (moved outside UK).

Summary: In our experience BCS may present at any age from infancy to late childhood. Ultrasound Doppler was the mainstay of diagnosis although further radiological imaging and interventions are required in management. Anticoagulation was necessary in all patients but 9/10 patients needed to be augmented primarily by radiological intervention (TIPS/stents).

Conclusion: With precise medical management and early radiological intervention with TIPS/stents liver transplantation and surgical shunts can be avoided in most children with BCS.

Single Centre Experience of Congenital Portosystemic Shunts

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Introduction: Congenital portosystemic venous shunts (CPSS) are rare (incidence 1:30,000 births) abnormal venous connections between portal and systemic veins resulting in varying degrees of bypass of the liver.
Aims/Objectives: To analyse mode of presentation, anatomical description, co-morbidities and management of CPSS at our centre.
Methods: A records database search between August 2003 and June 2018 was performed. Data collected included demographics, radiological imaging, serum investigations, co-morbidity, management and outcome. Patients with complete imaging studies (including portal venography) were classified anatomically.
Results: 28 (M:12) patients were identified. Median age at diagnosis was 3.5 months (range 0-10 years). Mode of presentation was incidental finding on imaging with only one antenatal diagnosis. Associated co-morbidities were**:** focal nodular hyperplasia 9, congenital cardiac abnormality 9, other vascular abnormality 3, genetic abnormality 5, developmental delay 9 and learning difficulty (including Autism and Attention deficit Hyperactivity disorder) 6, pulmonary hypertension 2, polysplenia 2, accessory liver lobe 2, cutaneous haemangioma 2, benign premature adrenarche 2 and portal cavernoma 1.
Median serum ammonia (pre-treatment): 81iu/L (range 47-120). 10 patients had complete imaging for classification (table 1). 8 were treated up until data collection. Shunt closure was by radiological intervention in 5, surgical in 3. Spontaneous closure was observed in 6.
Summary/Conclusion: In our centre, children with CPSS present as incidental findings early in life. CPSS have significant associated co-morbidities. There are no complications recorded to date for our treated group. 1 patient reports improvement in developmental delay post closure of CPSS. There are currently 8 awaiting work-up completion for treatment planning. We recommend CPSS closure should be considered after careful MDT evaluation.

Shunt anatomy				
Location	# of Shunts	Connection	Origin vessels	Draining vessels
IH	1	ES	RPV	IVC
EH	1	SS	SMV/SV	LRV
IH	1	ES	PVB	RA
IH	3	ES	RPV	MHV
IH	1	ES	PV	IVC
IH	1	ES	LPV	IVC
IH	Multiple	SS	RPV	RHV/IVC
IH	1	ES	PV	IVC
EH	1	SS	SV/IMV	LRV
IH	1	ES	PV	IVC

Table 1: Shunt Anatomy. IH-intrahepatic, EH-extrahepatic, ES–end to side, SS–side to side,
PV-portal vein, RPV-right portal vein, LPV-left portal vein, PVB-portal vein bifurcation, SV-splenic vein, IMV-inferior mesenteric vein, SMV-superior mesenteric vein, IVC-inferior vena cava, MHV-middle hepatic vein, RHV-right hepatic vein, LRV-left renal vein, RA-right atrium

Sirolimus in paediatric liver transplant: a single center experience

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Introduction: Sirolimus (rapamycin) is a macrolide immunosuppressive agent. It suppresses the T-cell response to IL-2 by binding to and inhibiting the mechanistic target of rapamycin (mTOR). Sirolimus (SRL) has been used in children after solid organ transplantation.There are only a small number of studies on mTOR inhibitor – based maintenance immunosuppression in paediatric liver transplant recipients.
Aims and Objectives: To review indications, safety and efficacy of using SRL in liver transplant recipients in a single center.
Subjects and Methods: Retrospective review of medical records of paediatric liver transplant recipients, who were commenced on SRL between 2011 and 2018.
Results: 13 patients received SRL: 1 bile salt export pump (BSEP) disease recurrence (to increase immunosuppression), 2 chronic rejection [both needed retransplant, 1 then developed posttransplant lymphoproliferative disease (PTLD) so SRL recommenced], 1 hepatocellular carcinoma (HCC), 2 low GFR, 7 PTLD, 1 unknown (started in other centre). 9 patients remain on SRL, with mean follow up 31 months (8 months -7years), 6 of them with PTLD. SRL was discontinued in: 1 patient with BSEP disease recurrence, who developed Pneumocystis Carinii Pneumonia (PCP) at 3 months; 1 patient with pulmonary toxicity; 1 patient who required retransplant for chronic rejection and 1 patient had tumour recurrence who died. In PTLD group there was no disease recurrence. 1 patient had acute cellular rejection 2 months post starting SRL. 2 patients had septic episodes 1 month post starting SRL, caused by Citrobacter in one and E.coli, Raoutella mixed infection in the other. 1 patient had lymphadenitis within a month and recurrent ear infections later. 2 patients had mild hyperlipidaemia. Renal function stabilized in the 2 children with low GFR, however follow up was short,1y9m and 2y8m, respectively. There were no wound healing or vascular complications. Myelosuppression, rashes and mouth ulcers were not seen in patients on SRL.
Summary: The most common indication for starting SRL was PTLD. Renal function stabilized in patients with low GFR. The main complications noted were infections and mild hyperlipidaemia, which did not require any treatment. The majority of children tolerated SRL well.
Conclusion: Our data suggest that SRL has a role in selected paediatric liver transplant recipients but careful monitoring is required.

