DOI: 10.1002/jpen.2095

ABSTRACTS

Poster Abstracts from the ASPEN 2021 Nutrition Science & Practice Conference

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Parenteral Nutrition Therapy

P1 - Is My Patient Non-Compliant or Do They Have Low Literacy Skills? A Case Report

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Purpose: Introduction: One in five U.S. adults, or 21% have low literacy skills. Literacy is defined as the ability to understand, evaluate, use and engage with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential.

Home parenteral nutrition (HPN) patients with low literacy skills may be labeled as non-compliant if they are unable to follow their prescription, have negative outcomes, or are readmitted back to the hospital. Studies show a correlation between low literacy and the impact on healthcare costs. Patients with low literacy skills had poorer health, higher rates of hospitalization and experienced higher health care costs.

Case Presentation: A 62 year old male with a high output enterocutaneous fistula (ECF) was readmitted for acute kidney injury (AKI) related to dehydration, then referred to a national home infusion provider for HPN (Table 1). The patient had been with another infusion provider and nursing agency, neither wanted to resume care due to reported non-compliance. The new HPN team reviewed the case, accepted the patient on service and set up new nursing. The infusion nurse met with the patient in the hospital to complete a nursing assessment, review expectations for home infusion and provide basic education regarding administration of HPN. He verbalized understanding, performed return demonstration, and discharged home. After 7 days, he was readmitted because the nursing agency was unable to provide adequate supplies for the ECF. He was then set up with a new agency and sent home with HPN, intravenous (IV) antibiotics, and IV hydration. The infusion nurse provided education regarding administration of all therapies. Within 3 days, the nursing agency reported the patient had 5 doses of IV antibiotics, 0 doses of IV hydration and was not sure if he was administering HPN correctly. During the nutrition assessment call, the patient revealed to the dietitian that he could barely read. He explained how he accidentally infused multiple doses of hydration, missed the antibiotics and had difficulty hooking up the PN (Image 1).
The dietitian informed the nutrition support team and nursing of the patient's literacy challenges. The nursing agency provided additional hands-on patient education and daily visits to ensure the patient was infusing as prescribed. The dietitian reinforced education, reviewed HPN administration and hydration infusion during weekly calls. The patient became independent, confident in his abilities and successfully administered all prescribed therapies at home without further readmissions to the hospital.

Conclusion: HPN is a complex therapy requiring significant patient education, reinforcement and support for success. When additional IV medications are prescribed, complexity greatly increases with the likelihood that patients will have difficulty, especially with low literacy skills.
The home infusion team can be integral in identifying literacy barriers. With 43 million adults in the U.S. having low literacy skills, this is an important consideration for all clinicians. The Single Item Literacy Screener (SILS) is a validated tool that may be useful in homecare (Table 2). The SILS includes a single verbal question, identifies patients needing assistance reading health related materials, and could be utilized during the initial evaluation

prior to HPN education. Understanding literacy levels can help determine the type of education needed and promote development of alternative forms of education.

Methods: N/A

Results: N/A

Conclusion: N/A

Financial Support: N/A

Patient Demographics

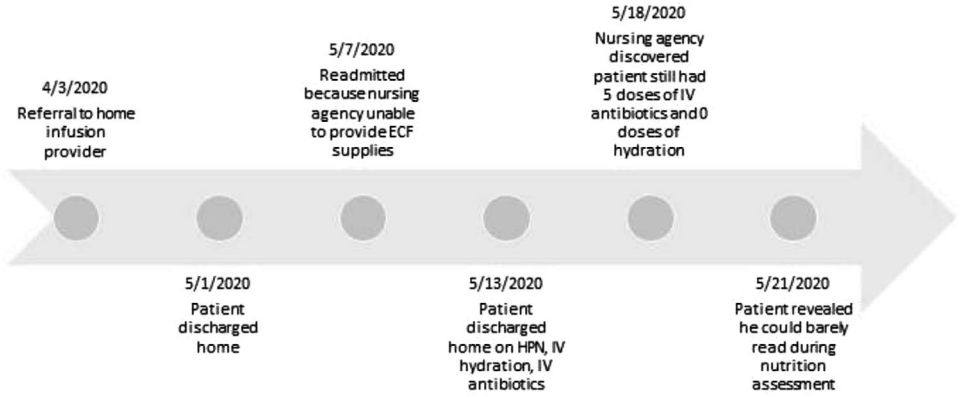
Admitting Diagnosis	Past Medical History	Home Infusion Medications
• AKI • Dehydration • High output ECF	• DM2 • HTN • SBO • Ventral hernia repair	• 3 in 1 Parenteral Nutrition • Vancomycin 1750mg IV q 24 hours in easy pump • NS 500ml 3x/week in easy pump

