Sunday Poster Presentations

Session Category
Pediatric and Neonatal

S60 - Variances in Human Milk Fortification Practice for Preterm Infants at Discharge from the Intensive Care Nursery.

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Purpose: Preterm infants have increased nutrient demands to support growth, and this requirement continues at discharge. Exclusive breast milk likely does not meet nutrient demands of preterm infants without additional fortification. There are a variety of feeding regimens recommended by registered dietitians at discharge. When a preterm infant is discharged with exclusive breast milk feedings, these additional nutrients are provided either as direct fortification to breast milk with powdered preterm discharge formula (PTDF), or alternating breast milk feedings with preterm discharge formula (PTDF) feedings. No randomized controlled trials exist that measure growth and development of discharged infants receiving fortified breast milk over non-fortified breast milk and/or PTDF. It has been documented that the use of PTDF powder mixed with breast milk does not meet the nutritional needs of preterm infants at discharge. Alternating breast milk feedings with PTDF provides additional calories and protein, but can impose the mother into pumping to maintain supply, which could discourage breastfeeding. The purpose of this study was to measure common discharge feeding practices recommended by registered dietitians for exclusively breast fed preterm infants at discharge.
Methods: Surveys were posted on neonatal nutrition networking sites that requested information from registered dietitians regarding discharge feeding practices of preterm infants. Anonymity was maintained among all participants.
Results: A total of 64 Registered Diettiains responded to the survey. Responses are as follows: 38 percent stated they recommend adding PTDF powder to every breast milk feeding, 16 percent supplemented exclusive breastmilk with 2 or less feedings of PTDF, and 6 percent reported supplementing breast milk with 3-4 feedings of PTDF. Forty percent of participants, however, reported a wide range in individualized breast milk fortification, including mixing with calorically dense preterm formula, using preterm human milk fortifier, or no fortification at all. For those discharged without breast milk fortification, 56% responded that the infant must have a proven track record of adequate growth and intake prior to discharge.
Conclusions: Discharge breast milk feeding regimens vary widely, indicating that preterm infants require different discharge plans based on need. Because of the lack of concrete guidelines and availabe PTDF

products available to meet these needs, preterm infants discharged from the intensive care nursery are at risk for suboptimal growth. Research measuring growth and intake of preterm infants in a post discharge setting is limited, and would be desirable to implement ideal feeding regimens.

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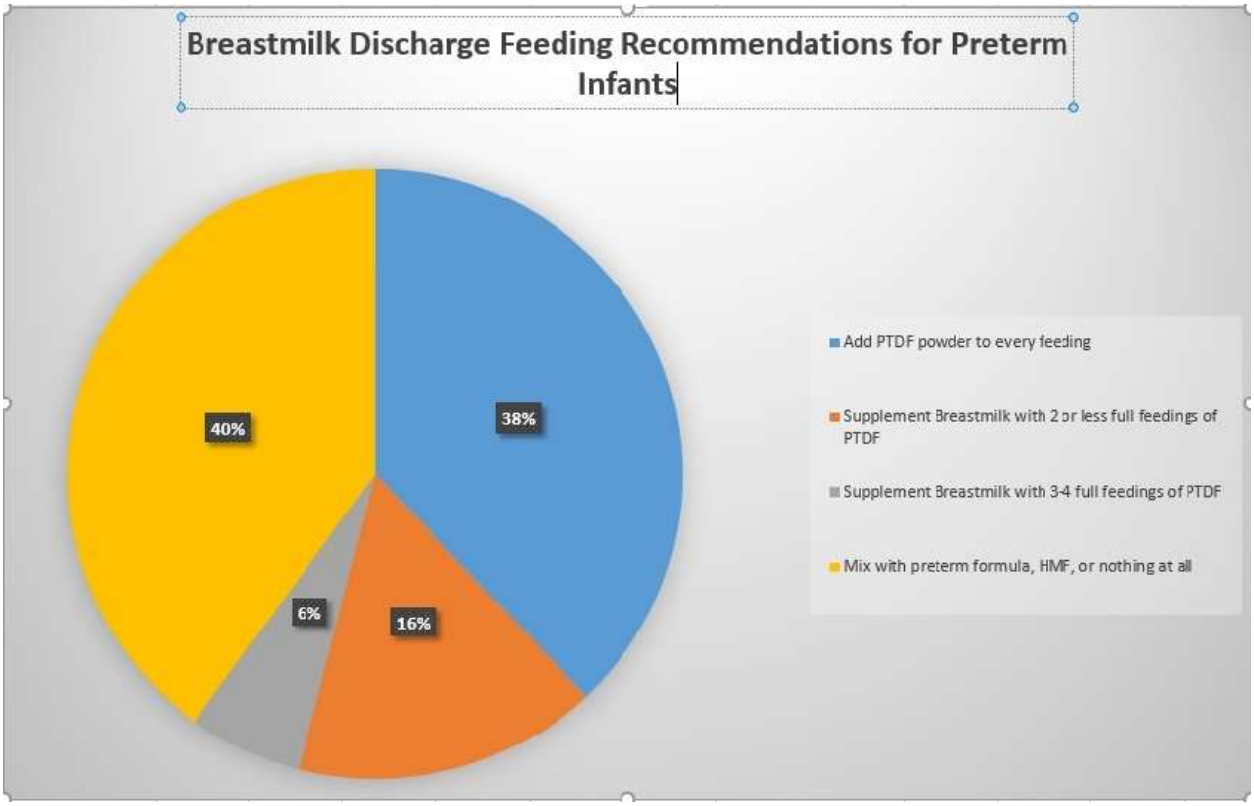

S61 - Associations Between Calorie Delivery, Malnutrition, and Severity of Illness with Mortality in the Pediatric Intensive Care Unit

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Purpose: Critically ill children often cannot meet their nutrition needs through oral intake alone. In such cases, enteral and/or parenteral nutrition is used to provide nutrition support. The goal of nutrition support for pediatric patients in the ICU is to avoid malnutrition among patients admitted with normal anthropometrics and prevent exacerbation of existing growth or nutrient deficiencies among malnourished infants and children The objective of this study was to describe the association between malnutrition status, calorie delivery, and severity of illness for the first 7 days following intubation with intensive care unit (ICU) mortality in pediatric patients.
Methods: Subjects from term infants to 21 years of age were included if they were admitted to the ICU and required ventilation for ≥48 hours. Severity of illness was estimated by averaging the daily pediatric sequential organ failure assessment (pSOFA) score for the first 7 days following intubation. Average calorie and protein delivery was calculated for the first 7 days following intubation and converted to average percent of the DRI for age and sex. Malnutrition status was defined by weight-for-age or BMI z-scores less than -1. The sample was divided into subgroups based on age categories (0-35.9 months, 36 months to 8 years, and 9 years and older). Logistic regression was used to describe the relationship between malnutrition, severity of illness and calorie delivery with mortality.

Results: Of the total 126 subjects included in this study, the majority were less than 3 years old (n=99, Table 2). When considerign the entire sample, average pSOFA was 10.2±3.2. Mean calorie & protein delivery were 39±29% and 92±60% of the DRI. Half of the sample was malnourished and 27% died in the ICU. Due to the uneven age distribution of the study population, demographic and clinical variables will be summarized by age categories (0-35.9 months (n= 99, 79%), 36 months to 8 years (n=12, 10%), and 9 years and older (n=15, 12%)). Among subjects who were 0-36 months (n=99), only average pSOFA (OR 1.25 95 % CI 1.05-1.49, p=0.006) and malnutrition (OR 2.45 95% CI 1.00-6.00, p=0.05) were significant predictors of mortality. No predictors of mortality were found in subjects older than 3 years.
Conclusions: This retrospective observational cohort found that the majority of pediatric patients admitted to the ICU who required mechanical ventilation for at least 48 hours were between 0 to 36 months of age. Among this group of patients, increasing severity of illness and malnutrition were significant predictors of mortality.

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S62 - Tracking Nutritional Outcomes in the Very Low Birth Weight Infant Utilizing Vermont Oxford Network Strategies and Benchmarks.

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Purpose: The purpose of our ongoing quality improvement Nutrition Committee is to improve the nutritional status of the Very Low Birth Weight (VLBW) infant, without a counterbalancing increase in morbidities. Our goal is to diminish Postnatal Growth Failure (PGF) (discharge weight below the 10th% at 36 weeks Post Conceptual Age (PCA)) in our 44-bed level III NICU. PGF occurs in 80 to 100% of VLBW infants nationwide. This is of particular concern, as insufficient Neonatal Intensive Care Unit (NICU) growth is associated with poor neurodevelopmental outcome. Vermont Oxford Network (VON) is a nonprofit voluntary collaboration of health care professionals working to improve the quality and safety of care for newborns and their families through research, education, and quality improvement projects.
Methods: Historically, our unit, averaging 550 annual admissions (including 150 VLBW neonates), did not have a focus on nutrition. To remedy this, we established a multidisciplinary Nutrition Committee in 2006, which uses the PDSA (Plan, Do, Study, Act) Model for Improvement. The committee determines areas needing improvement, reviews literature identifying potentially better practices and makes recommendations based on current evidence. In order to achieve and sustain compliance in practice changes, the committee's guidelines are submitted to the Neonatology division and the Nursing Clinical Practice council for approval. Unit staff is educated on the new guidelines before implementation. To improve compliance; a quick reference nutrition support card was created, continual nutrition education for staff and residents is provided and monthly chart audits are done to monitor each new practice change, for six months, or until 80% compliance is achieved. Spot audits are done to ensure continued compliance. Periodic emails are sent out to all staff, presenting improving outcome data and/or reinforcing guidelines that were below audit compliance expectations. The Nutrition Committee has a large reference section on our hospital's intranet. Results of these practice changes are measured by longitudinal growth in head circumference (HC) and weight measured against VON outcomes, Z-score differences that are calculated on every VLBW baby at discharge, and weekly chart audits to monitor gastrointestinal issues, particularly necrotizing enterocolitis (NEC).

Results: Nearly all monthly chart audits initially show compliance of 80%. Periodic audits reveal we continue to meet the standard.
While our birth HC (44th percentile average (avg.)) and weight (40th percentile avg.) have been unchanged, our Z-scores show significant improvement in HC growth at discharge since 2010. Less improvement has been seen in weight.
In that same period, a significantly lower percentage of NorthShore infants were discharged below the 3rd and 10th percentile (using Fenton growth curves) in HC than VON infants; avg. 5.7% and 17.0% respectively vs. VON avg. of 16.3 and 32.8.

NEC rates dropped from an avg. of 6.5% in 2001-2006 (before creation of the committee) to avg. 2.5% in 2010-2017. Chronic Lung Disease rates also dropped from avg. 16.5 to 13.3 during those periods.

Conclusions: A multi-disciplinary nutrition team provides a forum of collaborative practice which can advance quality of care and improve long term outcomes in a NICUs medically fragile population. In the past 12 years, all committee-recommended interventions, including skin care guidelines and donor milk manipulations, improved incidence of PGF without adverse gastrointestinal outcomes. Our babies under target discharge weights remind us that there is always room for improvement. Participation in an organization such as VON provides a means to benchmark success.

Financial Support received from: N/A

S63 - Knowledge, Attitude, and Intention of Breastfeeding Among Male and Female University Students

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Purpose: The purpose of this study was to examine university undergraduate females' and males' knowledge, attitudes and intention toward breastfeeding.

Methods: A cross-sectional study was conducted among 492 university students included 300 female and 192 male undergraduate college students. A questionnaire with validated scales to explore: Exposure to Breastfeeding, Knowledge about Breastfeeding, Iowa Infant Feeding Attitude Scale, and Infant Feeding Intentions was administered online to the university students.

Results: The majority of the participants were previously breastfed (92.9%). The females were significantly breastfed for more than 6 months as compared to males. The participants' exposure to breastfeeding was considerably high, where 89.8% had witnessed a woman breastfeeding. There was a highly significant positive correlation between sex and the knowledge and attitude scores (r=0.22, r=0.26, *P*=<0.001) where females had more Knowledge and positive attitude towards breastfeeding compared to males. Whereas males scored higher on intention scale (P<0.001). Furthermore, there was a highly significant positive correlation between knowledge and attitude among the participants (r=0.46, P<0.001). More than half (57.5%) of the students agreed that breast milk is the ideal food for babies and that breastfeeding is healthier than formula feeding and would increase mother-infant bonding. However, the majority of the participants reported low intention to breastfeed and that they will only formula feed their babies (75.8%). Females significantly reported their intention to formula feed their infants and do not wish to give breastfeeding a try (*P*<0.001). This revealed by the highly significant inverse association was found between knowledge scores and intention (r=-0.26, *P*<0.001).

Conclusions: This is the first study that investigated the knowledge, attitude, and intention of breastfeeding among young female and male college students in the UAE. Overall, the findings from this study revealed that although both males and female university students had good knowledge and attitude about breastfeeding, their intention to breastfeed was low with significant differences between sexes. This is alarming and necessitates that educational programs should promote breastfeeding in schools and universities in order to increase awareness and knowledge about the short term and long term benefits of breastfeeding. Moreover, healthcare experts should address the challenges and concerns raised by the young females and males in order to improve their attitudes and intentions about breastfeeding.

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ENCORE

Presented: Pediatric Intestinal Failure and Rehabilitation Symposium, September 2018, Pittsburgh, PA

S64 - Renal function in pediatric intestinal failure patients after 5 years of parenteral nutrition support

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Purpose: Pediatric intestinal failure (PIF) patients are at risk of comorbidities due to prolonged parenteral nutrition (PN) exposure. Renal dysfunction is a long-term concern and nephrocalcinosis has been previously reported in this population. In previously published literature adult patients on home PN experience a decline in eGFR over time but this phenomenon has not been evaluated in the pediatric population. Our objective was to investigate the trend in eGFR over a 5 year period, and to determine whether the presence of nephrocalcinosis was related to a change in renal function.

Methods: We conducted a retrospective cohort study of PIF patients managed by our intestinal rehabilitation program who received PN for minimum 5 years. Demographics, PN history, presence of nephrocalcinosis on ultrasound and serum biochemistry were collected and eGFR calculated using the Schwartz equation. Analysis was completed utilized a repeated measures ANOVA, paired and individual T-tests.

Results:

Twenty-five patients were included [18 males (72%); mean age of 7.5±16.9 months] and 20 patients were diagnosed with short bowel syndrome (80%) as the cause of their intestinal failure. The initial analysis using repeated measures ANOVA suggested a significant difference between baseline to year 5 (95.0±54.7 vs 120.1±30.8 ml/min/1.73m^2; $p<0.05$) for the entire cohort. We evaluated where the difference was occurring using a paired analysis comparing baseline eGFR to year 1 and noted a significant increase (95.0±54.7 vs 132.3±49.4 ml/min/1.73m^2; $p=0.002$). Differences were also noted between baseline and Years 2 through 5 ($p<0.05$). When we assessed the difference between Year 1 to 5, there was no significant decline in eGFR (132.3±49.4 vs 120.1±30.8 ml/min/1.73m^2; $P=0.204$). PN fluid support was significantly lower from baseline to year 5 (113.6 vs 93.6 cc/kg/day; $p<0.05$).

The cohort was stratified by presence or absence of nephrocalcinosis. Nephrocalcinosis was present in 10 patients (40%). On univariate analysis, there was no significant difference between groups for demographics (gender, gestational age), IF category or residual small and large bowel anatomy. Repeated measures ANOVA of nephrocalcinosis patients, revealed no change in eGFR from baseline to year 5 (107.9±71.9 vs 110.5±35.0ml/min/1.73m^2; $p=0.210$). Patients without nephrocalcinosis demonstrated an increase between baseline to year 5 (86.5±40.1 vs 126.6±27.1 ml/min/1.73m^2; $p=0.015$). Additionally, when we compared each time point between the two subgroups, there was no statistically significant difference at any time point between baseline and year 5.

Conclusions: Our results do not demonstrate any reduction in eGFR after 5 years of PN in PIF patients. Nephrocalcinosis is a marker of calcium deposition in the renal parenchyma and can be associated with development of future renal dysfunction. In this study, the presence of nephrocalcinosis did not impact eGFR over 5 years. The results suggest longer follow up may be required to witness any deterioration associated with nephrocalcinosis. Alternatively, nephrocalcinosis may not be an appropriate marker of renal function in this population.

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S65 - A Case Example: Collaboration between Hospital, Home Infusion and Family results in safe home discharge of a complex pediatric patient on HPN with blind parents as caregivers.

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Purpose: Our aim is to report a unique case study of a pediatric patient, newly diagnosed with chronic intestinal pseudo-obstruction (CIPO), whose parents are legally blind. Despite their limitations and fear of losing custody of their child due to concern regarding their competency to safely care for the child at home, they were able to safely and successfully manage administration of Home Parenteral Nutrition (HPN) using adaptive techniques taught by the hospital and home infusion liaison team.
Methods: After an unremarkable birth, the baby girl (BG) was taken on multiple occasions during her first 18 mo by her parents to the pediatrician and hospital for malnutrition. Child and Protective Services (CPS) was consulted as no etiology could be identified for her failure to thrive, and they placed BG with her paternal grandfather for foster care. Her parents requested transition to a specialty hospital to attempt to identify a diagnosis, and CPS provided 24/7 in-room monitoring. A diagnosis of CIPO was made, and further genetic testing also revealed ACTG2 visceral myopathy. During hospitalization, a variety of therapies were initiated including: TPN, iron, Miralax, Zofran, Cefazolin for UTI, anal sphincter botox, trial of NJ feeds with erythromycin, PO supplements, and a modified oral diet as tolerated. Once a plan of care was set, a referral was made to a national home infusion provider (HIP) to partner with the hospital team to assess if a safe discharge home was possible. Several obstacles were identified, and solutions were determined as outlined in Table 1.