Soft Vs Normal Diet During Bowel Preparation Prior To Colonoscopy

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Introduction: Paediatric bowel preparation remains a challenge especially in children with neurodevelopmental comorbidities and the very young, where placing a dietary restriction, together with the preparation can be difficult. Effective bowel preparation is essential for optimal evaluation and maintaining safety. Bowel preparation protocols vary greatly with no standard practice. There is little to find in the Paediatric literature regarding the level of dietary restriction.

Aims and Objectives: To compare the effectiveness of bowel preparation between a soft dietary restriction, to no dietary restriction and to assess if placing any dietary restriction during bowel preparation had any effect on the ability to perform a complete paediatric colonoscopy safely.

Subjects and Methods: The study was completed over a 6 month period. At the early months of the study period patients were placed on no dietary restriction whilst taking their bowel preparation. During the latter months of the study patients were advised to restrict themselves to a soft diet. The bowel preparation was administered with a combination of Senna (used alone in those less than 1 year of age) and Picolax, with increasing doses based on the patient's age group. The endoscopist completed a proforma based on the Boston Bowel Preparation Scale at the time of Colonoscopy to assess bowel preparation, which assigns a score from 0 (Unprepared colon) to 3 (Entire mucosa of colon segment seen) for each segment of the Colon. A total score from 0-9 was then given. The endoscopists were blinded regarding the start date of the change in dietary advice. There were a total of 6 endoscopists performing Colonoscopies during the study period. Means were calculated from the scores and the total scores were compared between the two groups. The groups were also compared based on age group, extrapolated from the preparation dosing banding, (0-4, 5-6, 7-12, 13-16) and segments of bowel (Right, Transverse, Left). The results were analysed by performing two tailed T-Test ($p<0.05$).

Results: A total of 158 procedures were analysed with 79 procedures for each group. The mean age of the normal diet group was 11.7 years compared to 9.2 years for the soft diet group. Mean total scores were 5.45 (Normal diet) vs 6.56 (Soft diet) ($p=0.005$). The most common total score given in the normal diet group was 3 (18) followed by 6 (16) and then scores of 5 and 8 respectively with 13 each. This compares to the soft diet group where 51.8% achieved scores of 8 (14) and the maximum score of 9 (27). The next commonly occurring score was 6 (8). Mean scores were statistically significantly higher in the soft diet group for all segments of the colon compared to the normal diet group. The largest mean difference between the two groups was found in the right colon (1.65 vs 2.17) ($p=0.0009$). The only age group that demonstrated a statistically significant difference between the 2 groups was the 13-16 year group ($p=0.0009$). Both groups contained total scores of 0 with 2 in the normal diet group vs 5 in the soft diet group. The right colon was most likely to achieve a score of 0 in both groups. There were no reported complications in both groups.

Summary: The results suggest a soft diet does indeed improve bowel preparation, with the right side of the colon most affected. Numbers of completely unprepared bowel which limited Colonoscopy were small in both groups. The results do suggest that soft diet during bowel preparation has most effect in older children.
Conclusion: Based on these results a soft diet does improve bowel preparation for Colonoscopy and should be recommended to reduce likelihood of complications, repeat procedures and missed diagnoses. The results do question whether it is appropriate to place the same dietary restrictions in younger children in whom bowel preparation administration is most difficult.

Splenomegaly or bezoar?

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Introduction: Bezoars are masses of undigested/partially digested material found trapped in any part of the gastrointestinal tract, especially in the stomach. They can occur in all age groups, and often in patients with behavioural disorders, abnormal gastric emptying and altered gastro-intestinal anatomy. They can be symptomatic or asymptomatic. They appear as a mass lesion on imaging studies (x-ray, ultrasound, CT) that are often done consequently to evaluate the patient's upper GI symptoms or initial clinicians' findings.

Aims and Objectives: We therefore present two patient cases with initial suspicion of malignancy due to anaemia and associated left upper quadrant mass.

Subjects and Methods: The first patient is a 7-year-old girl with learning difficulties and behavioural issues including pica. The second patient is a 15-year-old girl with weight loss that was thought to be related to a psychological cause.