AKI: acute kidney injury; ECF: enterocutaneous fistula; DM2: diabetes mellitus type 2; HTN: hypertension; SBO: small bowel obstruction; NS: normal saline

Single Item Literacy Screener

Literacy Tool	Question	Response Range	Scoring Criteria
Single Item Literacy Screener (SILS)	How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacist?	1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always	Scores greater than "2" are considered positive, indicating some difficulty with reading printed health related material.

Timeline



P2 - Incorporating ASPEN Consensus Recommendations for Refeeding Syndrome into the home infusion setting: Assessing homestart PN risk of refeeding

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Purpose: The American Society for Parenteral and Enteral Nutrition (ASPEN) published the Consensus Recommendations for Refeeding Syndrome (RS) in 2020. The consensus redefined RS as "a measurable reduction in levels of 1 or any combination of potassium, phosphorus, and/or magnesium, or the manifestation of thiamin deficiency, developing shortly (hours to days) after initiation of calorie provision to an individual who has been exposed to a substantial period of undernourishment. RS may manifest in a wide variety of severities, from slight, clinically insignificant decrements in electrolyte levels to severe and sudden decreases, which lead to, or risk development of, end organ failure if not preempted or corrected". The consensus established RS risk assessment based on criteria including BMI, weight loss, calorie intake, abnormal prefeeding serum potassium, phosphorus, or magnesium and high-risk comorbidities, as well as recommendations for avoidance and treatment of RS. In home infusion, when a referral is received for "homestart" of PN, patients are frequently at risk for RS. This abstract assesses risk for RS with homestarts according to consensus criteria and current company protocol for initiating home PN compared to ASPEN recommendations.

Methods: Retrospective chart reviews of 84 adult homestart PN referrals to a national provider were analyzed. Patients with varying diagnoses and geographical regions were initiated on PN in the home setting between 1/1/20-6/30/20. Initial PN assessments including BMI, weight loss history, caloric intake, prefeeding labs, and comorbidities were compared to the ASPEN Consensus Recommendations and categorized to determine frequency and severity of RS risk factors.

Results: Ninety four percent of 84 patients were determined to be at RS risk, with 75% at significant risk and 19% at moderate risk (Figure 1). Almost half (49%) had severe disease, placing them at significant refeeding risk. The most common condition was cancer at 44%, followed by malabsorption at 29%, bariatric surgery complications and protein malnutrition, both at 18% (Figure 2). Sixty percent of the total group experienced significant weight loss classified as significant RS risk, interestingly only 8% had BMI < 16 kg/m2. Half of the total group (51%) were categorized at significant refeeding risk due to minimal oral intake for greater than 7 days, with most having minimal intake for weeks or even months. In total, 38% had abnormal prefeeding electrolyte concentrations, with 32% at minimally low concentrations, placing them at moderate risk. Six percent had moderate/significantly low concentrations , indicating significant RS risk. This provider's protocol for PN home initiation was nearly identical to the Consensus Recommendations, with a difference in monitoring given the ASPEN recommendations were developed for hospitalized patients (Table 1).

Conclusion: This analysis demonstrated that malnutrition and risk of refeeding syndrome was inherent with almost all referrals for homestart PN. Practitioners should be aware of the risk of RS before implementing a plan for nutrition support and familiarize themselves with the new consensus recommendations. Home PN providers should have policies and procedures in place that incorporate consensus guidelines for identification and treatment of RS, prompting this provider to add the new RS risk assessment into the company's electronic PN Initial Assessment.

