Missouri for diarrheal illnesses per ICD-10 coding who had GPP testing within 48 hours of admission from 1/1/2017-6/30/2018. The GPP utilized was the BioFire FilmArray Gastrointestinal Panel which tests for twenty-two pathogens associated with gastroenteritis. **Results:** A total of 965 GPP panels were ordered in the interval we studied. 703 were females and 248 were men. The average age of females was 64 years and that of males was 61.4 years. 78.9% (n=762) of patients were Caucasian, 14.4% (n=110) were African American and the rest from other racial backgrounds. Of the GPP ordered, 556 (57.6%) tests had no organism identified. 17.69% (n=170) of tests identified Clostridium difficile toxin A/B identified, 6.24% (n=60) identified Norovirus and 5.31% (n=60) identified enteropathogenic E.coli. Of the positive tests these three organisms comprised 54.5% of identified pathogens. The average time before contact precautions were discontinued after negative testing was 64 hrs. The average time to discontinue antibiotics was 5 days after a negative GPP result. **Conclusion:** At our institution the gastrointestinal pathogen PCR panel has become the primary mode of identifying potential pathogens in acute diarrheal illnesses. Out of the 965 GPP run, just over half the tests performed were negative. Of the positive tests three out of twenty-two organisms tested for comprised over half of identified pathogens. Additionally there appeared to be no meaningful impact on infection control practices or in antimicrobial stewardship with practitioners averaging over 2 days to discontinue either contact precautions or antibiotics. While the gastrointestinal pathogen PCR panel is a convenient means to diagnosing patients with acute diarrheal illness, it has not shown to impact infection control or antimicrobial stewardship practices in the inpatient setting.

Tu1599

AQUAPORIN-5 EXPRESSION IS REDUCED IN LYMPHOCYTIC COLITIS
Yi T. Tong, Andrew Dupont, Brooks D. Cash, Atilla Ertan, Mamoun Younes

Introduction: Aquaporin-3 (AQP3) and Aquaporin-5 (AQP5) are members of a family of water channel proteins involved in the bidirectional transfer of water across cell membranes. They are expressed in epithelial cells of different types of normal tissue. Lymphocytic colitis (LC) and collagenous colitis (CC) are clinically similar diseases characterized by chronic watery diarrhea in patients with usually unremarkable colonic mucosa on colonoscopy. The aim of this study was to determine whether AQP3 and AQP5 expression in colonic epithelium is altered in LC and CC. **Methods:** Sections of formalin fixed and paraffin embedded colorectal biopsies from three control patients (CTL), 8 patients with chronic non-bloody diarrhea with biopsies negative for active inflammation or significant distortion (CTL-D), 8 patients with LC and 5 with CC were stained for AQP3 and AQP5 using immunohistochemistry. The staining intensity was scored as 3 (strong), 2 (intermediate), 1 (weak) or 0 (no staining). Statistical analysis was performed using Prism 7 Statistical Software. **Results:** AQP3 was not expressed in the colorectal epithelium, but on mononuclear cells in the lamina propria. By contrast, AQP5 was strongly (score 3) expressed in the epithelial cells in all three CTL cases. All 8 CTL-D cases also showed strong (score 3) AQP5 expression. In the 5 cases of CC, 3 (60%) had score 3 and 2 (40%) had score 2 but none had a score of 1 or 0. Of the 8 LC cases, 2 (25%) had score 3, 3 had a score 2 (37.5%), and 3 has score 1 (37.5%)(p = 0.0031). In the three cases of LC with markedly reduced AQP5 (score 1), enteric steroid treatment did not lead to significant improvement in diarrhea. **Conclusions** Colorectal AQP5 expression is reduced in most cases of LC. It is also reduced in some cases of CC, but not in biopsies from control subjects with diarrhea. Markedly reduced (score 1) AQP5 expression in LC may identify a subset of patients with suboptimal response to enteric steroid treatment. Additional larger studies are needed to confirm these findings.