Results: - A 7-year-old patient was admitted to hospital with concerns over increasing pallor and acute abdominal pain. Her GP has requested blood tests prior to hospital referral, and she was found to be profoundly anaemic. On examination, she was clinically anaemic and had an epigastric/LUQ mass thought to be splenomegaly initially. CT abdomen revealed a very large epigastric mass extending from the stomach to the first part of the duodenum, with appearances consistent with a bezoar. Splenomegaly was also seen. She received a blood transfusion as her Hb was only 51 g/L, and was referred to the surgical team. The mass was removed via laparotomy due to the size on a semi-urgent basis. She continued on iron supplementation, and was referred to CAMHS for her behavioural issues.

- A 15-year-old patient was treated for iron deficiency anaemia over a few months prior to current presentation. This was thought to be secondary to menorrhagia, and her haemoglobin levels did improve on iron supplementation. However, her appetite remained poor. She did not have any features of gastro-intestinal obstruction. She underwent a routine physical examination by her paediatrician in a multi-disciplinary clinic where she was found to have an epigastric mass. Initially it was thought to be due to splenomegaly but ultrasound scan of her abdomen revealed a large air-filled region in the midline with areas of low echogenicity in the region of the stomach. An abdominal radiograph confirmed features in keeping with a bezoar. Surgical referral was made in view of the size of the bezoar, as it would not be feasible to remove via endoscopic means.

Summary: Both cases were initially thought to be malignancy-related on the grounds of significant anaemia and suspected splenomegaly. It transpired that the masses were due to bezoars.

Conclusion: Bezoars can present very differently on a spectrum of symptoms - abdominal pain and distension, nausea, vomiting, anorexia, and weight loss. Severe cases may result in ulceration, gastrointestinal bleeding and even perforation. Malignancy may be considered in the initial diagnosis. In both cases, hair consumption was a common feature in the history, resulting in trichobezoars. It is

therefore important to enquire about unusual eating habits or pica, especially in a young person with suspected psychiatric/ behavioural disorders.

The comparison of paediatric clinical features of Eosinophilic Oesophagitis between the Caucasian and the Non-Caucasian population

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Introduction: Eosinophilic Oesophagitis (EoE) is a chronic allergic inflammatory disease of the oesophagus. This disease can present in a variety of ways in different populations but there is little known about how this relates to its pathophysiology. By determining whether there are patterns of clinical features of EoE between ethnic groups, this may progress towards a better understanding of the disease process.
A PubMed search with the terms: Eosinophilic Oesophagitis, paediatric and ethnicity showed five papers that had been published on this topic. This is in contrast to a PubMed search excluding the term paediatric, which had a total of twenty-four papers published. This shows there is a need for more research in this area.
Aims and Objectives: To identify if there is a significant relationship between ethnicity and clinical presentation of EoE in order to determine whether there may be a causative factor that is responsible for these differences.
Subjects and Methods: A retrospective case study was conducted using clinical data collected from a district paediatric hospital. The information collected was from the patient's first clinical consultation prior to a diagnostic biopsy. This data was evaluated to compare the different presentations of patients who were diagnosed with EoE and then separated into two groups: Caucasian vs. Non-Caucasian. The groups were then analysed for any patterns in presentation and whether this was significant.
Results: Overall, 48 patients with EoE were included, of which 24 (50%) were Caucasian and 24 (50%) were Non-Caucasian. Of the Caucasian patients, 19 (79%) were male and 5 (21%) were female, with a mean (SD) age of diagnosis of 8 years [range, 1-16]. Of the Non-Caucasian patients, 15 (63%) were male and 9 (37%) were female, with a mean (SD) age of diagnosis of 6 years [range, 1-14]. The clinical presentations with significant differences were constipation (8% vs. 79%; P=0.03), reflux (20% vs. 12%; P=0.08) and poor appetite (0% vs. 6%; P=0.07).
Summary: The majority of patients diagnosed with this condition were male, however, there was an equal presence of EoE in both the Caucasian and Non-Caucasian population. This is in contrast to a similar study performed on adult patients, which showed EoE was more prevalent in the Caucasian population (82% vs 24%). A further study, which assesses a wider range of the population may depict a more accurate result.
Conclusion: There are some significant differences in clinical presentation of EoE in the Caucasian compared to the Non-Caucasian population. This may be a point of reference for clinicians to have a higher threshold for this disease in certain populations

The evidence for benefits of probiotics in preventing Necrotising Enterocolitis in Neonates