BG was hospitalized a total of 88 days and was discharged home with her parents after they were granted custody. Per requirements of CPS, a 24/7 Home Health (HH) nurse was required to discharge to home. While finding and hiring HH RNs, BG and her family were required to move into housing next to the hospital. During this time, BG's national infusion provider provided home RN teaches for the first 5 days in their new housing and then weekly RN visits and as needed thereafter. After 7 weeks of staying in housing near the hospital, BG and her family were cleared by CPS and her medical team to go home, which was about 3 hours away. Over the next 12 mo she continued to become nutritionally replete and to make strides in her growth and development (Table 2).
Results: BG experienced a successful discharge with her family. Weight gain and milestones were achieved. Low readmission rate was noted with 3 readmissions total in 12 months which were all related to UTIs associated with her underlying disease. No therapy related complications, including catheter infections occurred during the 12 months after discharge.
Conclusions: With motivated caregivers and a good partnership between hospital and home infusion staff, obstacles to safe home therapy administration can be overcome resulting in improved clinical patient outcomes, enhanced patient quality of life, and reduced cost to the healthcare system.

Financial Support received from: N/A

Table 1

Obstacles to Safe Discharge Home	Solutions
Mom is completely blind (10 on a scale of 1-10 with 1 normal vision and 10 completely blind) and contaminated 50% of the time while flushing the central line and spiking the practice bag.	To allow her to contribute to care, all instructions were translated to Braille so she could read them to her husband who performed care. HIP RN placed tape 2 inches above the syringe tip and bag and was instructed not to touch below that point. On-going assessments of the mother were performed biweekly for 7 weeks regarding her ability to be independent with TPN administration support and to contribute to hookups and disconnects.

Father's degree of blindness is 4.	Through the initial assessment, it was determined that BG's father, while legally blind, is able to see well enough to do all tasks related to home TPN without contaminating. He received intensive training through and beyond hospitalization.
CPS requirement of medically supervised care in an outpatient setting.	72h hospital room in of parents assuming primary therapy administration care under supervision to monitor compliance and safety just prior to discharge home.
Mom who wanted to participate in care for her child as much as possible, including attaching tubing to pump and putting pump in backpack.	Dual chamber bag to allow single pump use at home.
MD concern in care conference regarding all possible points of contamination at home.	Spiking Bag at the pharmacy and ship twice weekly due to BUD of 96h.
HIP RN and case management observation of parent struggles to organize hospital room during room-in.	Braille label maker was utilized for labeling supplies. Weekly care conferences were initiated to track progress of the parents' education and to discuss any remaining medical and social obstacles for a safe discharge.

Table 2

Date	Age	Height	% Ht for Age	Weight	% Wt for Age
5/15/17	18 mos.	75.7 cm	5th	7.9 kg	<3rd
7/23/17	20 mos.	77.5 cm	3rd	9.25 kg	10th
9/12/17	22 mos.	79.8 cm	10th	10.7 kg	25th
12/14/17	25 mos.	83.2 cm	10th	11.7 kg	25th
3/13/18	28 mos.	87.5 cm	25th	12.9 kg	50th
7/17/18	32 mos.	88.2 cm	10th	13.2 kg	50th

S66 - Importance of evaluating unusual sources of a milky white pleural effusion in an extremely premature infant: A Case Report.

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Purpose: Introduction: Pleural effusion is an uncommon complication during the neonatal period. A milky white effusion in the setting of PN (parenteral nutrition) administration via a centrally placed catheter is concerning for a vascular perforation. We present a case of a pleural effusion in an extremely premature infant associated with breastmilk extravasation.

Description: BBW is a former 23+5 week premature infant with a birth weight of 680g and Candida albicans sepsis who was transferred to Nationwide Children's Hospital on DOL (day of life) 9 for evaluation of a pericardial effusion. The pericardial effusion was suspected to be due to fluctuating position of an upper extremity PICC (percutaneously inserted central catheter) caused by the inability to maintain a secure, occlusive dressing secondary to impaired skin integrity. A repeat echocardiogram on DOL 11 showed resolution of the pericardial effusion, however a surveillance x-ray demonstrated new findings of a right pneumothorax and pleural effusion (figure 1). The baby was not acutely symptomatic. A thoracentesis was performed and 20ml of a milky white liquid and 9 ml of air were aspirated. The milky white fluid had the appearance of either IV fat emulsion IVFE/PN solution or breast milk. The day prior to thoracentesis, the bedside nurse had difficulty advancing the oro-gastric tube as she was meeting

resistance, but the baby continued to tolerate breast milk feedings. Determination of the fluid source would determine medical management. The effusion aspirate was sent to the lab for analysis and showed 6490 WBC cells/mm^3, 2% lymphocytes, 9% PMNs, 89% monocytes/macrocytes and 366 mg/dl triglycerides. No organisms were seen on gram stain and no fungal elements were identified. The chemistry analysis of the fluid did not allow for differentiation between IVFE/PN and breast milk. Further discussion between the attending physician, clinical pharmacist and pathologist resulted in a unique laboratory plan to differentiate between the possible causative fluids. Knowing that the size and density of fat globules and percent fat content of fluid could help discriminate between fluid types, it was determined that fat content analysis, including microscopic examination of fat globules and gross analysis of centrifuged samples, would be most useful. A creamatocrit device was unavailable.
Results: After centrifugation, the lipid content of the breastmilk and pleural effusion fluid separated to the top (figure 2), whereas the IVFE/PN demonstrated a lipid content more evenly distributed (figure 3) which is consistent with higher density lipid particles in IVFE. Under the microscope, lipid globules were seen in both the pleural effusion and breastmilk samples but were not seen in the IVFE/PN sample. Based on these results, the IVFE/PN continued to be infused through the PICC, the OG tube was removed, and the baby was made NPO without re-accumulation of the pleural effusion or pneumothorax.
Conclusion: Esophageal perforation is a rare complication of oro-gastric tube placement. Exploration of all potential sources of the pleural effusion and chemical analysis of IVFE/PN and body fluids determined medical care for this infant and may have prevented further complications and unnecessary interventions.
Methods: N/A
Results: N/A
Conclusions: N/A

Financial Support received from: N/A

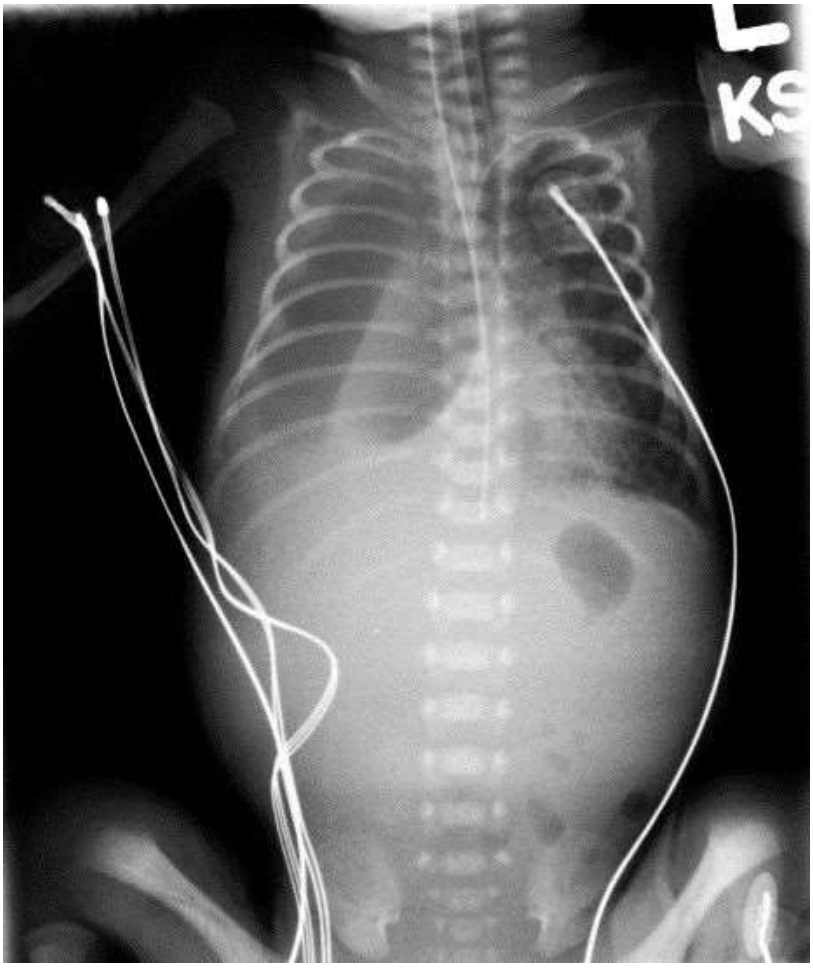
Figure 1

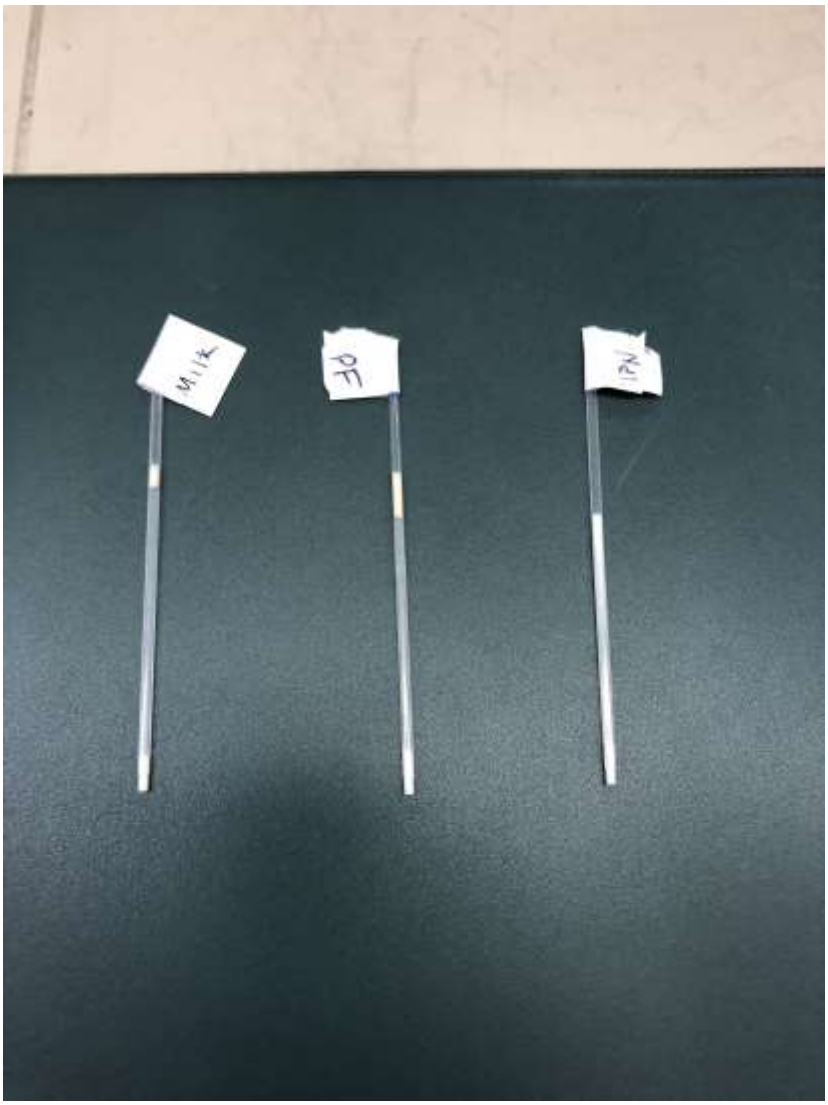

Figure 2

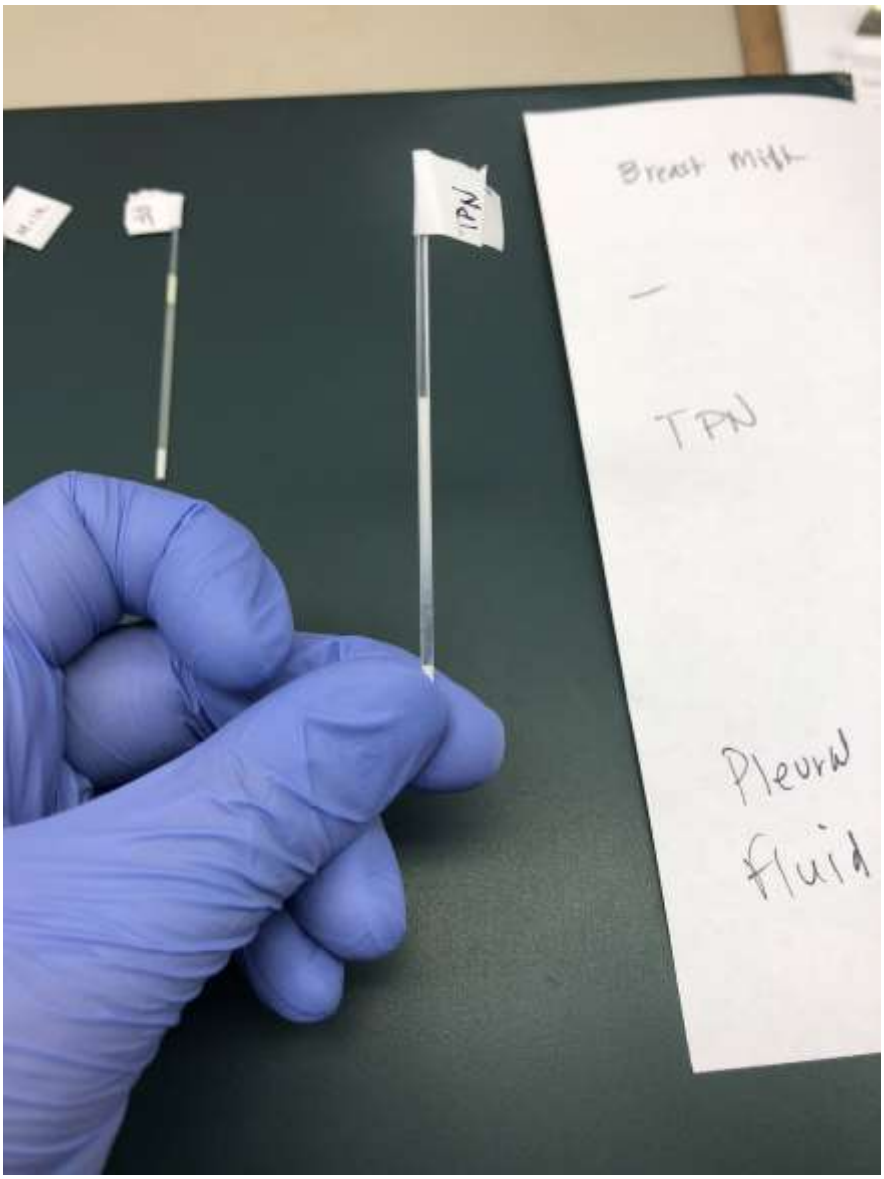

Figure 3

S67 - Safety and Tolerability of High Protein in Neonates and Infants Requiring Parenteral Nutrition

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Purpose: The purpose of this retrospective chart review was to evaluate the safety and tolerability of 4.5 g/kg/day of protein in neonates and infants requiring parenteral nutrition (PN) for up to 14 days after initiation. The effect of this protein dose on growth rates was evaluated over this same time period.
Methods: A retrospective chart review of neonatal and pediatric patients receiving PN was conducted. The primary outcome of safety and tolerability was evaluated by laboratory values reflecting renal and

liver function. Renal function was evaluated by blood urea nitrogen (BUN); liver function was evaluated with common liver function tests (LFTs) including albumin, alkaline phosphatase (AlkPhos), aspartate transaminase (AST), and alanine transaminase (ALT). Baseline values for laboratory tests were obtained on or before Day 1 of high dose protein. Highest value during treatment was obtained from Days 2 through Day 14 of treatment. Analysis of baseline, highest value, and change from baseline were reported using median and interquartile ranges. A secondary outcome of efficacy was assessed by comparing growth rate from up to 14 days prior to initiation of the 4.5g/kg/day dosing strategy to growth rate for the duration of 4.5 g/kg/day dosing. Growth rate changes were reported using mean and standard deviation.

Results: Ten patients received 4.5 g/kg/day of protein. Gestational age was 30.7 +/- 6.7 weeks with PN initiated at 36.6 +/- 4.3 weeks postmenstrual age. Patients receive high protein via PN for 9.2 +/- 4.3 days. Indications for PN included a diagnosis of malnutrition based on weight (40%); inability to feed the gut due to altered anatomy (40%); and inability to meet protein and calorie requirements via the enteral route (20%). The decision to initiate high dose protein of 4.5 g/kg/day included increased nutrient needs and inability to meet expected growth velocities at the previous protein dose in all patients. Baseline laboratory values, highest subsequent laboratory value while on high dose protein, and the change from baseline can be found in Table 1. Prior to high dose initiation, the majority of patients had baseline BUN, albumin, AST, and ALT below the upper limit of normal. Seventy-five percent of patients had AlkPhos values below the upper limit of normal. Subsequent laboratory values were available in 8 out of 10 patients who received high protein dose. The majority of patients remained within the reference ranges after initiation of 4.5g/kg/day of protein with the exception of AlkPhos. Patients with an elevated baseline AlkPhos experienced further increase while on the high protein dose. Average growth rate decreased following initiation of 4.5g/kg/day of protein via PN (Table 2).