Tu1600

AIR OR CARBON DIOXIDE INSUFFLATION IN UPPER ENDOSCOPIES AND THE YIELD OF QUANTITATIVE SMALL BOWEL ASPIRATE CULTURES
Melis G. Celdir, Amanda K. Cartee, John League, Joseph A. Murray

Introduction: Culture of anaerobic and aerobic bacteria in aspirates obtained during esophagogastroduodenoscopy (EGD) procedures is considered the gold standard for diagnosing small intestinal bacterial overgrowth (SIBO). Oxygen sensitivity of luminal anaerobic species mandates prompt and careful specimen handling during endoscopies for accurate colony growth. Increasingly more procedures are performed with carbon dioxide (CO2) insufflation as it has been shown to be associated with increased patient comfort, particularly in colonoscopies. At our institution, some endoscopy rooms use exclusively air or CO2. We aim to determine if air insufflation decreases the quantitative anaerobic culture yield. **Methods**: We performed a retrospective review of all patients who underwent EGDs with small bowel aspiration at our institution from January 1, 2017 through December 31, 2017. Since bowel preparation could induce transient changes in bowel microbiota, patients who exclusively underwent EGDs were included. Small bowel aspirations for bacteriologic culture were collected and cultured according to our laboratory protocol. We reviewed demographic data, comorbidities and indications for aspirate culture. Positive anaerobic culture was defined as bacterial growth of more than 10^5 CFU/mL in anaerobic growth conditions. Logistic regression adjusting for age was used to assess the association of the type of insufflation gas on culture positivity. **Results:** 171 and 213 EGDs using air and CO2 insufflation respectively were included. Demographics and comorbidities in air and CO2 groups were similar except for age. The most common indications for aspirate culture were diarrhea, abdominal pain, constipation, bloating, fatigue and weight loss, or they were requested as part of the evaluation of a gastrointestinal condition such as inflammatory bowel or celiac disease. Positivity rate of anaerobic cultures was 45.7% (84/184) in air and 33.7% (173/514) in CO2 groups (adjusted OR=1.37 CI: 0.89-2.11 p=0.146). Rates of aerobic growth more than 10^5 CFU/mL (air n=11, 6.43% vs. CO2 n=12, 5.63%, p=0.743) and yeast growth more than 10^4 CFU/mL (air n=5, 2.92% vs. CO2 n=6, 2.82%, p=0.950) did not differ between air and CO2 groups. **Conclusion**: Air insufflation during EGD does not decrease the yield of quantitative anaerobic cultures of luminal bacteria.

Table: Baseline characteristics of patients included in the study

	Air (n=171)	CO2 (n=213)	p-value
Age, Mean (SD)	52.6 (16.8)	47.8 (16.4)	0.005[1]
Gender, female, n (%)	58 (66.1)	144 (67.6)	0.752[2]
Proton pump inhibitor use, n (%)	57 (33.3)	78 (36.6)	0.503[2]
Surgical or anatomical predisposing conditions*, n (%)	24 (14.0)	38 (17.8)	0.314[2]
Major gastrointestinal morbidity**, n (%)	45 (26.3)	60 (28.2)	0.686[2]

[1]2-sample t test   [2]Chi-square
*Partial or total gastrectomy, duodenal diverticula, small bowel strictures, history of small bowel resection or anastomosis.
**Inflammatory bowel diseases, celiac disease, other autoimmune gastrointestinal diseases, gastrointestinal involvement due to chemotherapy or radiotherapy

Tu1601

DIARRHEA IN TUBE-FED HOSPITALIZED PATIENTS: FEEDING FORMULA IS NOT THE MOST COMMON CAUSE
Pimsiri Sripongpun, Korn Lertpipopmetha, Chanon Kongkamol