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Introduction: This literature review was proposed to explore effectiveness of probiotics in preventing necrotising enterocolitis (NEC), in neonates.
Aims and Objectives: The aim was to perform a detailed literature search to review the current evidence for effectiveness of probiotics for prevention of NEC in this age group, and provide a conclusion for their potential use in this area of clinical interest.
Subjects and Methods: Data was collected using the database Pubmed, which led to 518 studies. The key words used for the search were "neonates" and "prevention of NEC". The participants used included: extremely pre-term (<28 weeks), very pre-term (28 to 32 weeks) and pre-term (<37 weeks) and were of low birth weight (LBW) (<2499g) or very low birth weight (VLBW)(<1500g). Studies were selected based on the type of journal used, the different methods of data collection, such as RCT's and meta-analyses, as well as large sample sizes and the most updated information.
Results: The retrospective cohort studies and meta-analyses found that probiotics were safe and worked in NEC prevention in VLBW infants with one of the studies concluding a drop in NEC incidence from 3% to 1%. The RCT's also concluded a reduction for VLBW and pre-term infants with one study only commenting on the safety, with not enough data for a further conclusion. Multiple studies found the combination of Lactobacillus and Bifidobacterium to have brought the largest reduction in NEC. However, possible side effects of probiotics were briefly mentioned, such as bloating, infections and a rash.
Summary: Based on the above literature review, the results seem to favour probiotics, suggesting they may be effective in the prevention of NEC in neonates. However, further studies on the side effects of probiotics on neonates are required in order to facilitate their use in a clinical setting.
Conclusion: To conclude, the results seem to favour probiotics in their usage to prevent NEC in neonates, however this review comes with its limitations. Our review could not exclude information and selection bias, in retrospective studies. Further research is required on the types of mixtures and their harmful effects, as well as on extremely low birth weight infants to solidify its potential use in this patient group.

The parental experience of managing children and young people with dual diagnosis of Coeliac Disease & Type I diabetes Mellitus (T1DM) in day to day life: Implications for health-care professionals.

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Introduction: The underlying auto-immune pathology is the common link between these two chronic lifelong conditions that can affect patients simultaneously. The successful management requires significant lifestyle changes which could be difficult and challenging for both children and their families. The quality of care provided by health-care professionals could be inadequate unless there is a good understanding of the parental perspective & their expectations from the health services regarding the management of dual diagnosis.

Aims and Objectives: The study aims to explore the real-life experience and opinion of parents on health care delivery while managing children in day-to-day life following the dual diagnosis.

Subjects and Methods: Eight parents were interviewed by the author and co-author. The data was collected using written notes and audio recorder. The data was subsequently scrutinised using 'interpretative phenomenological analysis'. The parents of children diagnosed within the last two years were included in the study to reduce bias from more experienced parents. The interview was semi-structured, and parents were encouraged to share and discuss their experience in a focus group setting.

Results: The parents felt that self-management of coeliac disease was far more challenging compared to T1DM management in children with dual diagnosis. The parental anxiety was mainly related to the uncertainty of accidental recurrent gluten exposure from unidentified cross-contamination, its long-term nutritional impact & the risk of malignancy. The dietetic support for T1DM was perceived as more robust, practical and individualised compared to generic, fragmented and somewhat confusing advice in coeliac disease management. Most parents preferred face to face discussion over telephone or web-based educational resources. All parents reported some form of discrimination and social isolation for children with dual diagnosis. They anonymously felt that coeliac disease has more impact on social quality of life compared to T1DM. The high glycaemic index of many gluten-free foods, poor availability of gluten-free food in corner shops, lack of coeliac disease awareness in restaurant setting were additional challenges faced by the parents. Parents were confident in managing T1DM as they can control and manage hypoglycaemia, trained for carb-counting and calculate insulin dose depending on the diet. Loss of such 'controllability factor' in avoiding accidental gluten exposure was a major influencer causing parental dissatisfaction and stress in dealing with coeliac disease.

Additionally, the out of hours telephone-support for T1DM was reported by parents as invaluable in crisis management. Parents understand that complications for T1DM could be immediately life-threatening, but, interestingly they were more concerned about the uncertain complications of coeliac disease. The lack of 'transition clinic' for coeliac disease also caused parental concerns as such clinic was available for T1DM. Withdrawal of NHS funding for gluten-free diet through primary care was described as 'very harsh', 'discriminatory', 'unhelpful' and 'upsetting' by the parents since

currently available gluten-free food is non-subsidised and more expensive causing significant economic burden.

Summary & conclusion: Parents perceived that management of coeliac disease was more challenging compared to managing T1DM in children with dual diagnosis. The quality of support from health care professionals was better for T1DM compared to coeliac disease. The parental opinion & experience is important from the perspective of health care professionals to improve the quality of care and to redesign the service. The challenges highlighted by parents were lack of funding, lack of transitional care & less intensive support for coeliac disease besides more impact of the coeliac disease in the quality of life compared to T1DM. The need for improving the service delivery for coeliac disease compared to T1DM for patients with dual diagnosis was also highlighted in this study.

The role of small bowel imaging in the diagnosis of paediataric IBD.

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Aims: Inflammatory Bowel Disease (IBD) comprises Crohn Disease, Ulcerative Colitis and IBD-Unclassified (IBD-U). Reaching a diagnosis involves radiographic imaging. Children under 8 years usually undergo barium studies rather than magnetic resonance enterography (MRE) in older children. Here we evaluated the diagnostic workup of paediatric IBD patients to determine if small bowel imaging was performed as per guidelines in a timely manner.