Financial Support: n/a

Figure 1. Adult homestart PN patients at risk for refeeding syndrome

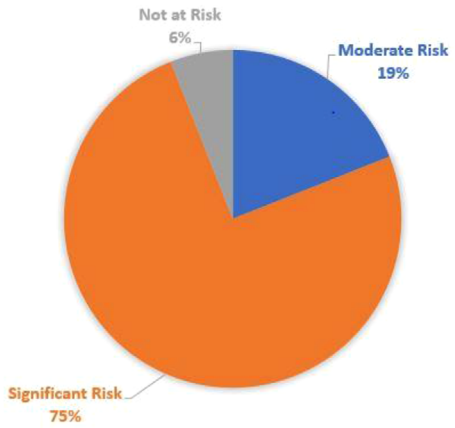
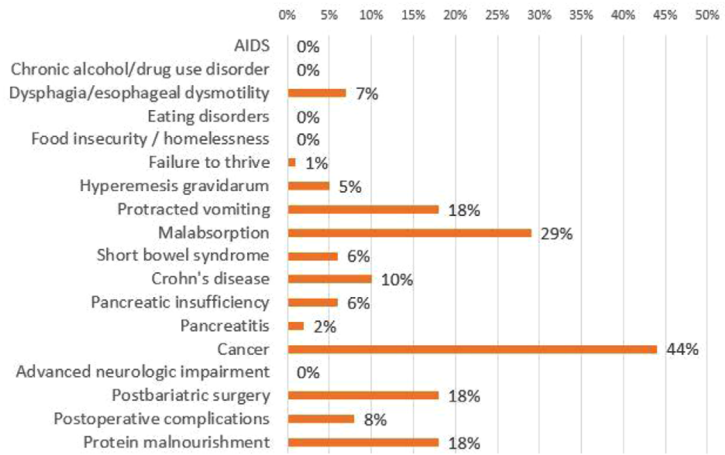


Figure 2. Diseases associated with increased refeeding risk in this homestart PN population



P3 - Clinical and Quality of Life Effects of Home Parenteral Nutrition Patients During COVID-19

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Purpose: COVID-19 is a new disease, from a novel coronavirus not previously identified in humans. At the time of this study, COVID-19 has resulted in 5.9 million documented cases in the US. Prior to COVID-19, the last global pandemic we experienced was H1N1 of 2009. Since then, research has continued to try to understand the influenza virus, develop treatments, and prepare for subsequent pandemics. Home parenteral nutrition (HPN) patients are considered high risk during the pandemic due to compromised immune systems, multiple disease states, and a high probability of malnutrition. The purpose of this study is to identify the effects of COVID-19 on HPN patients' overall clinical care and quality of life (QoL).

Methods: An online survey of 34 questions was created assessing demographics, clinical impact and QoL status during COVID-19. Active HPN patients from a national home infusion provider were surveyed during a 3 week period from July 31, 2020 through August 24, 2020. Excluded patients included those < 18 years of age. The responses were analyzed using descriptive statistics.

Results: The survey received responses from 35 HPN patients living throughout the United Stated. Many of the respondents came from the southern regions. The sample was comprised of 23 females (67.7%), 11 males (32.4%), and 1 with no response. Short bowel syndrome diagnosis accounted for 57% of respondents. Thirty (85.7%) respondents reported living in a COVID-19 hotspot. Only 1 out of 35 respondents had been diagnosed with COVID-19 with 94.3% reported wearing a mask while around others and 71. 4% requesting others to wear a mask around them (Chart 1). Table 1 shows responses to questions regarding clinical care during COVID-19. Few respondents reported delays in scheduled surgeries, however 22.9% reported delays in visits with healthcare providers. Overall, 80% of respondents felt like they have received the same level of care during COVID-19 as before the pandemic. Table 2 shows responses to questions regarding QoL during COVID-19. Sixteen (47%) respondents had increased feelings of anxiety or nervousness with 37.5% of those reporting a decline in usual daily activities as a result of those feelings. Twelve (35%) respondents had increased feelings of sadness or depression with 33.3% of those reporting a decline in usual daily activities as a result of those feelings.