Background and Aim: Diarrhea in hospitalized patients is not uncommon, especially in patients receiving enteral nutrition (EN). *Clostridium difficile* associated diarrhea (CDAD) and EN-associated are the most recognized etiologies of nosocomial diarrhea. However, when it comes to clinical practice, the data regarding how common each etiology contributes to the diarrheal episodes are limited. This study aims to identify the causes of diarrhea in tube-fed hospitalized patients. **Methods:** This is an analysis of prospectively collected data of the patients enrolled in 'Effect of Psyllium Fiber Supplementation on Diarrhea Incidence in Enteral Tube-Fed Patients: A Prospective, Randomized, and Controlled Trial' (RCT). The design of the study has been previously described (DOI:10.1002/jpen.1489, accepted, in production). Briefly, adult patients admitted to general medical wards and whom EN was then initiated were randomized to receive either psyllium-added or fiber-free EN formula for 10 days or until discharge/oral intake/death, and diarrhea was monitored using the King's Stool Chart. The RCT results revealed no difference in diarrheal incidences between both formulas, and the management of diarrhea if occurred was as the primary doctors' decisions. Thus, we analyzed the data of all enrolled patients as a cohort of tube-fed hospitalized patients. The causes of diarrhea were classified as: 1) CDAD: positive *C. difficile* toxin and/or colonoscopy demonstrated pseudomembranous colitis; 2) medication-associated: diarrhea occurred while receiving the medications reported in literature causing diarrhea + responded to the discontinuation of the drug; 3) overflow: diarrhea with a clinical presentation of fecal impaction + response to laxative/evacuation; 4) EN-associated: exclusion of other causes + clinical response to feeding adjustment. The causes and the characteristics of patients who developed diarrhea were analyzed. **Results:** In a cohort of 83 patients, 31 patients (37.3%) developed diarrhea. The most common cause of was medication-associated (61.3%), followed by CDAD (9.7%). EN-associated diarrhea was found in only 2 patients (6.5%). Patients who developed diarrhea had a higher number of days with tube-feeding (8 vs 4 days, p=0.001) and tended to have a lower baseline serum albumin (3.1 vs 3.3 g/dL, p=0.053) compared to those without diarrhea. Medications that can cause diarrhea were prescribed in a comparable proportion between patients with and without diarrhea, excepted for oral phosphate solution, it was prescribed more frequent in patients with diarrhea (51.6% vs 23.1%, p=0.016). **Conclusions:** The most common cause of diarrhea in hospitalized patients receiving EN is medication-associated, while EN-associated is quite uncommon. Review and cessation of possible drugs, especially oral phosphate solution, should be done before enteral formula modification.

Causes of diarrhea in tube-fed hospitalized patients

Cause of diarrhea	Number of patients (%)
Medication-associated diarrhea	19 (61.3)
CDAD	3 (9.7)
EN-associated diarrhea	2 (6.5)
Overflow diarrhea	1 (3.2)
Unidentified and spontaneously improved without treatment	6 (19.4)

CDAD - *Clostridium difficile* associated diarrhea, EN - enteral nutrition

Tu1602

MEASUREMENT OF STRESS AND ANXIETY AND THE ASSOCIATED FACTORS IN PEDIATRIC GASTROENTEROLOGY PATIENTS
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Background:: Salivary cortisol (sCortisol) is a reliable indicator of stress in children. Furthermore, the visual analogue scale for anxiety (VAS-A) and the State Trait Anxiety Inventory for Children (STAIC) are validated indicators of anxiety in children. However, little data exists regarding the interaction of these two factors with bowel disease. **Aims**: The primary aim was to investigate levels of stress and anxiety in children seen in the pediatric gastroenterology clinic. The secondary aim was to determine the influence of factors such as age, body mass index (BMI), sex, diagnosis, first appointment, and seasonality on patients' stress levels. **Methods**: Between March and November 2018, children (age ≥ 8 yrs) seen at the gastroenterology clinic in the morning (≤ 10 a.m.) who met the eligibility criteria were enrolled in the study. They filled out the STAIC and rated their anxiety with the VAS-A (0 to 10) before their visit. Saliva samples were collected in Salivette tubes, which were then frozen at -80°C until centrifugation and ELISA radioimmunoassay analysis. Bivariate analysis (T-test, ANOVA or Pearson's test) and multivariate regression analysis were performed with SAS 9.4 to assess the influence of patient-specific factors on their stress levels. **Results:** 75 children (35 males; mean (SD) age 13.7 (2.9) yrs) were enrolled. The diagnoses were distributed as follows: inflammatory bowel disease (n=29), irritable bowel syndrome (n=