Methods: A retrospective chart review was performed to determine if small bowel imaging was required and if so, when it was carried out. All paediatric patients participating in the DÓCHAS Study between January 2012 and January 2018 were eligible for inclusion. Exclusion criteria included control patients, patients yet without a formal diagnosis, and those with small bowel imaging prior to a formal diagnosis. The patients were then stratified based on patient age [≤8 years (G1) or >8 years (G2)] and diagnosis [UC (D1) or CD/IBD-U (D2)]. Descriptive statistics were used for the analysis.

Results: In total, 498 patients were eligible for inclusion. This audit identified that 12.5% (2/16) of children in G1 and 13.2% (36/272) of children in G2, required, but did not receive small bowel imaging. This equated in total to 13.2% (38/288) of paediatric IBD patients. Both age groups did not meet the desired timeframe of attaining small bowel imaging, within 1-2 months. In G1, the average 'time to barium' and 'time to MRE' was 3.5 months for each. In G2, the average 'time to barium' was 3.3 months and 'time to MRE' much longer at 7.2 months.

Conclusion: The findings from this national audit has elucidated gaps in the diagnostic work-up of paediatric patients with IBD. Of those requiring small bowel imaging, 13.2% were identified not to have received it. The mean time to attain small bowel imaging was 3.5 months for children ≤8 years and 5.3 for children >8 years. Better access and timely diagnostic imaging for children with IBD are necessary to bring improvements to diagnostic care for children with IBD.

Trans-Anal Irrigation is Useful in the Management of Secondary Chronic Constipation/Faecal Incontinence

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Introduction: Trans-anal irrigation (TAI) is a patient or care-giver led use of rectal irrigation systems for treatment of chronic constipation or faecal incontinence (CC/FI).

Aims and Objectives: To assess the utility of TAI in patients with secondary chronic constipation.

Subjects and Methods: A retrospective review of records of children/parents taught to perform TAI between 2006-2018. Data on demography, diagnosis, intervention and outcome were collected.

Results: We identified 111 children taught to use TAI. 80/111 children (76%) had idiopathic constipation (slow transit constipation or rectal evacuatory disorder (STC or RED)).

31/111 (24%) children had secondary constipation and 21 (68%) were male. Secondary causes were anorectal malformation (ARM, n= 16), hypermobility syndromes (HS, n=7), Hirschprung disease (HD, n=4), spina bifida (SB, n=3) and gastroschisis (GS, n=1).

Median(range)	ARM	HS	HD	SB	GS	Total
Number	16	7	4	3	1	31
Adoption	15/16	6/7	3/4	2/3	1	27/31
Transit study (STC/RED/ None)	3/3/10	5/2/0	1/2/1	1/0/2	0/1/0	10/8/13
Success	12/15	4/6	2/3	2/2	1	21/27
Age at adoption (years)	7.7 (3.7 -15.8)	14.3 (10.3-16.3)	9.8 (5.8-11.6)	11.6 (4.5-14.2)	14.8	10.3 (3.7-16.3)
Duration of use (	2.7 (0.6- 8.5)	1.8 (0.6-2.7)	1.8 (0- 7.6)	3(1.2-8.5)	4.7	1.2 (0-8.5)
Weaning	2	0	0	0	0	2
ACE stoma	0	0	1	1	0	2

Successful adoption was defined as continued use after one month of being taught TAI. The main reason for non-adoption was discomfort. 87% (27/31) patients successfully adopted TAI. Median age at adoption was 10.3 (3.7-16.3) years. Median duration of use until weaning or until present was 15 months (range 0-8.5 years). 78% (21/27) reported a good response (no soiling or occasional soiling only with regular emptying) to TAI. It was not anticipated that children with structural congenital anomalies would be weaned off TAI, however 2 children with ARM were successfully weaned off TAI after a median of 25 (3-102) months. Two children went on to have an antegrade continence enema (ACE) stoma.

Summary: TAI has minimal risks and avoids the complications of surgery. Adoption rates are high and subsequent success rates are high.

Conclusion: TAI may have utility in avoidance or delay of the ACE procedure. We recommend early consideration of TAI in patients with secondary constipation.

Use of transcutaneous bilirubinometer to determine the need for prolonged jaundice screen

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Introduction: Prolonged jaundice is defined by persistent jaundice beyond 14 days in babies born ≥ 37 weeks of gestation and 21 days in babies born < 37 weeks of gestation. There is no objective measurement if serum bilirubin blood test should be done in these babies. According to NICE guidelines[1] conjugated bilirubin of >25 micromoles/L and according to BSPGHAN guidelines [2] conjugated bilirubin > 25 micromoles/ L and/or >25% of total bilirubin could indicate serious liver disease. Some hospitals use transcutaneous bilirubin reading (TCBR) <100 micromoles/L as a guide not to perform serum bilirubin as it is unlikely to have significant jaundice.

Aims and Objectives: Use of TCBR as an objective measurement to determine whether serum bilirubin is required in babies presenting for the prolonged jaundice assessment.