Conclusions: Observational data gathered from ten patients indicates that high protein dosing of 4.5g/kg/day is well-tolerated in premature neonates requiring PN therapy with respect to renal and liver function tests for up to 14 days. Although the high dose protein was well-tolerated, the growth rate in patients who received this higher dose did not improve over the subsequent 14 day period. These findings are limited by the low number of patients enrolled and the limited duration of the higher dosing of 4.5 g/kg/day. Additionally, data on total calorie provisions was not collected as part of this project and were a potential contributor to poor growth rate.

Financial Support received from: N/A

Laboratory Values

Value (reference range)	Baseline Median (IQR) (n=10)	Highest Value on 4.5g/kg/day Protein Dose Median (IQR) (n=8)	Change from Baseline Median (IQR) (n=8)
BUN (8-28 mg/dL)	13.5 (10.25 - 15.75)	26 (23 - 28.75)	9 (8.25 - 12.75)
Albumin (2.8-4.2 g/dL)	2.65 (2.35 - 2.7)	2.85(2.73 - 3.23)	0.45 (0.125 - 0.775)
AlkPhos (100-450 IU/L)	175 (102 - 447.5)	390.5 (314.5 – 618.5)	165.5 (75 - 293)
AST (15-95 IU/L)	54.5 (23.25 - 70.5)	66 (36.5 – 72.75)	11.5 (-4.25 – 24.75)
ALT (10-55 IU/L)	18 (9.25-47)	24 (18.5 – 28.75)	-5 (-19.25 – 13.25)

Growth Rate

	Mean +/- SD

Growth rate prior to high protein dosing (g/day)	20.4 +/- 19.3
Growth rate during high protein dosing (g/day)	13.5 +/- 16

S68 - Feeding the Flow: A Survey of Enteral Feeding Practices for Infants with Bronchiolitis Receiving Therapy with High Flow Nasal Cannula.

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Purpose: Bronchiolitis is a viral lower respiratory infection affecting children from birth to 2 years of age and is the leading cause of hospitalization for infants and young children. High flow nasal cannula (HFNC) has become an increasingly popular treatment of respiratory support for children admitted with bronchiolitis due to its low side effect profile. Slain et al. (2017) and Sochet et al (2017) both published single center studies demonstrating that enteral feeds for infants on HFNC is not associated with an increase in feeding related adverse events; despite this, clinicians are frequently reluctant to feed infants while on HFNC due to concern for aspiration or worsening clinical status. Our institution subjectively felt significant variation between providers regarding when and if feeding should occur while a patient is on HFNC for bronchiolitis. This study evaluated current feeding practices and attitudes, with the ultimate goal to develop and implement a feeding protocol to standardize care for infants with bronchiolitis on HFNC.
Methods: Study investigators developed a feeding survey, which was then administered via REDcap to bedside nurses, respiratory therapists (RT) and physicians (residents and attending) in various locations (PICU, intermediate care, inpatient floor) of our freestanding tertiary care children's hospital. Respondents were instructed to assume that they were caring for an otherwise healthy infant with bronchiolitis when answering the questions on the survey; questions included wait time prior to feeding once HFNC initiated, maximum rate of HFNC for oral and nasogastric feeds, and findings which would make you hold feeds. For the purposes of analysis, RT and nursing answers were grouped. Answers were evaluated using chi square tests to explore significant associations at a $p<.05$ significance level, and estimated risk ratios (RR) and 95% confidence intervals to quantify significant associations.
Results: The survey was sent to 384 clinicians, with 171 responses received (44%) (Table 1). We found no difference between RT and nurses vs. physicians in how long before starting feeds after initiation of HFNC or the maximum rate of HFNC that they would allow nasogastric feeds. Physicians vs. RT and nurses did differ at what HFNC rate they would allow oral feed, with RT and nursing being less than half as likely to allow oral feeds at 7 lpm or greater HFNC compared to physicians (RR:0.35, 95%CI: 0.19-0.66, p=0.0006). Comparing clinicians on the inpatient wards to clinicians in the PICU, the inpatient wards were 1.5 times more likely than PICU providers to starts feeds within 9 hours of HFNC initiation (RR:1.50, 95%CI: 1.03-2.19, p=0.02). There was no difference between inpatient ward and PICU clinicians regarding the maximum rate of HFNC they would allow nasogastric feeds or the maximum HFNC rate that they would allow oral feeds. Clinicians working inpatient wards were over 6 times more likely than PICU clinicians to respond that the time of day affects their decision to start feeds (RR:6.68, 95%CI: 1.66-26.98, p=0.0008). Reasons to hold feeds were similar regardless of location or type of provider answering.
Conclusions: Since there are no national guidelines for the practice of enteral feeding while on HFNC, there is significant variation in provider comfort level with feeding while on HFNC. This survey as a whole demonstrated a variety of approaches and comfort levels within a single institution. The results of the survey were used to create an institution-wide standardized feeding protocol for infants with bronchiolitis that require HFNC which we will be implementing and studying this fall.

Financial Support received from: N/A

Table 1

		N = 171	%
Position			
	Bedside Nurse	75	44.4
	Physician	66	39.1
	Respiratory Therapist	24	14.2
	Other	4	2.4
Department			
	Family Medicine	12	18.5
	Pediatrics	53	81.5
Training Level			
	Attending	27	40.9
	Resident	39	59.1
Location			
	Emergency Department	2	1.2
	Inpatient Floor	109	64.9
	Intermediate Care	2	1.2
	PICU	55	32.7
Years in Pediatric Care			
	< 2 years	53	31.5
	2 - 5 years	59	35.1
	6 - 10 years	24	14.3
	11 - 15 years	12	7.1
	> 15 years	20	11.9

S69 - Calcium and phosphorus bio-accessibility from amino acid based medical nutrition formulas for infants and children under different in vitro digestive conditions.

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Purpose: Mineral bio-availability from food is important for infants and young children and is influenced by many factors. These include the food matrix and viscosity, composition of the mineral salt, route of administration (e.g. oral intake vs. post pyloric tube feeding), as well as physiological factors, such as mineral status, gastrointestinal functioning, age and use of medication (e.g. proton-pump inhibitors). In contrast to standard infant milk formulas, where many minerals come with the milk proteins, in amino acid based formulations all mineral salts need to be selected and added separately. In this research we have analyzed two infant and two junior amino acid based formulas from two manufacturers with different mineral salts. *In vivo* mineral bio-availability is difficult to study in infants and children, and therefore we used several *in vitro* methods to evaluate mineral bio-accessibility, including a validated, sophisticated dynamic model of the upper GI tract (TIM-1).
Methods: To analyze bio-accessibility of calcium and phosphorus, several commercially available amino acid based medical nutrition formulas for infants and young children were reconstituted according to instructions on the label for the respective products, and analyzed for mineral bio-accessibility after *in*

*vitro*digestion in a:
TIM-1 model: dynamic digestion model simulating physiological *in vivo* digestion with changing conditions (e.g. digestive enzymes, electrolytes and pH) in subsequent compartments representing saliva and stomach digestion followed by intestinal digestive conditions.
Dialysis tube: batch digestion simulating intestinal digestion only with pancreatic enzymes and bile at neutral pH.
Results: Bio-accessibility for both minerals was determined for one product (AA-1 infant formula) under conditions that simulated the dynamically changing conditions in the gastrointestinal tract of infants, such as mimicked in TIM-1. Calcium bio-accessibility was 51%, while phosphorus bio-accessibility reached 66%. Four amino acid based products were tested under intestinal conditions in a dialysis tube only. Under these conditions bio-accessibility ranged between 13% and 23% for calcium, and 55% and 76% for phosphorus, depending on the product and age of child simulated *(see figure 1A-D).*
Conclusions: Bio-accessibility of minerals from an amino acid based medical nutrition formula determined after *in vitro* digestion in the TIM-1 model, which closely mimics the normal physiological condition, including a pH gradient in the gastric compartment, results in higher levels than when bio-accessibility is determined under intestinal conditions only. These combined *in vitro* models enable optimization of mineral composition in the design of nutritional products, which may be helpful for patients with medical conditions requiring e.g. the use of proton-pump inhibitors and/or administration of nutrients directly into the small intestine.

Financial Support received from: Nutricia Research

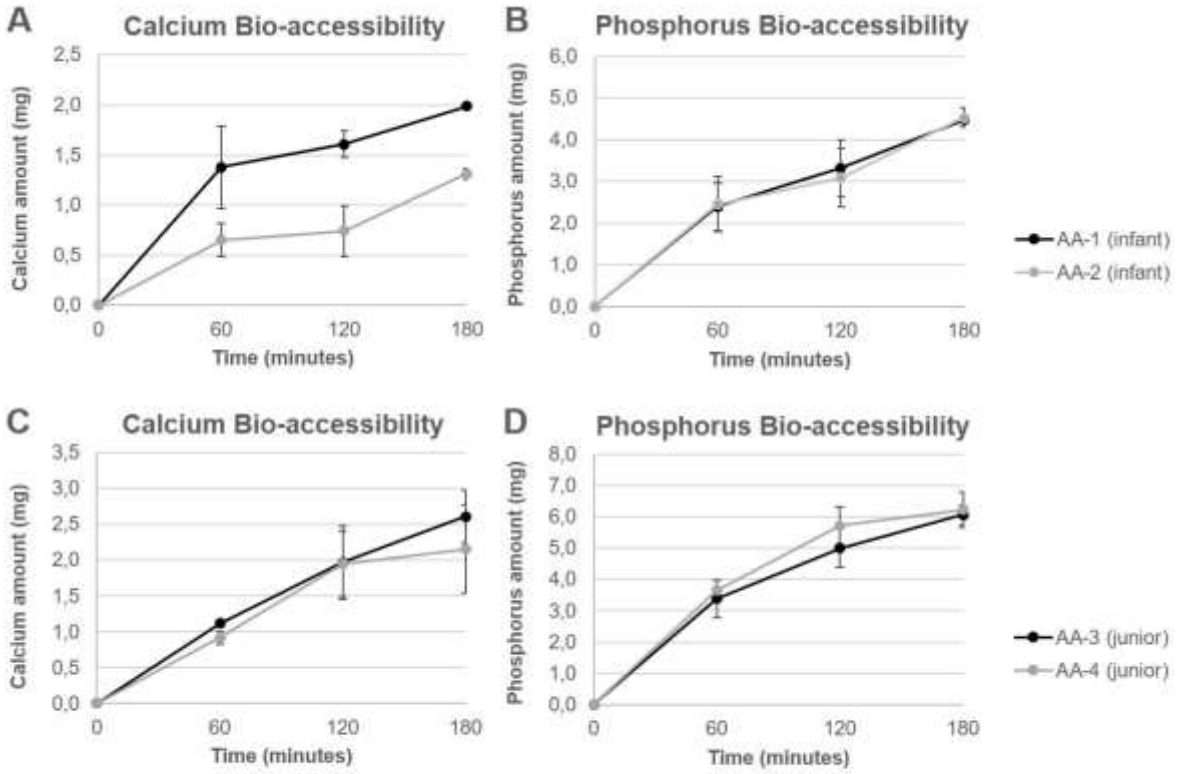

Figure 1: ***Bio-accessibility of calcium and phosphorus from infant (A and B) and junior (C and D) amino acid based formula under intestinal digestive conditions.***

S70 - A Case for Total Parenteral Nutrition during pregnancy for a patient with enterocutaneous fistulas, small bowel resections, and failure to thrive.

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Purpose: Introduction:
For even the healthiest of women, pregnancy is a demanding physiologic state that consists of dynamic changes. Adequate nutrition to meet the increasing energy requirements of pregnancy is essential for fetal development, and women are expected to gain weight accordingly throughout gestation. Females who are malnourished due to gastrointestinal impairment, such as in Crohn's Disease (CD), are at risk to carry out a viable pregnancy. CD is associated with significant morbidity and mortality, especially when complicated by strictures and enterocutaneous fistulas (ECF), and can be challenging for clinicians to manage and treat.
We report the case of a malnourished patient with a high-risk pregnancy during active CD, that was successfully managed with total parenteral nutrition (TPN). TPN has been shown to be safe during pregnancy, but to our knowledge, this is the first reported case of using TPN during pregnancy in a patient with fistulizing CD.

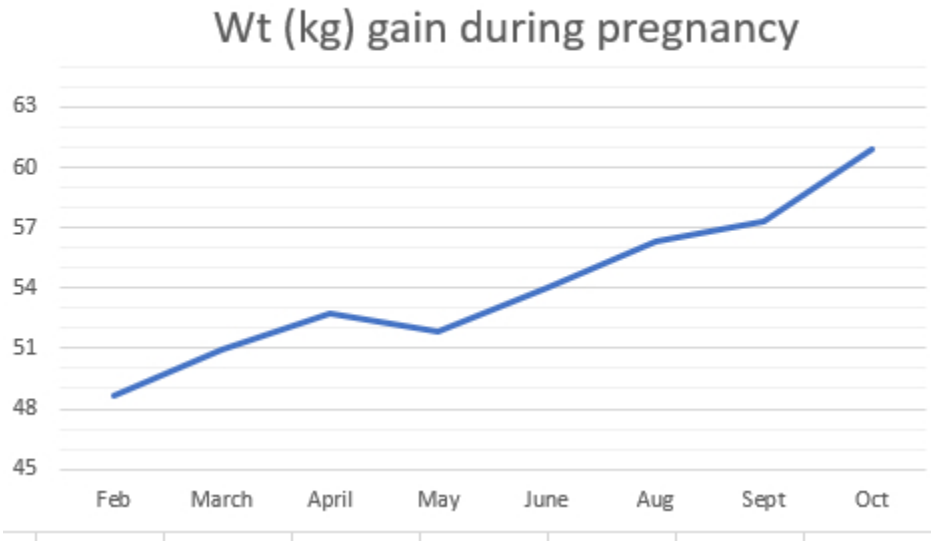
Description:
A 37-year-old malnourished female, 45 kg (BMI 17.5 kg/m2) with extensive CD was admitted to our institution with an abdominal wall abscess secondary to an ECF. She had a history of two prior small bowel resections for obstruction and was subsequently treated with medical management. After a multidisciplinary discussion, it was agreed that she would require surgical intervention given failure of medical therapy. Plan was for fistula takedown and small bowel resection, once she was nutritionally optimized. TPN was needed to meet her caloric goals, as she was unable to absorb a regular diet due to the complications of CD. Because food intake caused an increase in her fistula output, she was instructed to remain NPO. With her fistulas being in the proximal small bowel, enteral nutrition via tube feeds would also increase fistula output and thus was unfeasible. Following hospital discharge, she received TPN as an outpatient.
Four months later, she unintentionally became pregnant and surgical intervention was delayed until postpartum.
Given this patient's unusual condition, she required a tailored regimen to meet the demands of pregnancy. Plan was for indirect calorimetry (IC) each trimester to obtain accurate REE measurements, as predictive formulas cannot properly reflect disease state and the energy changes throughout pregnancy. TPN would then be adjusted based upon the REE multiplied by a stress factor to promote weight gain.

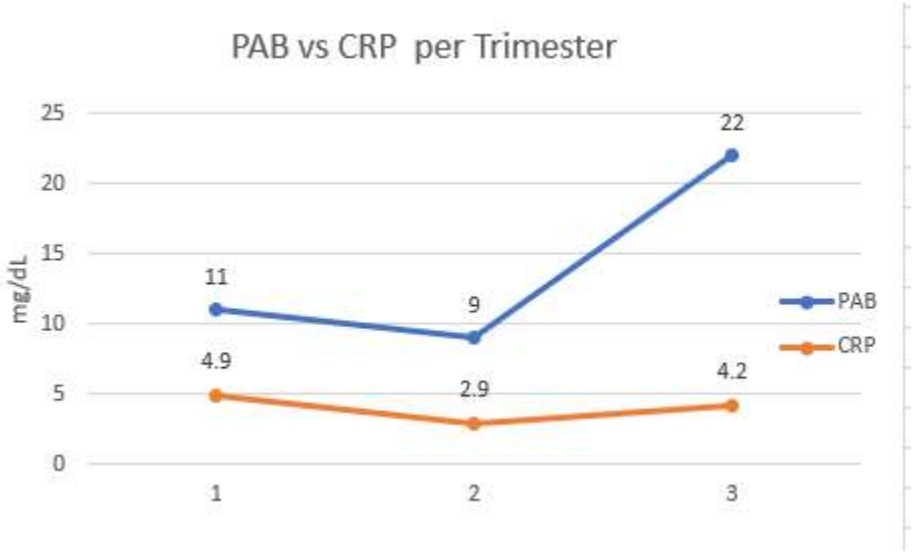
Methods: N/A

Results:
Weight trends during pregnancy are shown in Figure 1. Weight upon conception was 48 kg, 53 kg the end of the first trimester (+8%), 57 kg by the second trimester (+18%), and 60 kg by week 34 (+22%). She successfully gained about 0.45 kg per week during the 2nd and 3rd trimesters and an overall 11 kg by 34 weeks gestation (Figure 1). Two IC readings were performed during the 1st and 2nd trimester, which were 1,176 kcal and 1,278 kcal respectively. Third trimester IC was not performed for logistical reasons, and the second trimester REE was used in place. A stress factor of 1.2, 1.2-1.5, and 1.5.-1.7 was multiplied by REE during the first, second, and third trimesters respectively. Protein provision in TPN was given between 1.8-2.0 g/kg in the first trimester, 2.0-2.5 g/kg during the second trimester, and at 2.5 g/kg during the third trimester. Serum Pre-albumin (PAB) and C-reactive protein (CRP) at baseline were 11 mg/dL and 4.9 mg/dL respectively and 22 mg/dL and 4.2 mg/dL towards 34 weeks gestation. (see Figure 2).