15), coeliac disease (n=13), other (n=18). The median (Interquartile range (IQR) sCortisol was 101.5 nmol/l (78.6 - 121.0) for girls and 96.9 nmol/l (65.9 - 136.7) for boys, which is significantly higher than the 8.8 nmol/l and 8.6 nmol/l among their healthy peers. Yet, only 5.3% of patients felt anxious at appointment [(STAIC state score > 40), with a mean (SD) of 29.5 (4.7)], and 19.7% of patients felt anxious generally [(STAIC trait score > 40), with a mean (SD) of 32.5 (6.4)]. Similar results were found with VAS-A, which had a median (IQR) of 2 (1 - 5). In the bivariate analysis, sCortisol moderately correlated with age (r= 0.56; 95% CI: 0.38 ? 0.70; P < 0.0001) and poorly correlated with BMI (r= 0.33;95% CI: 0.12 ? 0.52; P =0.003). No significant correlation was found with sex, first appointment, diagnosis and seasonality. A multivariate regression analysis (α = 0.05) showed an association only between age and sCortisol: β = 7.87±1.35 (95% CI: 5.17 ? 10.55; P < 0.0001). **Discussion**: Most children with chronic bowel disease appear to exhibit low anxiety but significant chronic stress as reported by their high level of sCortisol. Greater age and greater BMI were associated with higher sCortisol. This is likely explained by higher hypothalamic-pituitary-adrenal activity during puberty.

Tu1603

GASTROINTESTINAL COMPLICATIONS IN PATIENTS WITH CLOCAL EXSTROPHY: A SINGLE CENTER EXPERIENCE

Gayathri K. Naraparaju, Carmelo Cuffari, Steven D. Miller, Rachel Davis, Mahir Maruf, John Gearhart

Cloacal exstrophy (CE) is a complex malformation of the distal urogenital tract, seen in 1 in 250,000 of births. The majority of patients with CE have associated gastrointestinal malformations (GI). This is an IRB approved chart review of 33 patients with CE (18 male;15 female, based on genetics), were treated at The Johns Hopkins Children's hospital from 2008 to 2016. Mean (range) age was 6 years (birth to 10 years). Among the 33 patients, 32 (97%) had gastrointestinal (GI) manifestations, including 27(81%) with omphalocele, 30 (90%) with imperforate anus, 14 (42%) with rudimentary hind gut, 1 (3%) with malrotation, 1 (3%) with bowel obstruction, 1 (3%) with rectal fistula, 1 (3%) with cleft anus, 1 (3%) with intussusception, 6 (18%) with short gut syndrome, 4 (12%) with malabsorption; out of which one required hospital admission for dehydration with electrolyte derangements and 10 (30%) with small intestinal bacterial overgrowth. Among the 33 patients, 28 (84%) had colostomy and 4 (12%) had ileostomy, 9 patients (27%) required feeds through a gastrostomy tube and 2 patients (6%) with gastroparesis and reflux required gastrojejunostomy tube. 14 (42%) patients presented with failure to thrive (Z score for weight/length or body mass index less than or equal to -2) by 2 years of age and among these patients, 12 of them continued to have the diagnosis of failure to thrive between 4-5 years of age. Hypoalbuminemia (< 3.2) was seen in 8 of the patients presenting with failure to thrive at 2 years of age. Linear growth failure (Z score for length -2) was seen in 7 (21%) additional patients by 2 years of age and 6 of them continued to have linear growth failure by 4-5 years of age. Dysmotility requiring laxatives was noted in 14 patients. Parenteral nutrition (PN) was used for a short duration (1 to 2 weeks) in 8 patients. One patient required parenteral nutrition for 2 months and developed PN cholestasis (maximum direct bilirubin level was 3.7mg/dl), which later resolved. Nutritional deficiencies including vitamin D deficiency (vitamin D level less than 20 ngm/ml) in seen in 14 (42%) patients, zinc deficiency in 4 (12%) patients, iron deficiency anemia (with hemoglobin< 10gm/dl, low mean corpuscular volume for age, high red cell distribution width or low iron levels) in 17 (51%) patients and vitamin B12 deficiency (vitamin B12 level<229pmol/L) in 1 (3%) patient. Gastrointestinal malformations are common in children with CE and frequently contribute to the development of growth failure, nutritional deficiencies, malabsorption and dysmotility. This study has shown that patients with CE require the close monitoring by a pediatric gastroenterologist, especially among those children with significant growth failure and malnutrition.