1. To determine if TCBR of <100 micromoles/L could be safely used as a measurement not to perform serum bilirubin. The objective is to minimise investigation in babies that do not have clinically significant jaundice.

Subjects and Methods: Babies presenting to paediatric Day Assessment Unit (DAU) for prolonged jaundice assessment were identified. TCBR were taken from the chest of these babies and the highest of 3 readings were taken. Serum bilirubin were also done in accordance to the current trust guideline. A correlation is made between the TCBR and serum bilirubin level.

Results: A total of 52 babies were recruited for this study between August 2018 - November 2018. 48 babies were born ≥ 37 weeks gestation and 4 were born <37 weeks gestation. The age range of presentation was between day 14 to day 66. **TCBR <50 micromoles/L:** 17 babies were in this category. All of them had a serum bilirubin of <100 micromole/L except, one (5.8%) who had a TCBR of 2 micromoles/L and a serum bilirubin of 103 micromoles/L with conjugated bilirubin of 7 micromoles/L. **TCBR of 50-100 micromoles/L:** Out of 11 patients in this category, 7 (63.6%) babies had a serum bilirubin level >100 micromoles/L which is a significant result and hence we would like them to be included in the prolonged jaundice screen. **Conjugated bilirubin >25 micromoles/L:** Only one baby was in this category. This baby had a TCBR of 48 micromoles/L and serum bilirubin 66 micromoles/L with conjugated bilirubin of 31 micromoles/L. The repeat serum bilirubin was 8 micromoles/L with conjugated bilirubin of 5 micromoles/L. **Conjugated bilirubin >25% of total bilirubin:** 4 babies were in this category. Three of them had normal serum bilirubin on repeat tests and all were discharged. One child was discharged without a repeat test as the total bilirubin was very low. In our audit, we noted conjugated bilirubin of >25 micromoles/L and/or >25% occurred only in babies with TCBR <50 when serum bilirubin was <100 micromoles/L and the repeat tests were normal.

Summary and Conclusion: Children can be safely discharged if the TCBR is <50 micromoles/L and they are thriving well with normal colour stools and urine. We recommend serum bilirubin to be done if TCBR is >50 micromoles/L as it is likely to be significant.

[1.] National Institute for Health and Clinical Excellence. (2010). Jaundice in newborn babies under 28 days (CG99). Retrieved from http://www.nice.org.uk/guidance/cg98/chapter/Recommendations#care-of-babies-with-prolonged-jaundice

[2] British Society of Gastroenterology, Hepatology and Nutrition (BSPGHAN). (2016).Guideline for the investigation of Neonatal Conjugated Jaundice. Retrieved from https://bspghan.org.uk/sites/default/files/guidelines/2016_guideline_for_the_investigation_of_neonatal_conjugated_jaundice.pdf

Whole gut transit measurement using novel magnetic resonance imaging mini-capsules

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Introduction: Paediatric constipation is widespread and management can be difficult. Measuring the gastrointestinal transit time could help with early selection of therapy, but current tests to measure it have limitations or use ionizing radiation, making them undesirable, particularly for younger patients. We have previously developed and validated prototypes of magnetic resonance imaging (MRI) transit marker capsules, which detect differences in whole gut transit between constipation and health. Those prototypes are however quite large (20mmx7mm) and large indigestible objects may not travel normally through the gut.

Aims and Objectives: We aimed to develop an improved MRI alternative to the old x-ray radiopaque markers (ROM) methods to measure whole gut transit.

Subjects and Methods: Mini-capsules (Fig.1A) were manufactured by JEB Technologies (Suffolk, UK). They are small (8mm×4mm), made of inert plastic material and filled with an oil-in-water emulsion that can be imaged uniquely by exploiting common water and fat selective MRI. Young patients with constipation and healthy volunteers swallowed 24 mini-capsules for 3 consecutive days, for a total of 72 mini-capsules (a common X-ray ROM protocol). They were scanned on the 4th day using a 3.0 T MRI scanner.

Results: The new mini-capsules were easy to swallow and the protocol was accepted well by the volunteers. The mini-capsules were imaged successfully in the colon (Fig.1B-C).

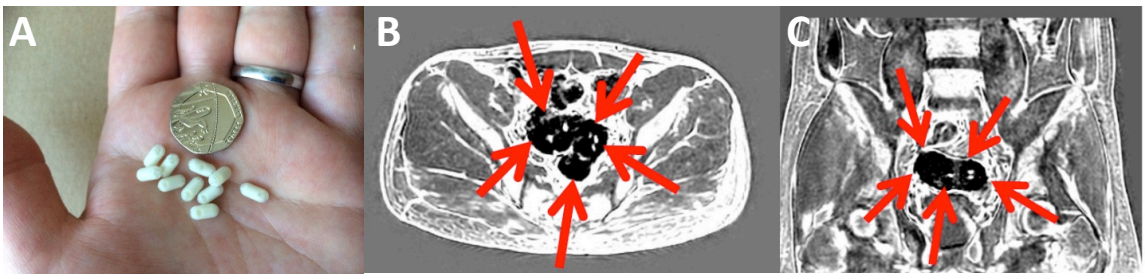

Figure 1: A) Example of mini-capsules; B-C) MRI images of the mini-capsules in the distal colon of a healthy volunteer.