Conclusions: In the case of a pregnant female suffering from malnourishment due to CD and ECF who was unable to meet caloric requirements with a regular diet, we found that TPN could safely optimize nutritional status to sustain adequate growth and development of the fetus.

Financial Support received from: N/A





S71 - Determination of Vitamin A and Vitamin D Deficiencies in Pediatric Burn Patients: Quality Improvement Project

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Purpose: Vitamin deficiencies occur when dietary intake is low or when vitamin loss increases. The purpose of this study was to determine whether our pediatric burn patients develop vitamin A and D deficiencies in order to assess whether additional supplementation is needed. Without sufficient vitamin A, oxidative stress and mitochondrial distress can result. Vitamin D deficiency is associated with higher mortality in critically ill patients. Our patients routinely receive multivitamins and vitamin C as supplementation without specific vitamin A and D supplementation. Whether this supplementation is

needed, however, has not been demonstrated. As a quality improvement project, our first step was to determine whether vitamin A and D deficiencies occurred to determine the need for further supplementation.
Methods: Medical records were reviewed and all available serum vitamin A and serum 25-hydroxy vitamin D levels were collected from November 2016 to September 2018. If a patient had repeat levels, only the initial level was used. All patients received standard daily children's multivitamin supplement and age appropriate daily vitamin C supplementation. Serum vitamin A concentrations were measured using liquid chromatography/tandem mass spectrometry. Serum 25-hydroxy vitamin D levels were measured using an immunochemiluminometric assay. The normal range of vitamin A is 20-65 µg/dL, while low normal values are from 20 to 30 µg/dL. Normal 25-hydroxy vitamin D concentrations are 30−100 ng/mL. Vitamin D insufficiency is defined as concentrations less than 30 ng/mL; deficiency is defined as <20ng/mL. Severe deficiency occurs when the concentration is <10 ng/mL.
Results: Twenty-six vitamin A levels were measured in 25 patients. Ten were below the normal range (40%), while 7 were low normal levels (28%). Nine patients had normal vitamin A levels. Thirty-two vitamin D levels were measured in 28 patients. Of these 28 measurements, 19 indicated deficiency (68%), with 4 severely deficient (14%). Eight patients had insufficient levels, and one was in the normal range.
Conclusions: Vitamin A and vitamin D deficiencies were common in our pediatric burn patient population. Routine supplementation should be considered.

Financial Support received from: N/A

S72 - Does Postoperative Parenteral Nutrition in Pediatric Patients with Perforated Appendicitis Improve Outcomes?

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Purpose: Appendicitis is a common surgical problem in the pediatric population. Patients with perforated appendicitis often present with peritonitis placing them at risk for delays in resumption of an oral diet. However, the postoperative course can be variable. Specific guidelines for timing of parenteral nutrition (PN) in this population are not clear although general pediatric guidelines recommend PN after 4-7 days of NPO status. The purpose of this study was to examine the use of postoperative PN in pediatric patients who underwent an appendectomy for perforated appendicitis. We hypothesize that the early initiation of PN in this patient population would not impact postoperative outcomes.
Methods: Pediatric patients < 18 years who were managed with appendectomy for perforated appendicitis from January 1st, 2012 to December 31st, 2017 were identified from an electronic database using ICD-9/10 codes. Data collected included demographics, days of vomiting before admission, imaging, operative findings, serum albumin, time to PN initiation, time to regular diet, length of stay, and thirty-day complications. Patients who received postoperative PN were divided into two groups based on time to initiation: ≤ 2 days (early) and > 2 days (delayed). Means ±SD or medians [q1, q3] were used for continuous variables and counts (%) for categorical variables. The Wilcoxon test was used for continuous variables and Fisher's test for dichotomous variables. A p-value less than 0.05 were considered significant. IRB approval was obtained with a waiver of patient/parent consent.
Results: There were 413 patients who had an appendectomy for perforated appendicitis. A total of 18.4% (n= 76) patients received postoperative PN. Nine patients were excluded for lack of follow-up (n=3) or failure of non-operative management prior to appendectomy during the same admission (n=6) leaving 67 for inclusion. M:F ratio was 45:22. Demographic data was not statistically different between groups (Table 1). Z-score weight for age was not statistically different between groups. Median days to PN initiation after surgery was 2 (1-4) with a median duration of 6 (4.5-9.5). Median days to initiation was statistically different in the early versus delayed group (1 vs. 4, p<0.001) as was duration of PN (8 vs. 5, p=0.001).

Serum albumin concentration ≤ 3gm/dL was noted overall in 56% of patients (n=28). A statistical difference in albumin concentration ≤ 3gm/dL was noted between the early and delayed PN groups (66.7% vs. 35.3%, p<0.04). No statistical difference was seen between early and delayed groups in length of stay (days 11 vs. 10, p=0.62), postoperative wound infection (16.2% vs. 6.7%, n=0.28), or postoperative abscess (40.5% vs. 43.3%, p=1).
Conclusions: Use of early parenteral nutrition in patients undergoing appendectomy for perforated appendicitis did not impact length of stay or other important postoperative outcomes. Future initiatives should focus on identification of at-risk patients to determine who would benefit most from PN therapy in this patient population.

Financial Support received from: No financial support was received for this abstract

Table 1- Demographic Data

	Early PN (≤ 2 days), n=37	Delayed PN (> 2 days) n=30	p-value
Age (years)	9 (4-12)	11 (6.3-12)	0.18
Weight (kg)	35.1 (16.8-58)	42.9 (28-54.4)	0.33
WBC (k/cumm)	15.5 (9.9-19.7)	17.6 (14.2-22.5)	0.15
Days of vomiting	2 (1-3)	2 (1.25-3)	0.89
Z score weight for age	0.49 (0.01-1.61)	0.88 (0.3-1.3)	0.45
Height/length	27% (n=10)	20% (n=6)	0.57
Initial imaging-ileus (n=47)*	20.8% (n=5/24)	34.8% (n=8/23)	0.34
Initial imaging-obstruction (n=49)*	19.2% (n=5/26)	26.1% (n=6/23)	0.73
Initial imaging-abscess (n=56)*	37.9% (n=11/29)	22.2% (n=6/27)	0.25

* Not all patients had data available for analysis. WBC: white blood cell count; PN: parenteral nutrition

Table 2- Outcome Data

	Early PN (≤ 2 days), n=37	Delayed PN (> 2 days), n=30	p-value
Postoperative abscess	40.5% (n=15)	43.3% (n=13)	1
Postoperative wound infection	16.2% (n=6)	6.7% (n=2)	0.28
Length of stay (days)	11 (8-14)	10 (9-12.8)	0.62
Time to regular diet (days)	7 (5-9)	8 (6.3-10)	0.22

PN: parenteral nutrition

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S73 - Teduglutide Reduced Parenteral Support in Children With Short Bowel Syndrome Associated-Intestinal Failure: a Phase 3 Study.

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Purpose: A 12-week, open-label study demonstrated the safety and efficacy of teduglutide treatment in children with short bowel syndrome associated-intestinal failure (SBS–IF). This 24 week, phase 3 study (NCT02682381; EudraCT 2015-002252-27) assessed the safety and efficacy of 0.025 and 0.05mg/kg teduglutide in children with SBS–IF.
Methods: Parenteral support (PS)-dependent SBS–IF patients aged 1–17 years chose to receive either standard of care (SOC) or teduglutide; teduglutide patients were double-blind randomized to receive 0.025 or 0.05mg/kg teduglutide once daily for 24 weeks. The primary endpoint was the number of patients who achieved ≥20% reduction in PS volume at Week 24. Efficacy data are from patient diaries; the study not powered for statistical comparison.
Results: 59 patients enrolled and all patients completed the study (0.025mg/kg, n=24; 0.05mg/kg, n=26; SOC, n=9). The primary endpoint was achieved by 54.2%, 69.2%, and 11.1% of patients in the 0.025mg/kg, 0.05mg/kg, and SOC groups, respectively. Enteral autonomy was achieved in 2 patients (8.3%) in the 0.025mg/kg group, 3 patients (11.5%) in the 0.05mg/kg group, and 0 patients in the SOC arm. Frequencies of the most common treatment-emergent adverse events in the 0.025mg/kg, 0.05mg/kg, and SOC groups, respectively, were pyrexia (33%, 42%, 44%), vomiting (42%, 31%, 56%), upper respiratory tract infection (29%, 31%, 44%), cough (8%, 38%, 33%), diarrhea (33%, 12%, 11%), nasopharyngitis (17%, 23%, 22%), abdominal pain (17%, 23%, 0%), dehydration (33%, 4%, 0%), increased ALT (29%, 8%, 0%), headache (13%, 19%, 11%), and catheter site erythema (0%, 4%, 22%).
Conclusions: Clinically meaningful PS reductions were attained for children with SBS–IF treated with teduglutide. The responder rate for PS volume reduction and enteral autonomy was numerically greater in the patient group treated with 0.05mg/kg teduglutide. The safety profile was favorable in both teduglutide dosing groups; no new safety signals were identified.

Financial Support received from: Shire Human Genetic Therapies, Inc.

S74 - A Case Study: Multidisciplinary Collaboration to Safely Discharge a Socially Complex Pediatric Parenteral Nutrition Patient Home to a Rural Area.

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Purpose: Introduction: This case study exemplifies the multidisciplinary effort required to safely discharge a medically and socially complex pediatric patient dependent on life sustaining home parenteral nutrition (HPN) to a rural area. A team comprised of nurse practitioners, social workers, nurses, dieticians, gastroenterologists, surgeons, case management, program coordinators and home infusion company (HIC) liaisons collaborated to identify and implement a safe discharge plan for this patient over a 2 month period. The outpatient HPN and Center for Advanced Intestinal Rehabilitation (CAIR) teams tracked the planning process in hopes of quantifying the tasks necessary to execute discharge. This included 11 bedside teaches to parents from HPN nurses (2 with the HIC liaison), 14 social work interventions, 8 nurse practitioner interactions, 14 home infusion company communications, 6 case management communications, 1 simulation experience and 1 outpatient follow-up visit 24 hours after local discharge. Ultimately, this discharge was unsuccessful and the patient was readmitted 4 days later for equipment and supply failures in the home.
Description:Patient is a 6 month old female with a complex past medical history: 34 weeks gestation, gastroschisis, medical NEC x2, short bowel syndrome, hyperbilrubinemia, parenteral associated liver disease, sacral dimple, clubfoot, malformation of right hand VSD, PDA, and PFO. She was transferred to our hospital at 4 months of age for nutrition optimization, initiation of Omegaven s/t PNALD and discharge planning on HPN. Family faced multiple discharge challenges including; managing medical facility being 4 hours from their rural home, financial stress from lack of parental employment s/t maternal and paternal

chronic illness, family facing eviction, excess unpaid utilities, no infusion nursing at home, minimal private duty nursing available and challenging supply availability from HIC.
Each issue was addressed and patient was discharged locally for infusion support and close follow-up. Supply and equipment failure issues were identified that were unable to be resolved outpatient. Patient was readmitted for inability to safely receive ordered PN. The team worked closely with the HIC to retrain parents on new equipment and discharge home again 5 days later. The patient has remained outpatient.
Results: Exceptional efforts required to prepare patient and family for discharge on HPN. Readmitted within 4 days s/t equipment failure. Outpatient barriers were identified. Through recognition of challenges, increased collaborative efforts, and alteration of equipment, this socially complex pediatric PN patient was safely discharged home.
Conclusions: A multidisciplinary team approach is necessary to safely discharge medically and socially complex pediatric patients' home on parenteral nutrition. There are limitations to the resources outpatient services can provide placing patients at risk for readmission. Collaborating with the HIC fosters safe discharge planning for home parenteral nutrition patients.
Methods: N/A
Results: N/A
Conclusions: N/A

Financial Support received from: N/A

S75 - Malnutrition in pediatric inpatients: diagnosis and follow-up at Boston Children's Hospital.
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Purpose: Malnutrition among hospitalized children has been associated with longer length of stay and higher readmission rates, but is often under-recognized. Our study aim was to describe the diagnosis, timeliness of management, and clinical characteristics of a sample of pediatric inpatients with malnutrition admitted to Boston Children's Hospital (BCH).
Methods: We identified all patients admitted to BCH from March 11 to March 18, 2018 with at least one body mass index (BMI) in the electronic medical record and recorded the BMI closest to the admission date. BMI is automatically calculated for patients with a documented weight and height. We excluded term infants <30 days old and preterm infants <1 month of corrected age. We collected patient demographic and admission characteristics from BCH's electronic data warehouse and by manual chart review. We defined malnutrition using the following age-based criteria: weight for length (WFL) z-score ≤ -2 for patients 1 month to < 2 years old, BMI z-score ≤ -2 for patients 2 to <18 years old, and BMI of <17 kg/m^2 for patients ≥ 18 years old. For malnourished patients, we reviewed registered dietitian (RD) and physician progress notes to determine whether malnutrition or failure to thrive was documented during the admission.
Results: 317 of 433 inpatients had a BMI. Of the 317 patients, 21 (7%) were malnourished. Among malnourished patients, 6 were <2 years old, 11 were 2-18 years old, and 4 were ≥ 18 years old. Mean WFL z-score was -2.7, mean BMI z-score was -3.7, and mean BMI was 16 kg/m^2. Mean length of stay (LOS) was 9.4 days (range 0.9-46 days) for malnourished patients and 5 days (range 0.4-62 days) for patients without malnutrition. RDs assessed 57% (12/21) of patients, at a mean time of 31± hours from admission (range 12-61 hours). For malnourished patients not seen by the RD during admission, mean LOS was 2.5 days (range 0.9-4.9 days). Of the 12 patients seen by RDs, malnutrition diagnoses were documented by at least one RD for 11 (92%) patients. Of the 21 malnourished patients, malnutrition diagnoses (typically using the term failure to thrive) were documented by at least one physician for 4 (19%) patients. Two of 5 patients with biochemical signs of refeeding syndrome were documented in RD progress notes to be at risk for refeeding syndrome. Thirty-three percent (7/21) of malnourished patients had a scheduled post-discharge outpatient nutrition follow-up appointment at a mean time of 58 days

(range: 35-59 days). Malnourished patients had a 30-day readmission rate of 33%, with mean time to readmission of 9.8 days (range: 0.5-27 days).
Conclusions: One in three malnourished patients were readmitted within 30 days. Malnutrition was poorly documented by physicians, suggesting a need for improved physician recognition and diagnosis of inpatient malnutrition. A substantial proportion of malnourished patients were not assessed by the dietitian during admission, perhaps due to a short LOS, highlighting the need for systematic discharge and follow-up to ensure malnutrition is treated as an outpatient.

Financial Support received from: Project was supported by Provider-Payor Quality Initiative

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Presented: 10th International Pediatric Intestinal Failure and Rehabilitation Symposium (PIFRS), September 20−22, 2018, Pittsburgh, PA

S76 - Efficacy, Growth, and Safety Outcomes of Teduglutide in Children with Short Bowel Syndrome–Associated Intestinal Failure: a Phase 3 Study.

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Purpose: A 24-week study (NCT02682381; EudraCT 2015-002252-27) in children with short bowel syndrome–associated intestinal failure (SBS–IF) treated with teduglutide found clinically meaningful reductions in parenteral support (PS) volume including a subset of patients who achieved enteral autonomy. Herein, we report the secondary results from this study.
Methods: Patients aged 1–17 years and their legally authorized representatives chose to receive either teduglutide or standard of care (SOC) for 24 weeks; teduglutide patients were double-blind randomized 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 0.025- and 0.05-mg/kg 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, a severe treatment-emergent adverse event was reported in 20.8%, 34.6%, and 0% of patients in the 0.025-, 0.05-mg/kg teduglutide, and SOC cohorts, respectively.
Conclusions: In children with SBS–IF, 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. The stable growth parameters indicate that the PS reductions implemented in teduglutide -treated patients corresponded to improved intestinal absorption without jeopardizing nutritional needs.

Financial Support received from: Shire Human Genetic Therapies, Inc.

Table. Change in Efficacy and Safety Endpoints

Parameter*	Teduglutide 0.025 mg/kg n=24	Teduglutide 0.05 mg/kg n=26	SOC n=9
PS volume			
Baseline, mL/kg/day	56.8±25.24	60.1±29.19	79.6±31.12
Change at Wk 24, mL/kg/day	–16.2±10.52	–23.3±17.50	–6.0±4.55
Change at Wk 24, %	–36.2±30.65‡	–41.6±28.90‡	–10.2±13.59
PS calories			
Baseline, kcal/kg/day	43.3±21.10	43.3±16.52	44.6±22.53
Change at Wk 24, kcal/kg/day	–14.9±8.29	–19.0±14.28	–0.5±4.95
Change at Wk 24, %	–42.5±29.15	–44.3±31.28	+1.9±17.58
PS days per week			
Baseline	6.5±1.10	6.6±0.79	6.6±1.33
Change at Wk 24,	–0.9±1.78	–1.3±2.24	0
Change at Wk 24, %	–16.0±31.34	–21.3±34.09	0
Citrulline			
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
Body weight *z* score			
Change at Wk 24	–0.02±0.37	–0.01±0.52	+0.14±0.32
Body height *z* score			
Change at Wk 24	–0.09±0.30	+0.04±0.24	–0.23±0.26
BMI score *z*			
Change at Wk 24	+0.11±0.49	–0.05±0.70	+0.37±0.59

*Data are mean ± SD values.
‡$P<0.005$ vs SOC
BMI=body mass index; PS=parenteral support; SOC=standard of care; Wk=week.