Tu1604

EFFICACY AND SAFETY OF ANAL SPHINCTER BOTULINUM TOXIN (BOTOX) INJECTION IN CHILDREN WITH ANORECTAL AND COLONIC DISORDERS

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Background: Anal sphincter botulinum toxin (botox) injection is often used to treat children with anorectal and colonic disorders refractory to conventional treatment, but our understanding of its efficacy and safety remains limited. Our objective is to review our institutional experience to better understand the outcomes of botox injection in children with various anorectal and colonic disorders. **Methods**: We performed a retrospective review of pediatric patients undergoing anal sphincter botox injection at our institution between 2009 and 2018. We recorded information on patient characteristics, injection technique, clinical response, and complications. Statistical analysis was performed to evaluate responses and associations between baseline characteristics and outcomes. **Results:** 456 injections were performed in 303 patients (61.6% male, median age 5.24 years, range 3 weeks-19 years). The most common diagnoses were Hirschsprung disease (HD, 50.2%), functional constipation (FC, 36.8%), anorectal malformation (2.1%), and anal fissure (1.7%). The majority (62.2%) had undergone anorectal manometry. Patients were treated with laxatives (65.3%), rectal enemas (24.4%), and antegrade enemas (8.6%) prior to injection. In addition to the 10.8% who had undergone appendicostomy or cecostomy creation, 46.5% had undergone other operations prior to injection, primarily surgery for HD (82.7%) and colonic resection (12.8%). Patients received a median dose of 100 units (range 90-200) of botox per injection. Of the 318 (70%) injections with response information, 73.3% of patients experienced improvement, 16% no change, and 10.7% worsening of symptoms. The percentage with ≤2 bowel movements per week decreased from 41.4% prior to injection to 9.7% afterwards (p<0.001) and the percentage with fecal incontinence ≥1 time per week decreased from 74.5% to 41.7% (p<0.001). Abdominal pain, pain with defecation, and straining with defecation decreased as well (all p<0.001). Complications were rare, with 2 patients (0.4%) experiencing temporary urinary incontinence and 1 patient (0.2%) developing a perianal abscess. Overall response and improvement in bowel movement frequency and fecal incontinence did not

differ between males and females or children (<13 years) and adolescents (≥13 years). However, positive clinical response was more common among children with HD (78.2%) than with FC (65.4%, p=0.02). **Conclusion**: In this large study of outcomes of anal sphincter botox injection in children, the majority of children experienced improvement in bowel movement frequency, fecal incontinence, and associated symptoms. Clinical response is more common among children with HD compared to those with FC.