Summary: The mini-capsules show promise as an improved method for measuring gastrointestinal transit without ionising radiation. Participants all found them easy to swallow, with the younger ones preferring to swallow with semi-liquids such as yoghurts.
Conclusion: We have developed new MRI mini-capsule markers that can overcome limitations of previous whole gut transit tests. They are particularly well suited for younger patients and their production can be scaled up industrially.

This work was funded by a NIHR i4i award. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR, or the Department of Health.

Alex Mowat Memorial Prize

The Alex Mowat Memorial Prize was established by his widow Ann and was presented at RCPCH Spring Meeting till 2008 when, with agreement with Ann, the prize was then presented at the BSPGHAN Annual Meeting.

Obituary from The Independent 21st November 1995

https://www.independent.co.uk/news/people/obituary-professor-alex-mowat-1583000.html

Alexander Parker Mowat, paediatrician, hepatologist: born Cullen, Banffshire 5 April 1935; Consultant Paediatrician and Paediatric Hepatologist, King's College Hospital, London 1970-95, Head, Department of Child Health, King's College Hospital 1993-95; Clinical Teacher, London University 1970-95; Professor of Paediatric Hepatology, London University 1990-95, Senior Examiner in Paediatrics 1993-95; married 1961 Ann Hunter (two sons); died Santiago, Chile 11 November 1995.

Alex Mowat had been Professor of Paediatric Hepatology at King's College Hospital, London, and his death represented a great loss to British paediatrics and to the many young patients he helped, both in Britain and throughout the world; he died while on a lecture tour in Chile.

Mowat was proud of his Scottish ancestry and his medical education in Aberdeen. The seeds of his brilliant academic career were sown during clinical appointments in the 1960s in Aberdeen, Hong Kong, and New York and matured in a research post in the Enzymology Department of the Rowett Research Institute, Aberdeen, and during a two-year Training Fellowship with Dr Irwin M. Arias in the Department of Medicine at the Albert Einstein College of Medicine, Yeshiva, New York. These posts gave Mowat an expertise in biochemistry, enzymology and hepatology which formed the basis of great clinical contributions to his chosen specialty of paediatric liver disease and in the care of children in general paediatric medicine. At the very early steps of his career, Alex Mowat met and married Ann Hunter, a continuous source of inspiration, support and love.

In 1970 Mowat was appointed to King's as Consultant Paediatrician and Paediatric Hepatologist, a post which was unique and a timely recognition of a completely new specialty. Although there had previously been no sustained academic interest in liver disorders in children in Britain, Mowat developed a first-class clinical unit for children who suffered with these rare conditions. The clinical work of the unit was backed up at all levels by research into causes and treatment; it needed staff from many disciplines and Mowat forged a team of hepatologists, paediatric and transplant surgeons, radiologists, pathologists, nurse specialists, dieticians and other specialists which had no equal at that time.

In 1986 the unit received official government recognition and funding, thus becoming the first supra-regional centre for the treatment of children with liver disorders from

all over Britain. The concentration of the children into one unit increased the knowledge and expertise in management and this was reflected in the improved results which formed the basis of more than 200 publications. Biliary atresia, portal hypertension and liver tumours were some of the conditions which were treated with results which were not surpassed in any centre in the world.

Mowat was supportive of the introduction of new techniques of treatment and this included the development of liver transplantation in children. His unit pioneered the development of auxiliary transplants and the successful introduction of the living-related programme - in which one of the parents gives part of their liver to be transplanted into the child - which has helped to ease the shortage of available organs in transplantation. Last year more than 560 children were admitted with life-threatening liver disorders and over 30 received liver transplants.

The international standing of the unit is remarkable and many of the research projects have been carried out in collaboration with university departments abroad. An example of the value of this work was the discovery of the key role of dietary copper in the causation of Indian Childhood cirrhosis, a finding which has led to the disappearance of the disease in parts of India in which this information has been made known.

The experience from King's was distilled by Mowat into his textbook Liver Disorders in Childhood (1979). The book reached its third edition in 1994 and is generally regarded as the reference book on the subject. Mowat has also been credited with raising the general awareness of his subject by introducing liver medicine into gastroenterological and general paediatric meetings. However his work was not restricted to the confines of the medical profession. In 1980 he encouraged parents of children attending the liver service at King's to develop an association which has become the Children's Liver Disease Foundation, a national charity. This organisation is dedicated to making the problems of children's liver disease more widely known, to improving outcome by funding research and to providing support for affected families. It has raised over pounds 3m.