S77 - Assessment of registered dietitian competency for independent inpatient parenteral nutrition prescribing: A pilot quality improvement initiative

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Purpose: Safe prescribing of parenteral nutrition (PN), a high-risk therapy, requires familiarity with its indications, initiation, advancement, monitoring and complications. At Boston Childrens Hospital (BCH), registered dietitians (RD) function with a high level of independence in recommending daily PN orders to prescribing clinicians. Training RDs new to this role has relied on mentored clinical experience, without an established tool to systematically assess competency. In this quality improvement initiative, we piloted an inpatient PN prescribing assessment tool designed to evaluate RD competency.
Methods: In 2017, a multidisciplinary team of physicians and RDs identified core curriculum concepts considered essential for an RD to make independent recommendations for parenteral nutrition at our tertiary care hospital. The curriculum was informed by a literature review and the 2016 ASPEN PN curriculum. Based on these core concepts (Table 1), we developed an inpatient PN prescribing assessment tool consisting of learning objectives and 8 clinical cases with accompanying discussion questions designed to test knowledge and decision-making. Between July and December 2017, all RDs

whose scope of practice included PN management completed the discussion questions for each case either independently or in a group session lead by an experienced RD. For each case, mastery of key management concepts in question responses was reported as a qualitative score of “advanced”, “proficient” or “novice.” An experienced RD reviewed case answers in a group setting and provided participants with tailored feedback regarding knowledge gaps identified by the tool and suggested specific training strategies for knowledge acquisition. To evaluate knowledge retention, the initial cases were revised to retest the same core concepts under different parameters. In May 2018, 9 new cases were administered either individually or in a group setting with similar qualitative scoring and tailored participant feedback.

Results: Of the eight RDs who completed both sets of cases (17 total), three scored proficient or advanced for all. Three RDs scored proficient or advanced for all eight cases on the first set and then scored as novice for two to three cases on the second set. Two RDs scored as novice for three cases each on the first set and received individual, tailored feedback regarding their knowledge gaps and suggestions for further training included provision of new educational materials, and recommendations to attend multidisciplinary PN rounds. These two RDs improved in two or three cases each on the second set. The core concepts most commonly answered poorly were indications for nutrition support and critical illness. The decline in performance of three dietitians upon reassessment could reflect inadequate mastery of those concepts, but alternative explanations include poorly worded cases or lack of engagement in the assessment process.

Conclusions: A tool to assess competency for independent PN prescribing can inform and complement mentored clinical experience in achieving competency. Systematic assessment of dietitian competency for independent PN prescribing identified areas requiring additional training for competency. Targeted additional training resulted in improved proficiency upon reassessment for some but not all RDs, suggesting that refinement of the tool may yield both improved competency measurement and competency scores.

Financial Support received from: N/A

Table 1. PN Cases

Cases	*Pediatric Parenteral Nutrition Core Curriculum Areas*
1	Indications for Nutrition Support
2	Central venous access
3	Nutrition management of a child with short bowel syndrome
4	Hyperglycemia and hypoglycemia
5	Hypertriglyceridemia
6	Critical Illness
7	Macronutrient distribution; overfeeding and underfeeding
8	Prematurity
9	Peripheral PN; appropriateness and limitations

S78 - Patterns of Parenteral Nutrition Use in Four Intensive Care Units in a Children’s Hospital

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Purpose: Parenteral nutrition (PN) is an essential therapy for select critically ill children in the intensive care unit (ICU). We aimed to examine the pattern of PN usage in four ICUs at our institution, and identify opportunities for modifying practices.
Methods: In this single center, prospective observational cohort study, we enrolled consecutive children (0 to 18 years), initiated on PN after admission to one of the 4 ICUs at a children's hospital (medical/surgical, medical, neonatal, and cardiac) over a 3 month period. We excluded patients receiving PN at the time of ICU admission. We recorded clinical characteristics, nutritional status, and details of nutrition delivery (indications, timing, and duration of PN use, and EN intake at the time of PN initiation and discontinuation) for 10 days (or until ICU discharge if earlier). PN initiation was deemed "early" if prior to day 3 in the ICU, and duration of PN use was deemed "short", if 4 days or less. Early initiation or short duration were a priori defined as potentially modifiable PN practices. Total energy and protein delivery were recorded.
Results: 95 of 99 eligible patients were included; 4 patients transferred to outside hospitals on PN during the study. The mean (SD) WAZ on admission was -0.78 (1.48) and WHZ/BMIZ was 0.13 (1.42), 75 children (79%) were well nourished (BMIZ >-2 to <+2) (Table 1). Figure 1 shows total energy intake during the study period. Reasons for starting PN included; a) hemodynamic instability (41%), b) ileus (29%), c) EN intolerance (6%), or d) as a supplement to insufficient EN (8%). Median (IQR) time to initiate PN after ICU admission was 4 (1, 6) days, which was significantly different among the 4 ICU's. PN duration was 8 (5, 14) days. Figure 2 classifies patients based on the timing and duration of PN. 33% of the cohort received early PN with median PN duration of 10 (5, 14) days (of these, 70% were post-surgical) and 17% had a short PN course. The late PN group had greater WAZ decline at hospital discharge (-0.73 vs. -0.31 p=0.02) and longer hospital stay (36 vs. 21 days p=0.002) compared to early PN. Median energy intake was 0% of prescribed at time of PN initiation and 32% at PN discontinuation (n=47).
Conclusions: PN practice patterns varied significantly among the 4 ICUs in our study. Early PN initiation or short duration PN was recorded in 45% of the cohort, presenting opportunities for potential practice review and modification in this well nourished cohort. Patients in the late PN group had significantly greater nutritional deterioration and longer hospital stay. The relationship of PN timing and duration on patient outcomes must be further examined.

Financial Support received from: N/A

Table 1. Baseline characteristics at ICU admission of patients receiving PN, median (IQR) except where noted

Characteristic	MSICU (n=35)	CICU (n=37)	MICU (n=4)	NICU (n=19)	P value
Age (months)	40.2 (17.1, 83.8)	2.2 (0.2, 14.0)	75.7 (16.2, 196.4)	0.3 (0.1, 2.9)	<0.001
Sex (male), n (%)	19 (54)	19 (51)	3 (75)	11 (58)	0.843
Weight	14.9 (11.1, 25.0)	3.9 (3.0, 9.1)	22.1 (7.5, 46.2)	3.5 (2.9, 4.2)	<0.001
WAZ	-0.33 (-1.39, 0.54)	-0.81 (-1.57, -0.26)	-2.20 (-2.60, -0.08)	-0.13 (-2.32, 0.29)	0.174
WHZ/BMIZ	0.44 (-0.38, 1.10)	0.22 (-0.84, 0.87)	-0.06 (-1.21, 0.45)	-0.15 (-0.94, 1.33)	0.575
ICU Days at PN initiation	1 (1, 4)	4 (4, 8)	8 (3.8, 31)	2 (1, 5)	0.001

Table 2. Patient related outcome data, median (IQR) except where noted

Characteristic	MSICU	CICU	MICU	NICU	P value
PN duration (Days)	11 (6, 16)	7 (4.5, 10.5)	13 (8.3, 14.8)	10 (5, 30)	0.085
ICU Length of Stay (LOS)	9 (6, 15)	17 (13, 27)	62 (38, 75)	15 (9, 40)	<0.001
Hospital LOS	24 (15, 57)	37 (26, 70)	80 (44, 96)	36 (19, 61)	0.068
WAZ (Hospital discharge)	-0.60 (-1.42, 0.65)	-1.85 (-3.37, -0.71)	-2.25 (-3.5, -0.37)	-1.83 (-2.52, -0.07)	0.001
Change in WAZ (Hospital discharge)	N=31 0.02 (-0.26, 0.24)	N=36 -0.87 (-1.61, -0.29)	N=4 -0.69 (-1.25, 0.72)	N=17 -0.89 (-1.50, -0.45)	0.001

Figure 1. Energy intake via parenteral and enteral nutrition support

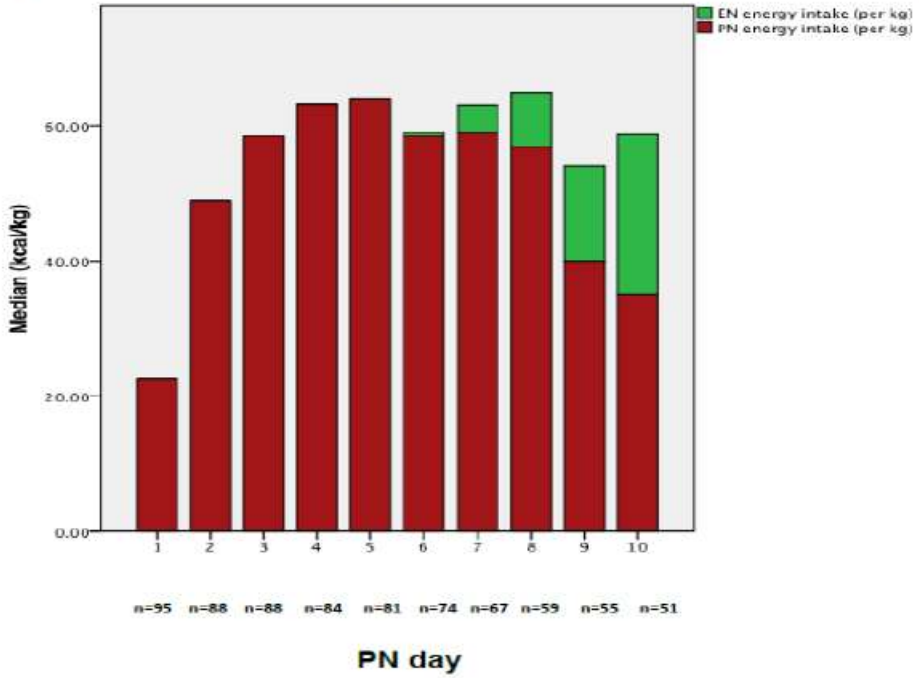

Figure 2. PN Practice Patterns; Timing versus Duration

	Early PN: Initiated at median ICU day (IQR) 1 (1,1) n (%)	Late PN: Initiated at median ICU day (IQR) 5 (3.5, 8) n (%)
Short PN Duration: ≤ 4 days n (%)	4 (4.2%)	12 (12.6%)
Long PN Duration: >5 days n (%)	27 (28.4%)	52 (54.7%)

S79 - Effect of Routine Carnitine Supplementation on Carnitine Profile and Lipid Tolerance in Preterm Neonates.

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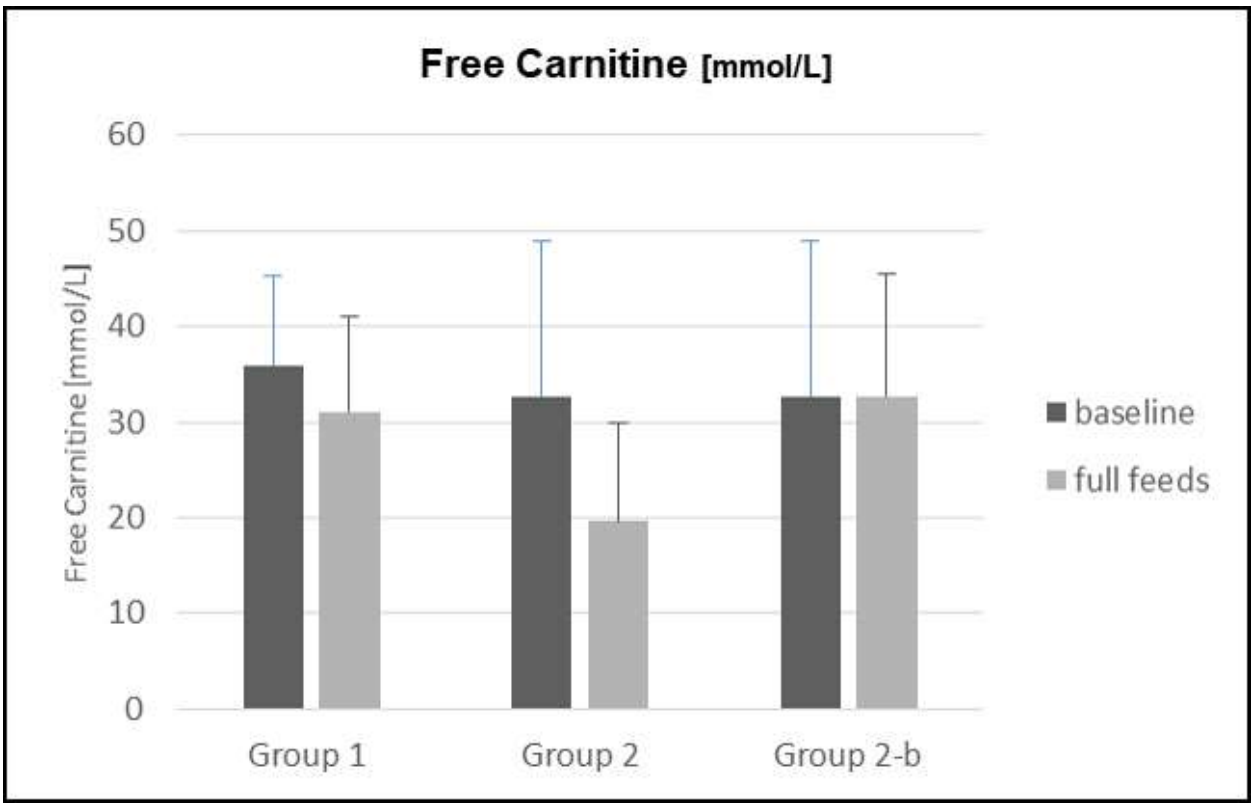
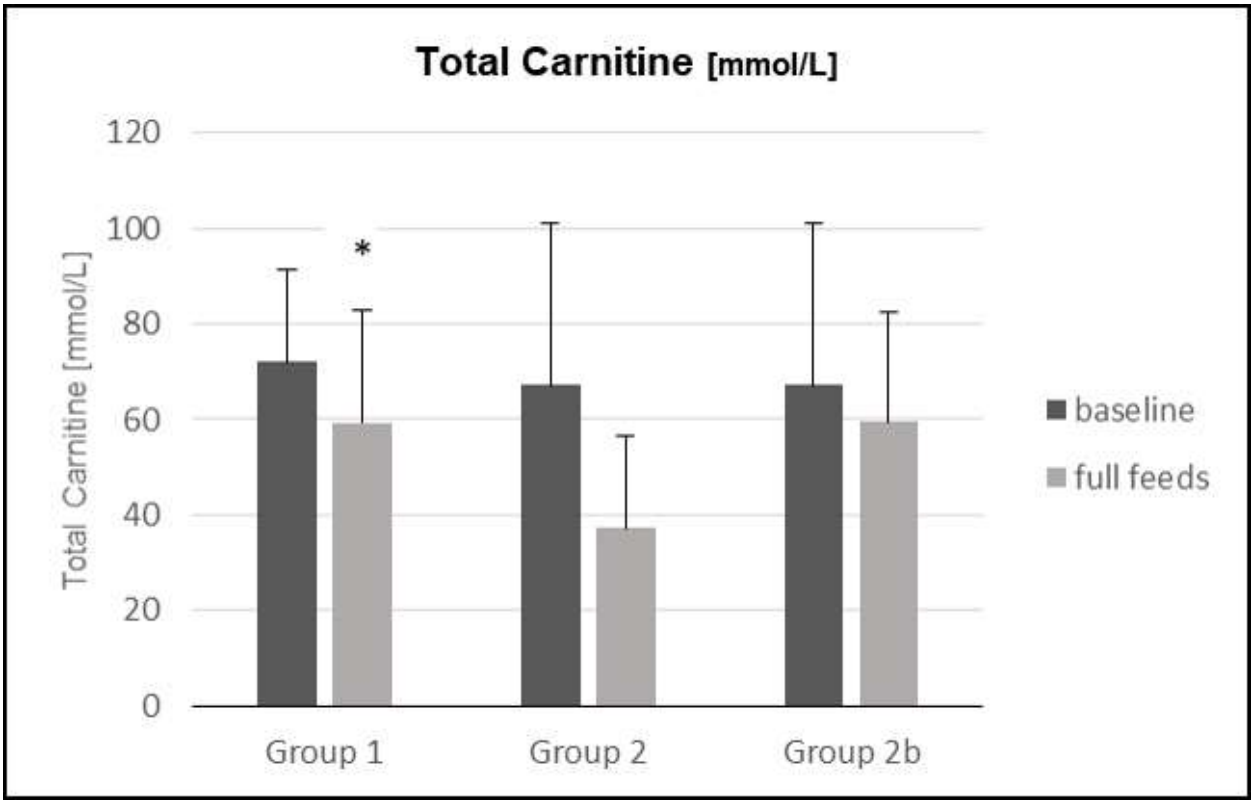
Purpose: Neonates are at increased risk for developing carnitine deficiencies because of immature endogenous carnitine synthesis. In preterm infants, this may be exacerbated with decreased carnitine tissue stores, lack of placental carnitine transfer that normally occurs during the third trimester, and dependence on carnitine-free parenteral nutrition (TPN). Guidelines regarding parenteral carnitine provision and dosage are limited, resulting in a wide variety of practices among neonatal intensive care units. In 2012, The American Society for Parenteral and Enteral Nutrition published a position paper recommending carnitine supplementation at 2-5mg/kd for preterm infants, establishing guidelines for the first time; however, this dosage was based on limited data available. Our objective was to analyze carnitine profiles from our unit before and after a protocol of routine supplementation of carnitine was implemented, to determine the efficacy of this dosage in maintaining normal serum carnitine levels and improving lipid tolerance.
Methods: A retrospective chart review was conducted on infants born <31 weeks gestation and <1250gm, after routine parenteral carnitine supplementation of 5mg/kg/day was started (Group 1) and compared to historical controls before supplementation (Group 2). Baseline free and total carnitine data were collected from routine newborn screens, and again once full feeds were reached or after >1 month of TPN if feeds were not established and carnitine data was available. Peak triglyceride levels and the number of days to reach full lipid dose (Intralipid, 3gm/kg/day) were also collected. Data was analyzed using chi-square and t-tests.
Results: Carnitine and lipid data of 63 infants were recorded for Group 1 and compared to 29 infants in Group 2. Demographic and clinical characteristics of the two groups were comparable. At baseline, free and total carnitine levels between both groups were similar (free and total carnitine 35.9$\pm$9.4mmol/L and 72.1$\pm$19.2mmol/L in Group 1 versus 32.7$\pm$16.3mmol/L and 67.1$\pm$34.1mmol/L in Group 2, p=NS). At full feeds, infants in Group 1 had significantly higher free and total carnitine levels (31.1+10 and 59.2+23.8mmol/L in Group 1 versus 19.6+10.4 and 37.2+19.3mmol/L in Group 2; p<0.0001). No biochemical carnitine deficiencies (free carnitine <10mmol/L) were reported in Group 1, compared to three cases reported in Group 2. A sub-analysis of data of 7 infants who did receive IV or enteral carnitine supplements in Group 2 (started empirically with prolonged TPN duration and suspected deficiency) revealed carnitine levels at >1M of TPN similar to Group 1 (Group 2b; free and total carnitine 32.7+12.9 and 59.4+23.1mmol/L, respectively). No difference was observed in initial and peak TG levels and days to reach full lipid dose (p=NS).
Conclusions: Preterm infants routinely supplemented with parenteral carnitine at 5mg/kg/day demonstrated higher free carnitine levels at full feeds, with no reports of low carnitine levels associated with this dosage. No effect of parenteral carnitine supplementation was observed in lipid tolerance. A routine dosage of 5mg/kg/day of parenteral carnitine appears adequate to maintain normal serum carnitine levels in preterm infants.