Tu1605

CHRONIC INTESTINAL PSEUDO-OBSTRUCTION IN CHILDREN: EPIDEMIOLOGY AND HEALTH CARE UTILIZATION OF INPATIENT ADMISSIONS

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Chronic intestinal pseudo-obstruction (CIPO) is a rare but disabling gastrointestinal motility disorder. There is limited understanding of the epidemiology and healthcare burden of this disease due to several factors, including low incidence of the disease and complexity of diagnosis. **Aim:** To characterize the epidemiology and factors affecting healthcare burden in children and adolescents with CIPO, who require inpatient admission in the United States by using a nationwide sample. **Methods:** We inquired the Kids' Inpatient Database (KIDS 2016) developed by the Healthcare Cost and Utilization Project, which includes a random sample of inpatient discharge records from US hospitals, utilizing Stata 15.1 program to analyze data for ICD-10 diagnosis code (K59.8) for CIPO either as a primary or secondary diagnosis among patients 0-18 years, during the year 2016, the latest year for which this data is available. Multivariable logistic regression and Wilcoxon rank-sum test were used and P<0.05 considered statistically significant. **Results:** In the year 2016, there were 1671 inpatient discharges from US hospitals for patients coded with a primary or secondary diagnostic code for CIPO; of these, 350 admissions (21%) listed CIPO as the primary diagnosis. The incidence of CIPO related inpatient admission was 29 per 100,000 patients (Table 1). Common secondary diagnoses included gastrostomy status (32%), gastroesophageal reflux (21.2%), feeding difficulties (20.1%), constipation (16.8%), dehydration (15.4%) and ileostomy status (12.6%). After controlling for age group, race, income status, and insurance it was found that males vs. females (aOR: 1.10; 95% CI: 0.94 - 1.28; P = 0.241) and Whites as opposed to other races (aOR: 1.55; 95% CI: 1.27 - 1.88; P <0.001) were more likely to be admitted. In addition, patients with Medicaid were more likely to be admitted as compared to private insurance. (aOR: 0.81; 95% CI: 0.64 - 1.02; P = 0.072). Chronic intestinal pseudoobstruction related admissions results in significant healthcare burden, with a median (Interquartile Range- IQR) cost of hospitalization of US$ 52,079 (US$ 23,530 - 120,961) and a median (IQR) length of stay of 6 days (3-14 days). The presence of gastrostomy and ileostomy status appeared to incur lower median cost of hospital admission and length of stay (Table 2). **Conclusions:** Among children requiring inpatient admission in US hospitals, chronic intestinal pseudoobstruction is a rare diagnosis; however, it results in a high incidence of inpatient admissions and creates a significant healthcare burden. The cost of hospitalization was higher in patients without gastrostomy and ileostomy status. An aggressive multidisciplinary management of various comorbidities is crucial in reducing inpatient admissions in this cohort.

Table 2: Co-morbid conditions and healthcare utilization

	Gastrostomy	No gastrostomy	p-value	Ileostomy	No ileostomy	p-value
Length of stay (median)	5.5 days	6 days	0.138	5 days	6 days	0.059
(interquartile range- IQR)	(3 - 11 days)	(3 - 16 days)		(3 - 9 days)	(3 -14 days)	
Cost of hospitalization (median)	$45,970	$54,824	0.028	$42,485	$52,826	0.005
(interquartile range- IQR)	($23,412 - $96,284)	($23,686 - $146,779)		($20,274 - $87,657)	($24,222 - $129,234)	

Table 1. Demographics (total n=1671)

Age group	n (%)	Gender	n (%)	Race/ethnicity	n (%)	Hospital region	n (%)	Insurance	n (%)	Household income	n (%)
0 - 5 year	723 (43.3%)	Male	781 (46.8%)	White	868 (61.7%)	Northeast	286 (17.1%)	Medicare	10 (0.6%)	$ 1 - $42,999	372 (22.6%)
6 - 10 year	378 (22.6%)	Female	890 (53.2%)	Black	165 (11.7%)	Midwest	404 (24.2%)	Medicaid	809 (48.4%)	$43,000 - $53,999	363 (22.1%)
11 - 15 year	338 (20.3%)			Hispanic	244 (17.3%)	South	598 (35.8%)	Private	754 (45.1%)	$54,000 - $70,999	493 (30%)
16 - 18 year	231 (13.8%)			Asian/Pacific Islander	48 (0.4%)			Self-pay	24 (1.4%)	$71,000+	417 (25.3%)
				Native American	5 (0.4%)						
				Other	77 (5.5%)						

Tu1606

PREVALENCE OF CHILD ABUSE IN CHILDREN WITH FUNCTIONAL CONSTIPATION

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Objective: An association between functional constipation (FC) and child abuse has been described. However, data in pediatric patients are limited and the diagnosis of child abuse remains challenging. Our objective was to determine the prevalence of child abuse and neglect (CAN) in children with FC as compared to their healthy peers. **Methods:** A case-control study was carried out in children aged 3-10 years old, including children with FC according to the Rome III criteria recruited at a single center (cases) and healthy children without gastrointestinal complaints recruited at schools (controls). Parents of children were questioned about their child's history of CAN and asked to fill out the Child Sexual Behavior Inventory (CSBI). Children were interviewed using the Sexual Knowledge Picture Instrument