Conclusion: The COVID-19 pandemic has not impacted the level of health care for the survey participants, despite the noted delay in visits with healthcare providers. Respondents have experienced no loss of family or financial support and no gaps in home parental nutrition therapy. Survey results reveal the respondents are diligent about practices to limit their risk of contracting COVID-19 as evidenced by the minimal number of respondents being diagnosed with COVID-19. The COVID-19 pandemic has made an impact on the emotional health of respondents causing feelings of anxiety, depression and a decline of daily activities and independence. In an effort to minimize the impact the COVID-19 pandemic has on their QoL, respondents are encouraged to continually engage with their family, collaborate with support groups and reference evidenced-based resources.

Financial Support: N/A

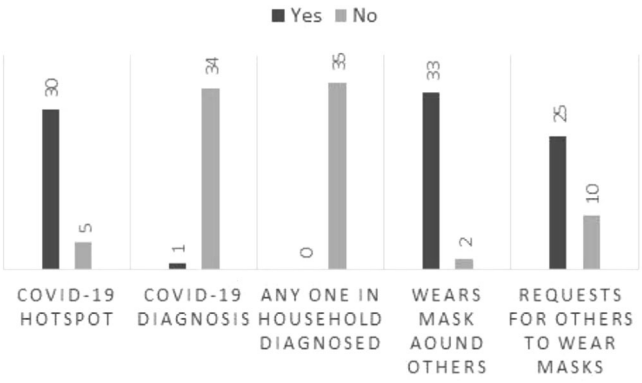
Clinical Care Survey Results

Clinical Care Survey Question Results	Value (percentage)
Experienced delays in scheduled surgeries	3 (8.6%)
Reported delays in visits with healthcare providers	8 (22.9%)
Received care via virtual or telephone physician visits	12 (35%)
Reported a preference for virtual or telephone physician visits	17 (49%)
Received the same level of care during COVID-19 as before the pandemic	28 (80%)
Fear of being sent to ER/hospital during pandemic	19 (54%)
Reported no loss of job, loss of wages, loss or change in healthcare insurance	30 (88.2%)
Experienced no impact on family or caregiver support	31 (88.6%)

Quality of Life Survey Results

Quality of Life Survey Question Results	Value (percentage)
Reported no loss of family or caregiver support during pandemic	31 (88.6%)
Increased feelings of anxiety or nervousness	16 (47%)
• Of the 16 respondents, reported a decline in usual daily activities due to feelings of anxiety or nervousness	6 (37.5%)
Increased feelings of sadness or depression	12 (35%)
• Of the 12 respondents, reported a decline in usual daily activities due to sadness or depression	4 (33.3%)
Increased concern of future during pandemic	18 (51.4%)
Feeling less independent during COVID-19	11 (31.4%)
Fear of health decline related to HPN during COVID-19	18 (53%)

COVID-19 Patient Exposure Results



ENCORE

Publication: Wood A, Durbin B, Ready Brown R, Haselhorst J, Cooper C. S52 - Parenteral Nutrition Knowledge Gaps Amongst Various Medical Professionals: Where Are We Now? (abstract). Supporting Information. ASPEN Nutrition Science & Practice Conference: March 28–31, 2020, JPEN J Parenter Enteral Nutr. 2020 Feb;44(2):132-133.

P4 - Parenteral Nutrition Knowledge Gaps Amongst Various Medical Professionals: Where Are We Now?