Financial Support received from: N/A



Free Carnitine [mmol/L]



Total Carnitine [mmol/L]

S80 - Neonatal Registered Dietitians with an Integrated-Role in the Neonatal Intensive Care Unit Improves Nutrition Intake and Growth for Very-Low-Birth-Weight Infants.

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Purpose: Background: Extrauterine growth retardation (EUGR) is defined as discharge wt <10% in preterm infants. EUGR is linked to poorer neurodevelopmental outcomes, therefore NICUs strive to prevent this occurrence. In 2012-2014, >50% of our VLBW infants, discharged with EUGR. This finding prompted a reevaluation of nutrition practices and the integration of a nutrition-support-trained RD into the team to improve nutrition and growth outcomes.

Objective: The primary aim was to determine if having an integrated neonatal RD reduces the rate of EUGR in VLBW infants; secondary outcomes looked at improving nutrition intake and growth velocity.
Methods: Methods: This study was a retrospective chart review of VLBW (< 1500 grams) infants in St. Luke's Children's Boise NICU. We compared growth and nutrition data when there was no/non-integrated RD (*Pre-RD: Oct 2013- May 2014*) to data after implementation of an integrated RD (*Post-RD: Jan 2016-Aug 2016*). Other variables included: LOS, birth wt (BW), gestational age (GA), day regain to BW, growth velocity, and calorie/protein intake. Continuous data were analyzed using ANOVA and categorical data using chi-square. P<0.05 was considered statistically-significant.
Results: Results: In total, 54 VLBW infants were included (pre-RD: n=27; post-RD: n=27). No differences between groups for BW (1045.6 ± 305.5 g), GA (28.5 ± 2.9 wks), Gender (50% male) or LOS (65 ± 36 d) were observed. Less EUGR was observed in the post-RD group (20%) compared to the pre-RD group (58%); chi-sq: 0.013.
Conclusions: Conclusion: Having a nutrition-support-trained RD integrated into the NICU positively impacts nutrition outcomes in VLBW infants, as shown by improved growth velocity, higher nutrition intakes, and less EUGR. This data strongly supports the role of the trained neonatal/nutrition-support RD in the NICU, as well as for developing nutrition guidelines and PN/EN order-writing.

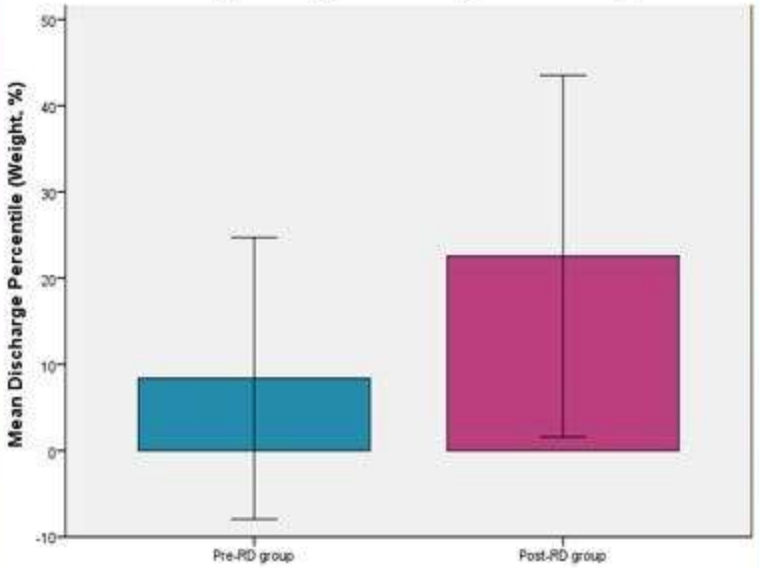
Financial Support received from: N/A

Table 1. Characteristics of infants in each group

	Pre-RD	Post-RD	p-value
LOS (days)	64.8 ± 44.6	65.2 ± 25.8	0.97
GA	29.2 ± 3.1	27.81 ± 2.6	0.086
BW (grams)	1045.56± 345	1045.74± 267	1
Gender (% Male)	52%	48%	1
Delivery (% CS)	74%	63%	n/a

No significant differences between study groups

Figure 1. Post-RD Group showed more infants with discharge weight > 10% (less EUGR)

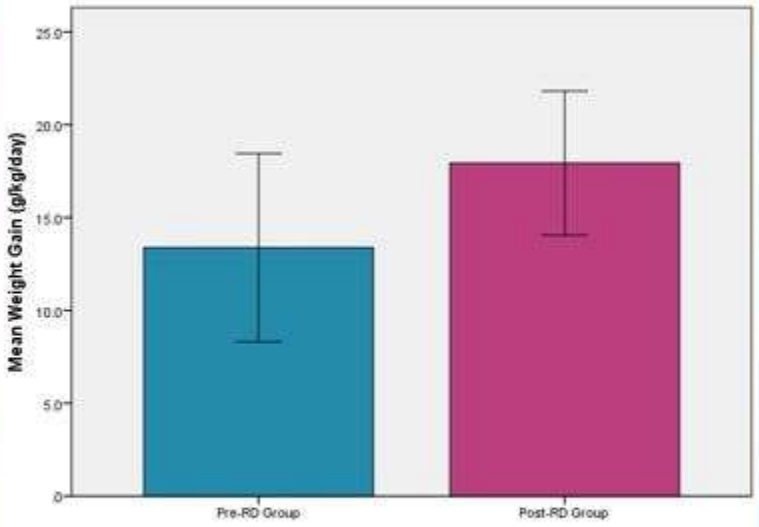


Error Bars: ± 1 SD

pre-RD mean discharge wt%: 8.4 +/-16.3 (more EUGR);

post-RD mean discharge wt%: 22.6% +/- 21% (less EUGR); (p=0.008).

Figure 2. Post-RD Group showed more infants met weight-velocity goals



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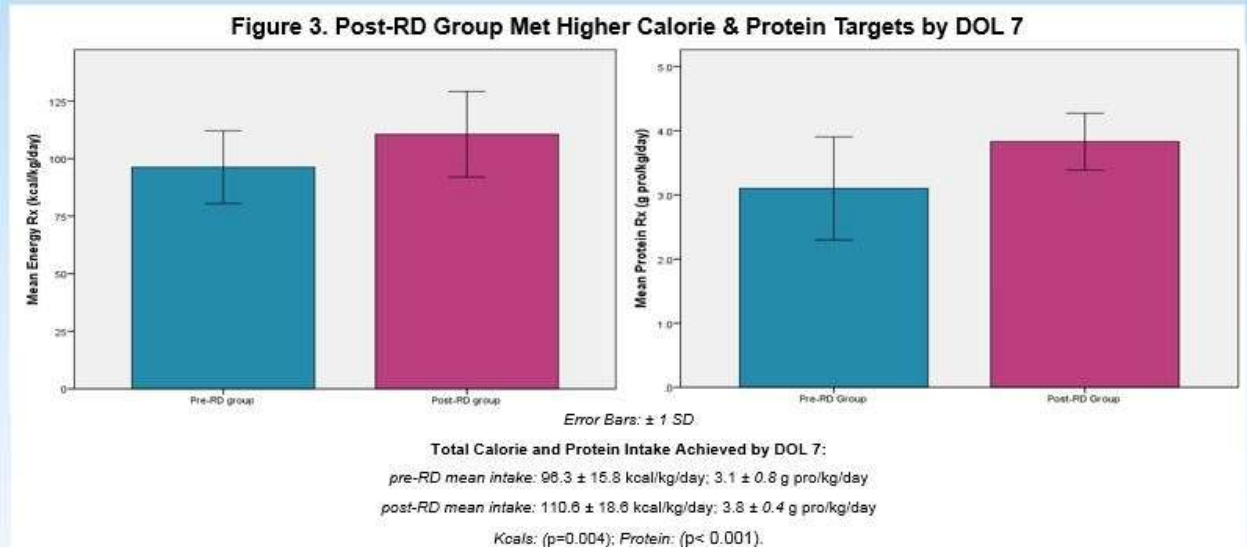
***Growth Velocity:** 1-wk after achieving full-volume/fortified feeds*

pre-RD mean growth velocity: 13.4 ± 5.1 g/kg/day.

post-RD mean growth velocity: 17.9 ± 3.9 g/kg/day; (p=0.001).



S81 - Iron Overload and Persistent Cholestasis Requiring Chelation Therapy in an Infant with Short Bowel Syndrome: A Case Report.

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Purpose: Introduction: Iron is an essential mineral that is required for blood production and is bound mainly to ferritin in the liver or in the plasma to transferrin. Short bowel syndrome (SBS) patients often require intravenous (IV) iron supplementation due to gastrointestinal malabsorption. During times of iron overload, nontransferrin-bound iron contributes to free radical production, leading to cirrhosis, fibrosis, and inflammation. Chelation therapy is used in cases of severe iron overload to remove excess iron accumulation and reduce complications.[1] We present an infant with SBS complicated by intestinal failure associated liver disease (IFALD) and iron overload likely due to daily IV iron infusions who required chelation therapy.

Description: A 5 month old male, was a former 35-week gestation infant with SBS secondary to prenatally diagnosed gastroschisis and multiple intestinal atresias. He was left with 55cm of residual small bowel in continuity at the level of the distal transverse colon. His course was complicated by IFALD, cholestasis and iron deficiency anemia. He was fully dependent on parenteral nutrition (PN) and previously received 1g/kg/day of soy bean lipid emulsion. He was transferred to our institution for management of intestinal failure. On admission, he had an elevated ferritin level (5291 ng/mL; reference range 10-75 ng/mL) and an elevated direct bilirubin level (9.9 mg/dL; reference range 0.0-0.4 mg/dL). Per his transfer records, he had been treated for anemia with daily IV iron dextran added to the PN, dosed at 0.5-1mg/kg/day for a total of 147 days until transfer to our institution. IV iron was discontinued on admission to our facility. His IV lipid was changed to 1g/kg/day of fish oil lipid emulsion (FOLE) to treat IFALD. The hematology team consulted and recommended cardiac and liver magnetic resonance imaging (MRI) to assess iron accumulation. The MRI demonstrated an estimated 4 mg iron/g dry weight in the liver (reference range 0.17-1.8mg iron/g dry weight[1]). The hematology team recommended against chelation therapy unless the liver iron concentration was >10mg iron/g dry weight. His direct bilirubin levels rose over the next 2 weeks, reaching a peak of 16.4 mg/dL. After assessing his cholestasis, the hematology team recommended chelation therapy with IV deferoxamine, and he underwent a 4 week treatment dosed at 2mg/kg/hr over 24hrs. Upon completion of chelation, his direct bilirubin level declined to 6.9 mg/dL. Over the next 2 weeks, the direct bilirubin levels continued to decrease, but then plateaued for the following 3 weeks. Due to this plateau, he underwent a second course of chelation with IV deferoxamine dosed at 0.6mg/kg/day for 7 days. The day chelation therapy was completed, he acquired a staph epidermis central line associated bloodstream infection, and an associated spike in his direct

bilirubin level. Over the next two months, his direct bilirubin level normalized. The FOLE dose was unchanged since admission.
Conclusions: IV iron therapy is often used for SBS patients, typically given as intermittent maintenance or repletion dosing and levels carefully monitored. As there is no bodily mechanism to excrete iron, chelation therapy is used in cases of severe overload to restore normal iron levels and to reverse or reduce the organ damage. In this case report, chelation therapy assisted in reversing cholestasis in an iron overloaded patient with IFALD that was unresponsive to FOLE therapy alone. Patients with IFALD requiring IV iron should be carefully monitored and dosage tailored accordingly based on laboratory trends.
Methods: N/A
Results: N/A
Conclusions: N/A

Financial Support received from: N/A

ENCORE

S82 - An Enteral Nutrition Bundle to Reduce the Incidence of Necrotizing Enterocolitis in a Level III Intensive Care Nursery

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S83 - Pureed Complementary Foods by Gastrostomy tube Improves Gastroesophageal reflux and Oral Intake in Infants and Young Children.

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Purpose: Children with gastrointestinal anomolies requiring neontal surgery are at risk for gastroesophageal reflux disease and its negative effect on nutritional status. Blenderized food regimens have shown promise in improving the symptoms of GERD and oral feeding in older children. However, these diets are not routinely used in children under two, due to concern for nutritional inadequacy, maintenance of growth, and premature introduction of bovine milk. The objective of our study was to develop a protocol to safely introduce a pureed diet by GT in post-surgical infants and observe outcomes on growth, GERD, and nutritional status.
Methods: Prospective cohort study of the initiation and tolerance of a pureed complementary foods diet i post-surgical children aged 5-14 months old with GERD and oral aversion, and dependence on GT feedings. Anthropometric measurements and nutrient intake analyses were completed by the registered dietitian at the start and end of the study. A GERD symptom survey was completed by the child's primary caretaker at the start and end period as well.
Results: Seven patients were enrolled between October 2017 - July 2018. Median age at initiation was 10 months. Patients were followed for an average of 6 months (range of 3-10 months). 100% of the patients maintained or improved their weight for age z-score, 71% reported improvement in GERD symptoms, and 71% experienced improved oral acceptance. All children met macro- and micro-nutrient requirements after initiation of the new diet regimen, and 43% of the children had improved micronutrient intake as a result of the intervention. 100% of the families chose to continue the diet after completion of the study period.
Conclusions: A blenderized complementary foods diet fed via gastrostomy tube was safely introduced in post-surgical infants and young children. This dietary intervention shows promise in its ability to improve GERD symptoms, oral intake, and micronutrient intake, all while allowing continuation of normal growth.

Financial Support received from: N/A

S84 - A Double-Blind, Randomized, Controlled Study Evaluating the Effects of Vitamin D Supplementation in Preterm Infants Fed Transitional Formula.

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Purpose: Transitional formulas, also referred to as preterm discharge formulas, (22 kcal/ounce), are recommend for infants less than 35 weeks gestation at birth. However, few data exist related to follow-up of infants receiving these formulas who were born between 28-34 weeks gestation. Specifically, there is concern that these infants may require additional vitamin D supplementation to promote bone growth and bone mineral metabolism. The optimal level of vitamin D intake and its effect on preterm infants based on their birth weight (BW) is unknown and therefore there are no evidence-based guidelines for vitamin D use in preterm infants. The purpose of this study was to determine the effect of increasing the vitamin D content in the diet by supplementing transitional formula with vitamin D drops when assessed at approximately 52 weeks post-menstrual age (PMA).
Methods: In this randomized, placebo-controlled, double-blinded study, preterm infants, 28 0/7 – 34 6/7 weeks PMA at birth and between 1000-2250 grams BW, were enrolled and any initial feeding strategy was permitted. Infants with other major illnesses were excluded. Enrolled infants were expected to receive primarily transitional formula (defined as 80% of enteral intake or up to 2 breast milk feedings per day) by 38 6/7 weeks PMA or hospital discharge. At 38 weeks PMA or approximately 1 week prior to hospital discharge, infants were randomized to study drops providing 400 IU/L of vitamin D (investigational arm) or placebo that continued until 52 weeks PMA. At enrollment and at outpatient follow-up visit at 52 weeks PMA (50-54 weeks PMA range), diet history, anthropometric measurements, and labs: serum 25-hydroxyvitamin D (25-OHD), parathyroid hormone, alkaline phosphatase activity level, and serum phosphorous were performed.
Results: Sixty infants were enrolled. There were 39 infants analyzed after including data from only one infant in twin pairs or triplets. In addition, 12 infants dropped out after hospital discharge and lab draw was unsuccessful on one infant. Therefore, 26 infants completed the study. Mean gestational age at birth was 31.5 ± 1.4 weeks and BW was 1547 ± 320 grams. Further data is provided in Table 1. Changes in lab values are shown in Table 2. 25-OHD levels in the control group increased from 29.8 ± 11.6 to 36.2 ± 6.5 ng/mL ($p=0.084$) while levels in the intervention group increased from 24.0 ± 10.5 to 53.0 ± 11.2 ng/mL ($p\leq0.001$). Infants who received the intervention drops had significantly higher 25-OHD levels at the end of the study compared to infants who received the control drops ($p\leq0.001$). 2/13 (15%) control infants and 7/13 (54%) intervention infants had 25-OHD levels < 20 ng/mL at enrollment ($p=0.097$). No infants in either study arm had 25-OHD levels <20 ng/mL at 52 weeks PMA respectively.
Conclusions: Addition of 400 IU/L of vitamin D as a supplement to transitional formula leads to significantly higher serum 25-OHD at 52 weeks PMA.