Academic and clinical work produced other responsibilities for Mowat which he handled with skill. He was Head of the Academic Department of Child Health within the hospital and an examiner for London University and the Royal College of Physicians. He was also Honorary Consultant in Paediatrics to the Royal Air Force and Chairman of the Hospital Consultants' Committee.

Alex Mowat also had a full life outside his work. He loved his golf and taught many friends the art of whisky tasting.

Edward R. Howard and Giorgina Mieli-Vergani

Sean Devane Memorial

The Sean Devane Memorial Prize was established in 2008 with agreement from his widow to acknowledge Sean's contribution to the field of Gastroenterology and to BSPGHAN

In Memoriam Sean Devane, 1956–2008

Greenough, Anne

Journal of Pediatric Gastroenterology and Nutrition: August 2008 - Volume 47 - Issue 2 - p e1

Sean Devane was one of the last of a generation who had interests and expertise in a wide range of specialities. Although his main commitment was to the intensive care of babies on a tertiary neonatal intensive care unit, his other interests included paediatric gastroenterology, the education of medical students, and the administration and monitoring of postgraduate training. Sean's major contribution to the European Society for Paediatric Gastroenterology, Hepatology, and Nutrition was the Web site of the society that he managed and maintained to extremely high standards.

His thoughtful and intelligent advice and support were greatly appreciated by many aspiring paediatric consultants. Sean gained his medical training at the University of Dublin, where he obtained honours in 6 subjects, qualifying in 1980. Over the next 6 years he undertook house officer and senior house officer posts and obtained broad experience in a wide range of paediatrics in Ireland, before coming to the UK as a senior house officer at Cambridge University. He then undertook a research fellowship at the Institute of Child Health under Professor Dame June Lloyd and Dr Peter Milla, which led to his MD thesis. In 1989 he was appointed lecturer in Child Health at King's College School of Medicine and Dentistry at King's College Hospital, and in 1993 consultant to the tertiary neonatal intensive care unit (Frederic Still Ward) at King's College Hospital with a particular interest in developmental gastroenterology.

Sean's numerous strengths as a consultant included his abilities to relate to all levels of staff and provide efficient administrative structures to teaching and training programmes (where many others had failed), but above all, to bring calm and sense to troubled situations. Sean coped with his prolonged and painful illness with a bravery that humbled all of us. He is survived by his wife Stephanie and his 2 sons, Eoin and Aidan, his family, his many friends and colleagues, particularly on "Fred Still," and the babies and families whom he looked after.

Previous Prize winners

2008 Southampton

Alex Mowat Prize:	Dr Andrew Barclay
Best Abstract Presentation:	Ms Elaine Buchanan
Best Presentation:	Dr Sherina Ross

2009 Sheffield

Alex Mowat Prize:	Dr Johann van Limbergen
Sean Devane Memorial:	Dr Jenny Epstein
Best Allied Health Professional:	Ms Jackie Falconer

2010 Liverpool

Alex Mowat Prize:	Dr Emer Fitzpatrick
Sean Devane Memorial:	Dr Rachael Taylor
Best Poster Presentation:	Dr Paul Henderson

2011 Edinburgh

Alex Mowat Prize:	Dr Paul Henderson
Sean Devane Memorial:	Dr Emer Fitzpatrick
Best Poster Prize:	Ms Helen French

2012 Nottingham

Alex Mowat Prize:	Mark Goddard
Sean Devane Memorial:	Anna Gregory
Challenging Case:	L isa Whyte
Best Poster:	Ms Hannah Williamson

2013 Manchester

Alex Mowat Prize:	Dr Protima Amon
Sean Devane Memorial:	Dr Lisa Whyte
Best Poster Prize:	Dr Rana Bitar

2014 London

Alex Mowat Prize:	Dr Vandana Jain
Sean Devane Memorial:	Dr Ed Giles
Best Poster Prize:	Dr Bradley Keller

2015 Stratford upon Avon

Alex Mowat Prize:	Dr Mona Abdel-Hady
Sean Devane Memorial:	Dr Kelsey Jones
Best Poster Prize:	Sarah Macdonald and Katherine Fawbert
Best PICO Presentation:	Dr Huey Miin Lee

2016 Bristol

Alex Mowat Prize:	Dr Nicola Ruth
Sean Devane Memorial:	Y Koh
Best Poster Prize:	Martin Lister

2017 Glasgow

Alex Mowat Prize:	Dr Suzanne Davison
Sean Devane Memoria:	Dr Neil Chanchlani
Best Poster:	Chris Smith

2018 Leeds

Alex Mowat Prize:	David Wands
Sean Devane Memorial:	Natasha Burgess
Best Poster:	Dr Ozan Hanci

Dr Falk Pharma Award established in 2018

£200 voucher and free registration to one of their European Symposium, with registration, travel and accommodation expenses

Leeds 2018	Dr Sik Yong

[i]

Thank you to our Charities for their continued support in providing educational grants

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