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P5 - Parenteral Nutrition in Geriatrics

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Purpose: Optimization of nutritional status amongst geriatric patients is important because malnutrition is associated with increased rates of infections, poor wound healing, prolonged hospital stays, and increased mortality.1-3 While oral and enteral nutrition remains the first-line of nutritional support, there are situations where oral and/or enteral nutrition are inadequate or contraindicated. In these cases, administration of nutrition parenterally is recommended.2,3 However, the management of parenteral nutrition (PN) can be complex in geriatric patients given they have more comorbidities and are more prone to electrolyte disturbances due to age-related changes.1,4 Despite knowing this, there remains very few studies on PN in geriatric populations. Hence, the aim of this study is to elucidate the indications, complications, and outcomes of PN amongst hospitalized patients ages 80 or older.

Methods: This is a retrospective study of 111 patients ages 80 or older who received PN during their hospitalization at a single tertiary medical center between January 2018 and January 2020. Demographic data, comorbidities, weight, BMI, PN formulation, estimated energy requirement, indication for PN, PN-related complications, and outcomes were obtained through review of electronic health records.

Results: Of the 111 patients who received PN during their hospitalization, 77 (69.4%) were not able to tolerate oral or enteral nutritional support and 34 (30.6%) were able to tolerate oral or enteral nutrition but not enough to meet their nutritional requirement. The most common indication for PN was bowel obstruction or ileus (n = 60, 54.1%), followed by cancer-related malnutrition (n = 23, 20.7%). The most common PN-related complication was refeeding syndrome (n = 63, 56.8%), followed by hyperglycemia (n = 36, 32.4%). and hypervolemia (n = 36, 32.4%). Of the 111 patients, 66 (59%) were discharged off PN. Out of those 66 patients, 49 (44%) resumed oral nutrition and 17 (15%) were either started on or resumed enteral nutrition. On the other hand, 26 patients (23%) were continued on total or partial PN after discharge. The remaining 23 patients (21%) died during their hospital stay, with 13 (12%) of those deaths occurring after transitioning to end-of-life care.

Conclusion: Bowel obstruction and ileus were the most common indication for starting PN in hospitalized patients ages 80 or older, with refeeding syndrome, hyperglycemia, and hypervolemia occurring as frequent complications. Overall, the majority of these patients were eventually transitioned to oral or enteral nutritional support upon discharge, suggesting that PN can be beneficial in geriatric populations but requires skilled management and close monitoring of electrolytes, blood glucose, and volume status to reduce the risk of developing TPN complications.

Financial Support: n/a

Table 1. Parenteral indications and complications amongst geriatric patients ages 80 and older.

Able to tolerate oral or enteral feeds?	Number of Subjects (n)	Percentage of Subjects (%)
No	77	69.4%
Yes	34	30.6%
PN Indication	Number of Subjects (n)	Percentage of Subjects (%)
Bowel obstruction or ileus	60	54.1%
Cancer-related malnutrition	23	20.7%
Esophageal disorder (achalasia, esophagitis, perforation)	7	6.3%
Oropharyngeal dysphagia	5	4.5%
Feeding tube malfunction	4	3.6%
Infectious colitis	4	3.6%
Perforated diverticulitis	4	3.6%
Short gut syndrome	3	2.7%
Gastrointestinal fistula	3	2.7%
Pancreatitis	2	1.8%
Intractable vomiting	2	1.8%
Chemotherapy-related mucositis	1	0.9%
Inflammatory bowel disease	1	0.7%
Perforated Appendicitis	1	0.9%
PN-related Complication:	Number of Subjects (n)	Percentage of Subjects (%)
Refeeding syndrome	63	56.8%
Hyperglycemia	36	32.4%
Hypervolemia	36	32.4%
Decompensated heart failure	10	9.0%
Bacteremia or fungemia	7	6.3%
Transaminitis	4	3.6%
Elevated triglycerides	1	0.9%