Financial Support received from: Mead Johnson Nutrition provided study formula and research support for this study.

Table 1 - Baseline Characteristics

	Control Group (n=13)	Intervention Group (n=13)	p-value
Gender (M/F)	3/10	5/8	0.7
Gestational Age at Birth (wk)	30.9 ± 1.1	32.0 ± 1.5	0.05

Race, n (%) Caucasion Black Hispanic Asian	 6 (47%) 3 (23%) 2 (15%) 2 (15%)	 7 (54%) 3 (23%) 2 (15%) 1 (8%)	1.0
Birth weight (g)	1495 ± 297	1618 ± 347	0.3
Birth length (cm)	39.6 ± 3.1	41.2 ± 3.3	0.2
Birth head circumference (cm)	27.7 ± 1.7	29.9 ± 2.1	0.007

Table 2 – Pre and post measurements of intervention and control groups and comparisons of groups' changes.

	Control Group (n=13)		Intervention Group (n=13)		p=value
	Start of Study	End of Study	Start of Study	End of Study	
25-OHD, (ng/mL)	29.8 ± 11.6	36.2 ± 6.5	24.0 ± 10.5	53.0 ± 11.2	≤0.001
Intact PTH, (pg/mL)	43.9 ± 22.9	13.6 ± 7.7	48.2 ± 29.3	17.4 ± 7.9	0.2
Phosphorous, (mg/dL)	6.7 ± 0.3	6.8 ± 0.4	6.9 ± 0.5	6.5 ± 0.4	0.07
Alkaline Phosphatase, (units/L)	191 ± 46	200 ± 55	218 ± 45	212 ± 35	0.5

S85 - Nutrition Impact of Implementing a Small Baby Unit within the Neonatal Intensive Care Unit.
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Purpose: Designation of a Small Baby Unit (SBU) has been shown to improve some patient outcomes. Potential benefits of SBUs include continuity of care delivered by specifically trained caregivers and consistent protocols. In April 2018 our NICU created a SBU for infants between 22-30 weeks birth gestation. SBU specific nutrition protocols were created based on infant birth weight. The aim of this study was to determine if SBU creation improved nutrition and growth related outcomes.
Methods: A convenience sample of patients admitted to the SBU at a 75-bed level IV children's hospital NICU was obtained. SBU patients (n=36) were matched with historical controls admitted to the NICU between June 2016 to March 2018, prior to creation of the SBU. Matching was based on gender, birth gestational age and birth weight. Weight, head circumference (HC) and length were collected at birth, SBU discharge (30 weeks) and NICU discharge. Anthropometric percentiles and Z-scores were plotted on the Fenton growth chart. Nutrition data obtained included hours to initiation of enteral nutrition (EN), substrate of first feeding, days of life (DOL) to feeding fortification, volume at which feedings were fortified, DOL to full EN, DOL to regain birth weight, and parental nutrition (PN) days. Changes in anthropometrics and nutrition milestones were analyzed using t-tests.

Results: Subject characteristics were similar between groups at the start. Hours to first EN were significantly less in SBU subjects than in controls (21.64 ± 2.02 hours vs. 34.21 ± 3.88 hours, p=0.006). Also statistically significant was that SBU subjects took fewer DOL to regain birth weight (10.38 ± 0.88 days vs. 13.3 ± 0.88 days, p=0.01). DOL to feeding fortification, volume at feeding fortification, DOL to full EN and PN days were not statistically significant between groups. With the exception of length Z-score in the SBU group, all other anthropometric Z-scores showed a statistically significant ($p < 0.05$) decrease from birth to SBU discharge for both groups. Since at the time of data collection not all SBU subjects had been discharged from the NICU, further analysis was conducted using only matched pairs with available data at NICU discharge (weight [n=24], HC [n=23], length [n=23]). From birth to NICU discharge, weight and length Z-scores showed statistically significant ($p < 0.05$) decreases for both groups. HC Z-score decreased from birth to NICU discharge in both groups but the change was not statistically significant.
Conclusions: Subjects in the SBU did regain their birth weight in fewer days and received their first EN

feeding sooner than those in the control group. These changes are likely related to the SBU nutrition protocol's aim of administering earlier EN, quicker EN advancement and beginning EN fortification sooner leading to improved nutrition delivery. Growth outcomes were not improved in SBU subjects versus controls. In both groups, most anthropometric Z-scores had worsened upon SBU discharge at 30 weeks and at NICU discharge when compared to birth. Further investigations into the impacts of SBU implementation, as well as, strategies for improving SBU subject growth are warranted.

Financial Support received from: N/A

POSTER OF DISTINCTION

S86 - Decrease in Central Line Utilization with Improved Growth in VLBW Newborns Following Feeding Roadmap Implementation

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Purpose: Early enteral nutrition in very low birth weight (VLBW) newborns has been shown to be protective against common neonatal morbidities. Central line associated blood stream infections are also of concern in immunocompromised preterm newborns. The objective of this quality improvement project was to implement a standardized feeding advancement roadmap in an attempt to decrease central line utilization and improve early enteral feeding and growth.
Methods: The registered dietitian and medical director of the Neonatal Intensive Care Unit (NICU) developed an enteral feeding initiation and advancement roadmap for VLBW infants (birth weight < 1500 grams). A retrospective analysis of two cohorts, one compromising six months prior to first protocol implementation and one six months after final protocol implementation, was completed in regards to: time to first enteral feed, days to full feeds, age at full feeds, composition of first feed, central line days, peripherally inserted central catheter (PICC) utilization, and average weight gain. Means for continuous variables were compared with Student's t-test while proportions were compared with X^2 between groups.
Results: 162 patients were included in the analysis. 80 infants were identified in the six months before protocol implementation and 82 after final protocol implementation. The mean (SD) days to initiation of enteral feeds were significantly different between the two groups 3 (2) vs. <1 (1) ($p<0.0001$) as was the mean (SD) days to full feeds, 12 (8) vs. 10 (4) ($p = 0.03$); and mean (SD) age (day of life) at full feeds, 15 (9) vs. 11 (4) ($p=0.0002$). The incorporation of donor milk into the protocol significantly increased the percentage of infants exposed to human milk as their first feed 71% vs. 91% ($p=0.0009$). Central line days were significantly shorter in the post protocol group, mean (SD) 11 (16) vs. 6 (8) ($p=0.02$) and they had less utilization of PICC lines 35% vs 12% ($p=0.0005$). The two groups also had different growth velocities with the pre-protocol group averaging 21 grams/day vs 24 grams/day in the post-protocol group ($p< 0.0001$).
Conclusions: Implementation of a feeding initiation and advancement roadmap lead to significant reductions in the time to initiation of achievement of enteral feedings and reduced central line utilization. Due to the small number of cases of necrotizing enterocolitis and central line infections in our cohorts, we were unable to show a significant difference in their incidence but the process measures we improved can be helpful in addressing common risk factors for both outcomes.

Financial Support received from: N/A

S87 - The Role of Specialized Nutrition Support for Wound Care in a Pediatric Patient with Hidradenitis Supprativa

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Purpose: Introduction: Hidradenitis Suppurativa (HS), also known as acne inversa, is a chronic, follicular inflammatory skin disorder characterized by formation of sub-cutaneous cysts that can erupt, creating deep wounds with significant protein, fluid and associated micronutrient losses. While no specific medical nutrition therapy has been shown to cure HS, it has been suggested that eliminating dairy and brewer's yeast from the diet may be helpful. We present the nutritional management of an adolescent female patient with HS successfully managed by a multidisciplinary team at our institution.
Case Presentation: A 17 year old female patient with history of HS, obesity, iron deficiency anemia, depression and recently diagnosed eating disorder was admitted for severe malnutrition (intentional weight loss of 41% over previous 1.5 years) and wound management related to severe HS. To meet nutritional requirements and support poor oral intake, supplemental enteral nutrition (EN) was initiated 4 days after admission, using a standard adult formula. As oral intake declined further, with minimal improvement in weight, laboratory values and wound healing, EN presciption was increased so that oral and enteral feeds provided a total caloric intake REE x 2.4 protein intake of 2.5 g/kg. Oral iron, zinc and vitamin C supplementation were added to further promote wound healing. One month after admission, she underwent surgical debridement with primary closure of right axillary wound and Jackson-Pratt drain placement in left axillary wound. Two months after admission because of poor wound healing, she was put on a dairy free diet (elemental formula with a free amino acid modular) with no change in caloric and protein intake. Over the ensuing months, nitrogen balance studies were obtained to monitor protein losses, kidney function and nutrition-related laboratory values were closely monitored to optimize micronutrient supplementation (iron, zinc and vitamin C). At four months of hospitalization because of significant improvements in wound appearance and laboratory values she underwent sacral wound debridement with a fasciocutaneous flap and closure of bilateral groin wounds. During the subsequent weeks of hospitalization, caloric and protein needs decreased (REE x 1.3; 2 g/kg/day) as wounds healed, weight increased and patient no longer met criteria for severe malnutrition, *-EN was weaned as her oral intake improved. She was discharged home after 6 months of admission on a full oral diet including high protein oral supplements and micronutrient supplementation.
Discussion: We present the successful management of a female adolescent patient with complex HS who had suboptimal macro and micro nutrient intake preventing wound healing. Determining protein losses by nitrogen balance, optimizing calorie, protein and micronutrient intake and changing her to an elemental formula supported wound healing. Close monitoring by the RD, along with Nutrition Support Team involvement and sequential laboratory testing allowed us to adequately support her nutritional needs to control inflammation and promote wound healing.
Conclusion: Care for patients with HS differs from patients with other types of wounds. There is a dearth of literature and no evidence-based nutrition practice guidelines. We report successful multidisciplinary approach to the management of complex HS using dairy free enteral nutrition, laboratory monitoring and micronutrient supplementation to optimize nutrition intake. This case report will add to the literature as we emphasize the impact of nutrition support for wound care in this rare disorder.
Methods: N/A
Results: N/A
Conclusions: N/A

Financial Support received from: N/A

S88 - Effects of preoperative nutritional status on factors influencing recovery from posterior spinal fusion for adolescent symptomatic scoliosis

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Purpose: Posterior spinal fusion for patients with neuromuscular scoliosis, a congenital/genetic/developmental delay diagnosis, and cerebral palsy (CP) may require prolonged hospitalization and carries a risk of delayed functional recovery. Early recovery depends on early mobilization and nutrition. However, little is known about the quality of recovery obtained when an accelerated recovery pathway for posterior spinal fusion for adolescent symptomatic scoliosis (ASS) is used. This study aimed to evaluate the factors affecting nutritional status after posterior spinal fusion for ASS.
Methods: Patients undergoing posterior spinal fusion for ASS, managed during the period between January 2012 and December 2017, were reviewed retrospectively for the time required postoperatively to resume at least 50% daily nutrition, the cause of scoliosis, % weight for height (W/H), mobility, the Cobb angle, operative duration, the amount of intraoperative bleeding, pain management consisted of epidural anesthesia, patient controlled analgesia (PCA) with intravenous morphine, use of nonsteroidal anti-inflammatory drugs (NSAID), and use of acetaminophen. We evaluated the association between the time required postoperatively to resume at least 50% daily nutrition and these factors. To identify correlations, we used Pearson's correlation coefficient, the t test, and one-way analysis of variance. The accepted level for statistical significance was $P \leqq 0.05$.
Results: Eighty-three patients were included in this study. The age range was 9 - 19 (14.5 ± 2.0) years. Eleven patients had neuromuscular scoliosis, 37 CP, 31 congenital/genetic/developmental delay, and 4 other diseases. As to W/H, 51 patients had a normal nutritional state, 9 mild nutritional disturbance, 12 moderate nutritional disturbance, and 11 severe nutritional disturbance. As to mobility, 26 patients were bedridden, 9 could crawl, 11 used a wheelchair, 16 walked with help, and 24 walked independently. The Cobb angle was 89.2±24.2°. The operation was 494±107 minutes in duration. The amount of intraoperative bleeding was 2811±1949 ml. For pain management, 65 patients had epidural anesthesia, 80 PCA, 39 NSAIDs, and 60 acetaminophen. The time required postoperatively to resume at least 50% daily nutrition was 6.5±4.0 days, which correlated significantly with W/H ($p=0.028$), mobility ($p=0.025$), the Cobb angle ($p \leqq 0.01$), and the amount of bleeding ($p \leqq 0.01$). The amount of bleeding also correlated significantly with the time required postoperatively to resume at least 50% daily nutrition on multiple regression analysis ($p=0.048$).
Conclusions: This study showed that preoperative nutritional state and surgical invasions affect postoperative early nutrition. We should encourage early nutrition with appropriate preoperative nutritional interventions in addition to pain control.

Financial Support received from: N/A

S89 - Nutrition Delivery and Hospital Acquired Malnutrition in PICU ECMO Patients.
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Purpose: Extracorporeal membrane oxygenation (ECMO) is advanced life support instituted for refractory cardiorespiratory failure. There are few data examining timing and optimization of nutrition delivery practices and incidence of malnutrition in pediatric ECMO patients. Optimal nutrition therapy may be a modifiable factor to improve outcomes.
Methods: We conducted a retrospective cohort study of patients admitted to the pediatric intensive care unit (PICU) from January 1, 2014 to June 1, 2017 who required ECMO for $\geq$72 hours. The primary objective was to describe and quantify nutrition delivery practices in this population. The secondary aims were to evaluate nutrition provision relative to nutrition goals, to measure changes in anthropometric parameters and to assess the incidence of malnutrition in this population, in accordance with standards

and definitions outlined by the Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition. Energy intake goal was 120% of the World Health Organization basal metabolic rate with protein goal of 2.5 g/kg (infants: 80-100 kcal/kg, 3-4 g/kg protein). We hypothesized ECMO patients experience delayed initiation and achievement of goal nutrition, and declines in anthropometric z-scores and increased incidence of malnutrition from hospital admission to discharge. Descriptive statistics were used to characterize the cohort, and Fisher's Exact test was performed to compare the time of nutrition initiation with the incidence of acquired malnutrition.

Results: Twenty-four patients were analyzed. Detailed demographic and clinical characteristics of the cohort are presented in Table 1. Nutrition was initiated in 12 patients (50%) in <24h, in 6 patients (25%) between 24-48h and in 6 patients (25%) in 48-72h from ECMO cannulation (see Table 2). Energy and protein intake goals were met <48h from ECMO cannulation in 13 patients (54%), 48-72h in 6 patients (25%) and 72-96h in 5 patients (21%). Daily energy intake met $\geq$80% goal on ECMO days 3-14 in patients receiving PN and on days 4-12 with EN (see Figure 1). Malnutrition was present in 2 (8%) patients on admission and acquired in 6 (25%), see Table 2. Of the 12 (50%) patients who initiated nutrition in <24h, 2 (17%) acquired malnutrition (see Figure 2). There was no statistical significance in the incidence of acquired malnutrition with initiation of nutrition <24h versus categories $\geq$24h after ECMO cannulation, nor with the achievement of goal nutrition in $\leq$48h from ECMO cannulation versus >48h. Seven (29%) children did not survive; one of these was malnourished on admission and one patient acquired malnutrition during hospitalization. Five patients who acquired malnutrition survived to hospital discharge. There was no significance between acquired malnutrition and survival to hospital discharge.

Conclusions: Most of the retrospective cohort initiated nutrition within 24-48 hours of ECMO cannulation and met energy and protein intake goals by 72 hours. Fewer patients who initiated nutrition in <24 hours acquired malnutrition, although this did not reach statistical significance. Future research is needed to assess challenges to early initiation of nutrition, and to determine the relationship between energy and protein intake and outcomes for ECMO patients.

Financial Support received from: N/A

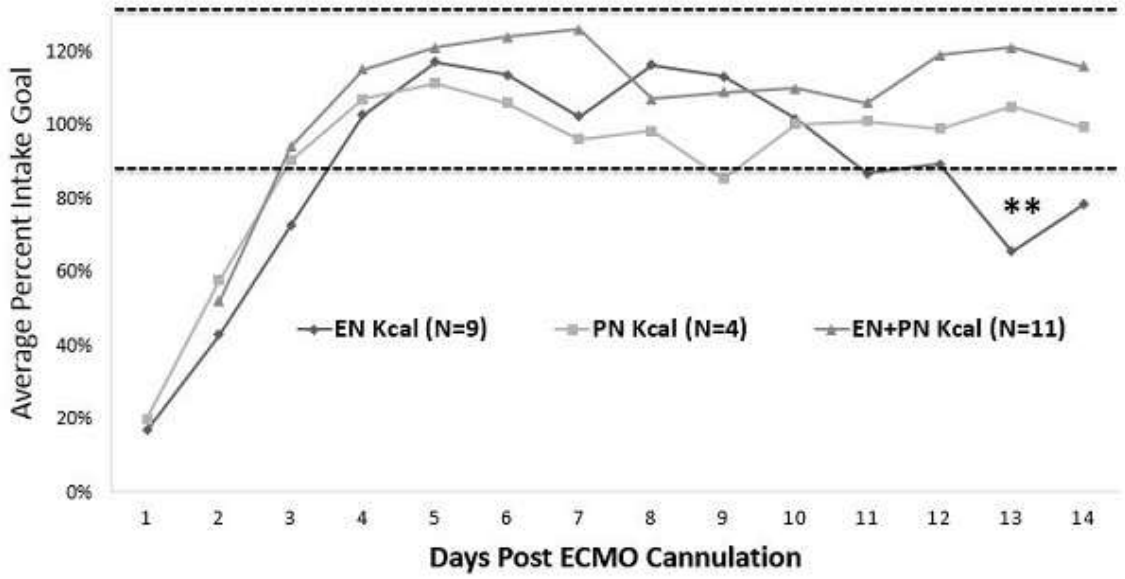
Table 1. Patient Characteristics (N=24)					
Age	7.8 (1.7,13.9) years				
Sex	Female: 14 (58%) Male: 10 (42%)				
Primary diagnosis	Acute respiratory distress syndrome: 9 (37.5%) Cardiac arrest: 5 (21%) Cardiopulmonary failure: 3 (12.5%) Septic shock: 3 (12.5%) Acute hypoxic respiratory failure: 1 (4%) Broncho-esophageal fistula: 1 (4%) Pulmonary embolism: 1 (4%) Pulmonary hemorrhage: 1 (4%)				
ECMO Modality, initial	Veno-Arterial: 13 (54%) Veno-Venous: 11 (46%)				
Exclusive EN	9 (37.5%)				
Exclusive PN	4 (16.5%)				
EN + PN	11 (46%)				
Gastric feeds	9/20 (45%)				
Transpyloric feeds	11/20 (55%)				
	CPR	VIS	OI	ECMO Flow (L/min)	Lactate (mmol/L)
At ECMO cannulation	17 (11,29)	-	22 (12,46)	2 (0.9,2.8)	2.1 (1.3,4.8)
At EN initiation	-	0 (0,5)	-	2.2 (1.0,3.3)	1.1 (0.6,1.5)
At PN initiation	-	4 (0,7.5)	-	2.2 (1.3,3.5)	2.3 (1.2,4.2)

Values shown as median (interquartile range), or number (%) patients; ECMO, extracorporeal membrane oxygenation; EN, enteral nutrition; PN, parenteral nutrition; CPR, cardiopulmonary resuscitation, minutes; VIS, vasoactive infusion score; OI, Oxygenation Index

Table 2. Nutrition and Clinical Outcomes (N=24)	
Δ Weight-for-age Z-score	-0.1 ± 0.7
Δ BMI-for-age or weight-for-length Z-score	-0.2 ± 1
Δ MUAC-for-age Z-score	-0.8 ± 1.5
Malnutrition* present on hospital admission	2 (8%)
Malnutrition* acquired during hospital stay	6 (25%)
Nitrogen balance, grams	-1 (-4.8,1.0)
EN or PN initiation, <24h from cannulation	12 (50%)
EN or PN initiation, 24-48h from cannulation	6 (25%)
EN or PN initiation, 48-72h from cannulation	6 (25%)
EN or PN initiation, >72h from cannulation	0
EN or PN goal, ≤24h from cannulation	9 (37%)
EN or PN goal, 24-48h from cannulation	3 (13%)
EN or PN goal, 48-72h from cannulation	7 (29%)
EN or PN goal, 72-96h from cannulation	5 (21%)
Goal <48h and acquired malnutrition	3 (50%) of acquired malnutrition
Goal <48h and no acquired malnutrition	9 (50%) of no acquired malnutrition
Goal ≥ 48h and acquired malnutrition	3 (50%) of acquired malnutrition
Goal ≥ 48h and no acquired malnutrition	9 (50%) of no acquired malnutrition
PN indication	9/15 (60%) impaired bowel function; 6/15 (40%) inadequate EN
ECMO duration, days	7.4 (5.6,15.7)
Intensive care unit length of stay, days	22.5 (11.9,35.5)
Hospital length of stay, days	33.6 (19.4,66.5)
Continuous renal replacement therapy	11 (46%)
Central line associated blood stream infection	3 (12.5%)
Ventilator associated event	16 (67%)
Catheter associated urinary tract infection	1 (4%)
Pressure ulcer	6 (25%)
Death during hospital stay	7 (29%)
Death and acquired malnutrition	1/6 (17%) of acquired malnutrition
Death and no acquired malnutrition	5/18 (28%) of no acquired malnutrition
Death and preexisting malnutrition	1/2 (50%) of preexisting malnutrition
Survived and acquired malnutrition	5/6 (83%) of acquired malnutrition
Survived and no acquired malnutrition	11/18 (61%) of no acquired malnutrition
Survived and preexisting malnutrition	1/2 (50%) of preexisting malnutrition

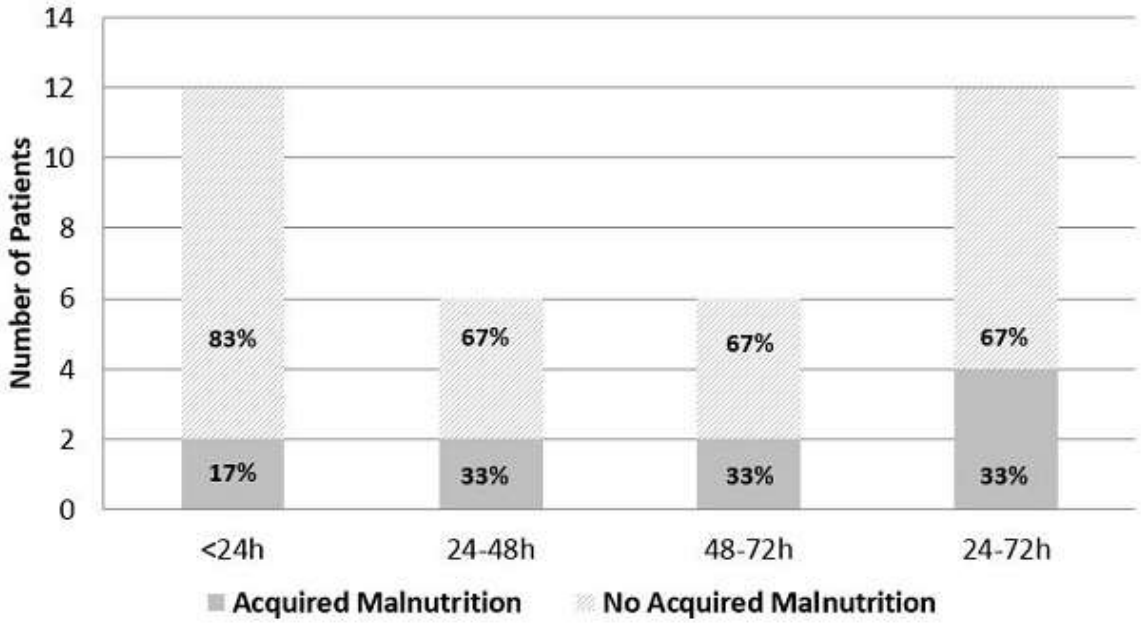
Values shown as mean ± standard deviation, median (interquartile range) or number (%) patients; Δ, change from admission to discharge; *, malnutrition defined by the Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition; BMI, Body Mass Index; MUAC, mid-upper arm circumference; EN, enteral nutrition; PN, parenteral nutrition; ECMO, extracorporeal membrane oxygenation

Figure 1. Patients Receive Adequate Nutrition by ECMO Day 4



**On day 13, one of 3 remaining patients in the EN group was made NPO and resumed feeds on day 14.
ECMO, extracorporeal membrane oxygenation; EN, enteral nutrition; PN, parenteral nutrition

Figure 2. Proportion of Patients with Acquired Malnutrition According to Timing of Nutrition Initiation



Three Fisher's Exact tests were performed to evaluate for significance of acquired malnutrition in patients with initiation of nutrition at <24h vs 24-48 hours, 48-72 hours and a combined category of 24-48 hours plus 48-72 hours. Setting the significance at $p<0.05$, no comparisons were statistically significant.

S90 - Improving the Rate of Anthropometric Measurements in the Pediatric Intensive Care Unit.

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Purpose: Malnutrition occurs in up to 25% of patients in pediatric intensive care units and is associated with adverse health outcomes including increased length of stay, prolonged ventilation, and higher mortality. Anthropometric measurements should be obtained at admission and routinely during hospital stay to evaluate nutrition status and optimize care delivery. With this project we aimed to increase the documentation, reporting, and discussion of anthropometric measurements namely height/length, weight, and occipital frontal circumference (OFC), in patients within 24 hours of admission and weekly through their admission.

Methods: Process improvement using multiple cycles of plan, do, study, and act were applied. Interventions to increase capture of anthropometric measurements included unit education, recruitment of nurse champions, team huddle engagement, simplification of process mapping, new equipment purchase and instruction, timely feedback, and required formal discussion of patient's nutrition status during patient rounds. A proportions hypothesis test was used to compare frequency of anthropometric measures obtained during the three study phases: pre-intervention, post-intervention, and sustainment phase. A p-value less than 0.05 signified statistical significance.

Results: **PICU Patients:** There was a statistically significant increase in obtainment of height/length and OFC within 24 hours of admission and weekly and a statistically significant increase in admission, but not weekly weights, during the post-intervention and sustainment phases (Table 1).

CVICU Patients: There was a statistically significant increase in obtainment of admission OFC during the post-intervention phase, with a loss of significance during sustainment phase. There was a non-significant increase in capture of admission height/length during the post-intervention and the sustainment phase. There was a statistically significant improvement in obtainment of weekly height/length and OFC but not of weekly weights during the post-intervention and sustainment phase (Table 2).

Conclusions: Education and outreach interventions raised awareness of above noted goals with a resultant increase in rates of measurements obtained. During the sustainment phase, there was a slight regression in data collection, although these still remained above baseline rates. There was no significant improvement in length of stay.

Sustainment has proved challenging due to multiple factors including nursing turnover, elimination of unit support personnel, inaccuracy of bed scales, and the ongoing high acuity demands of PICU care that preclude measurements. Additional interventions may be considered that are focused on individual accountability and regular feedback to increase compliance and change unit culture. The decrease during the sustainment phase is a cause for concern. This may suggest that other alternative modalities need be considered such as the formation of an anthropometric team dedicated to obtaining consistent and accurate measurements to ensure compliance.

Financial Support received from: N/A

Table 2

CVICU																	
New Admit									Existing Patients								
Weight			Height/Length			OFC			Weight			Height/Length			OFC		
Pre	Post	P Value	Pre	Post	P Value	Pre	Post	P Value	Pre	Post	P Value	Pre	Post	P Value	Pre	Post	P Value
100%	100%	NA	87%	94%	0.295	28%	64%	0.006	98%	100%	0.153	50%	83%	0.00	48%	84%	0.00
Pre	Sustain	P Value	Pre	Sustain	P Value	Pre	Sustain	P Value	Pre	Sustain	P Value	Pre	Sustain	P Value	Pre	Sustain	P Value
100%	100%	NA	87%	95%	0.212	28%	52%	0.074	98%	100%	0.153	56%	75%	0.002	48%	75%	0.00

Proportions hypothesis test performed to compare change in obtainment of anthropometric measurements within 24 hours of admission and weekly during admission to the CVICU.

Table 1

PICU																	
New Admit									Existing Patients								
Weight			Height/Length			OFC			Weight			Height/Length			OFC		
Pre	Post	P Value	Pre	Post	P Value	Pre	Post	P Value	Pre	Post	P Value	Pre	Post	P Value	Pre	Post	P Value

91%	98%	0.006	49%	73%	0.00	36%	61%	0.018	91%	89%	0.62	38%	69%	0.001	45%	75%	0.003
Pre	Sustain	P Value	Pre	Sustain	P Value	Pre	Sustain	P Value	Pre	Sustain	P Value	Pre	Sustain	P Value	Pre	Sustain	P Value
91%	97%	0.042	49%	71%	0.00	36%	65%	0.023	91%	93%	0.618	38%	76%	0.00	45%	76%	0.003

Proportions hypothesis test performed to compare change in obtainment of anthropometric measurements within 24 hours of admission and weekly during admission to the PICU.

ENCORE

S91 - Long-Term Outcomes Following Intestinal Rehabilitation of Infantile Onsent Ultra-Short Bowel Syndrome.

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Purpose: Intestinal Failure (IF) is a condition of malabsorption resulting from small bowel resection, anatomical defect, or functional dysmotility requiring long-term parenteral nutrition (PN). Ultra-short bowel syndrome (USBS) is defined as residual small bowel length of < 30 cm. Ensuring proper growth and nutrition while minimizing significant mortality and morbidities in infants with USBS is challenging. Management by specialized multi-disciplinary intestinal rehabilitation teams has improved outcomes for these high-risk infants. The purpose of this study was to evaluate treatment and outcomes of infantile onset USBS in a single quaternary NICU.
Methods: To evaluate treatment and outcomes of infantile onset USBS in a single quaternary NICU.
Results: Mean gestational age was 32 5/7 ± 11 1/7 weeks and birthweight was 1849 ± 926 grams. Residual small bowel length was 14 cm (IQR, 10 to 25) and 11% (1/9) had preserved ileocecal valve and colon. One infant was lost to follow-up and one infant died during NICU stay. Enteral autonomy was achieved in 2 patients by 1.4 years. 78% (7/9) infants had IF associated liver disease which resolved with the use of fish oil-based lipid emulsion. No patients received transplants or autologous intestinal reconstruction (AIR) procedures.
Conclusions: During a three-year follow-up, 22% (2/9) infants with USBS achieved enteral autonomy while only 11% (1/9) died. None required AIR or transplant, and despite long-term PN, none developed liver failure. These results describe the highly encouraging outcomes in this high-risk population of infants with USBS.

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S92 - Fraily prevalence is influenced by poor diet quality in children and adolescents who have undergone liver transplanation.

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Purpose: Frailty is prevalent in children with end-stage liver disease[1]. However, no information exists whether this condition is prevalent in children and adolescents after liver transplantation (LTx). Suboptimal vitamin D (vitD) status and poor diet quality (DQ) have been associated with frailty in adults. We hypothesized that frailty in pediatric LTx recipients would be prevalent and associated with sub-optimal vitD status, physical inactivity and poor DQ.
Methods: We prospectively studied lifestyle factors and frailty in children and adolescents up to 7.2 (±4.3) years post-LTx (n=15). Frailty was assessed using a modified Fried Phenotype (weakness [hand-grip], slowness [6-minute walk], shrinkage [skeletal muscle mass-z scores by Dual Energy X-ray absorptiometry], diminished physical activity [accelerometer]. Frailty was defined as a Fried Phenotype score >5 (max score :10)[1]. Three day food records were assessed for macro-and-micronutrient and DQ (Healthy-Eating Index-Children). Physical inactivity and muscle function was assessed using validated methods (sit-to-stand, stair-climb, push-up, sedentary activity hrs). Additional variables included age, weight, weight-z, height, height-z, skin fold measuers (triceps, subscapular, mid-arm circumference [MAC]), gender, liver diagnosis, PELD, immunosuppressive therapies (dose/type/serum levels), serum 25(OH)D, AST, ALT, γ-GT, albumin, total/conjugated bilirubin, PTT and INR at LTx and study visit.
Results: Mean (± SD) for age, weight-z, height-z was 12.5 ±3.1 yrs, 0.22 ± 0.97 and -0.06 ± 1.28, respectively. Frailty occurred in 33% (n=5) of children. While weight-z and height-z were lower in frail children ($p<0.05$), no other significant differences in anthropometric variables (absolute or z-scores for tricep, MAC, MAMC or subscapular skinfolds) was observed between frail and non-frail children ($p>0.05$). Mean serum 25(OH)vitD was 91.1± 10.9 nmol/L with over 93% of participants receiving daily vitamin D supplementation in the range of 400-2000 IU/D. Mean energy intake and % protein, % fat and % carbohydrate intake was 2238 ± 521 kcal, 16.0 ± 3%, 32.1 ± 6.7% and 52.9 ± 7.5%, respectively. With the exception of lower dietary calcium ($p=0.04$) and sodium ($p=0.04$) in frail participants, no significant differences in macro-and-micro-nutrient intake or serum 25(OH)vitD concentrations between frail vs non-frail children was observed. In contrast, the proportion of children with DQ scores indicative of poor DQ (< 60) was higher in frail (80%) vs non frail children (9.1%) $p<0.05$. There were no differences in age, gender, liver diagnosis, PELD, immunosuppresive therapies, serum liver biochemistry data and physical inactivity in children with-and without frailty ($p>0.05$).
Conclusions: Frailty is prevalent in vitamin D sufficient children and adolescents post-LTx who consume diets low in overall DQ. Implications to nutrition support practice will be discussed.

References
1.Lurz E, Quammie C, Englesbe M, et al. Frailty in Children with Liver Disease: A Prospective Multicenter Study. J Pediatr 2018;194:109-15.

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