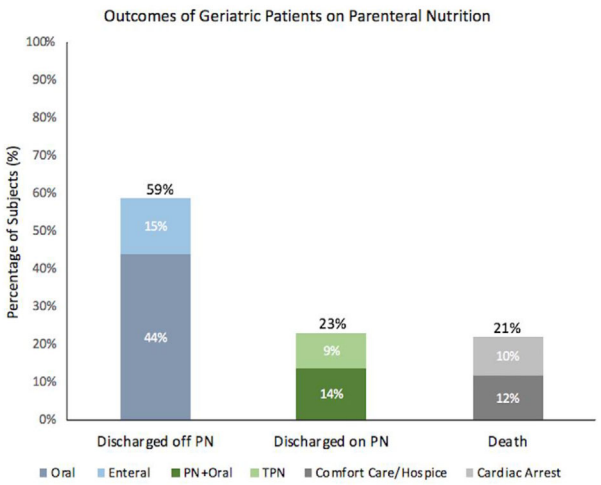

Figure 1. Outcomes of geriatric patients ages 80 and older who received parenteral nutrition. Out of 111 patients, 66 patients (59%) were discharged off PN. Out of those 66 patients, 49 (44%) resumed oral nutrition and 17 (15%) were either started on or resumed enteral nutrition. 26 patients (23%) of the 111 patients were discharged on PN. Of these 26 patients, 10 patients (9%) were discharged on total PN and 16 patients (14%) were discharged on PN plus oral intake as tolerated. A total of 23 patients (20.7%) died during their hospitalization, with 13 (12%) of those deaths occurring after transitioning to end-of-life care.

P6 - Ethanol locks for prevention of CRBSI: Unintended consequences of the FDA Unapproved Drug Initiative driving cost to extreme levels affecting access to therapy.

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Purpose: Studies strongly suggest that ethanol lock therapy (ELT) is an effective approach to reduce catheter-related bloodstream infections (CRBSI) for patients receiving long term home parenteral nutrition (HPN). Until February 2020, at least three generic manufacturers produced dehydrated ethyl alcohol used in preparation of ethanol locks for prevention of CRBSI in patients requiring long term central venous access. Due to the FDA's Unapproved Drug Initiative (UDI), there is now only one FDA approved branded alcohol product available. At almost 10x the price of previous generic products—this is forcing many providers to discontinue ELT due to a lack of reimbursement; affecting access and potentially putting long-term HPN patients at higher risk of CRBSI.

Methods: Due to a market shortage of dehydrated ethyl alcohol in January 2020, this national home infusion provider contacted prescribers of HPN and ELT to recommend (a) consideration of antibiotic lock prophylaxis, especially for patients with history of multiple CLABSIs and (b) limiting ELT to pediatric patients/high-risk patients and patients who did have insurance coverage for ELT. The nutrition team surveyed 18 branch pharmacies on utilization of ethanol locks in home PN from January 1, 2020 through June 30, 2020 asking: (1) how many patients were prescribed ELT in January when there were multiple formulations available at a lower price (2) vs. June 30 when generic versions were unavailable and one brand remained (3) if there was reimbursement for ELT and (4) new incidences of CRBSI if ELT was discontinued.

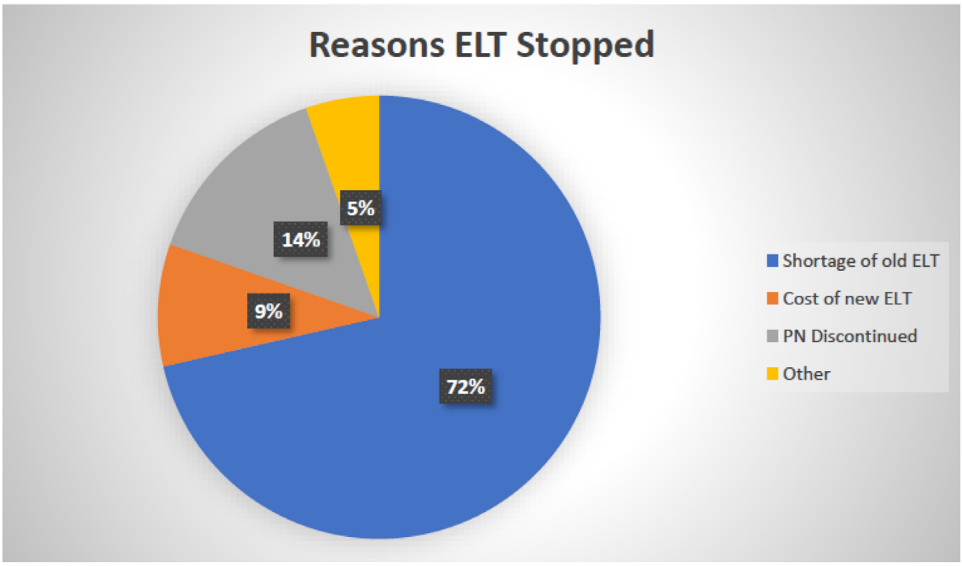
Results: Seventy four HPN patients received ELT from January to June 2020 (49% pediatric and 51% adult). 56 patients or 76% discontinued ELT by the end of June. Prescribers for 16 patients did not stop ELT. 10 of the 56 patients, or 18% were switched to antibiotic lock therapy ELT concentration or frequency was reduced in 6 patients who remained on ELT 5 patients, or 7% developed a CRBSI after stopping ELT by June 30 15% of patients had insurance coverage for ELT, only one covered the actual cost of the ELT

Conclusion: The unintended consequences of the FDA's Unapproved Drug Initiative of 2006 are significantly higher prices and limited manufacturers for PN ingredients and related drugs. ELT has been impacted with an 800–900% price increase, affecting access to this critical adjunctive therapy which is effective in decreasing CRBSI for patients requiring long term central venous access. All home infusion providers are faced with the same price increase since there is now only one branded product on the market for purchase. As a result, a competitive national provider actually issued a company-wide mandate not to provide ELT for HPN patients. Clinicians involved in HPN need to be aware of the impact of these policies limiting access to safe and appropriate HPN. Having only one branded product available at an astronomical cost and very limited insurance coverage for newly released products contributes to the precariousness of the PN related drug supply in the United States. Clinicians and organizations like ASPEN, NHIA, and the Oley Foundation should continue to lobby for significant changes within the FDA.

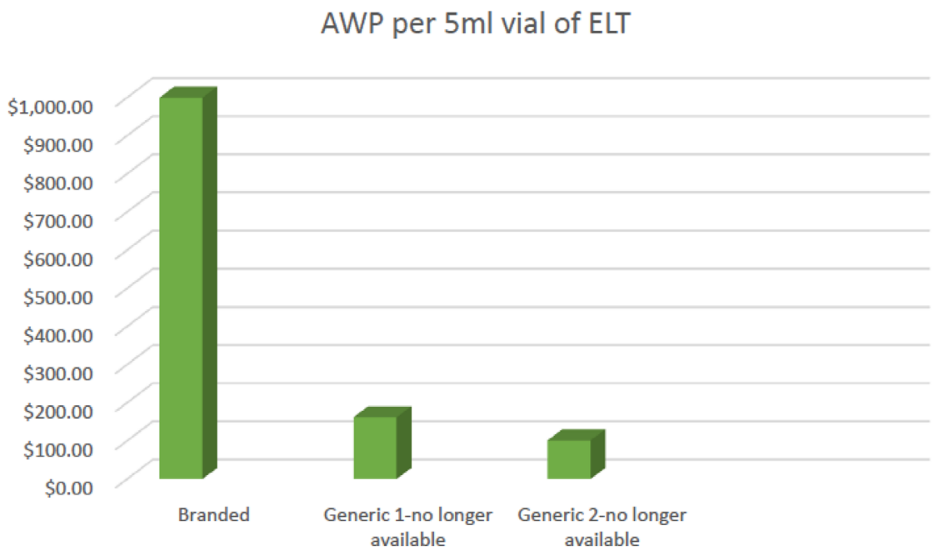
Financial Support: not applicable

Reasons why ELT discontinued

Reasons why ELT discontinued



AWP for branded vs. generic dehydrated alcohol



P7 - Performance of a Parenteral Nutrition Medication Use Evaluation to Develop Interventions

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Purpose: Parenteral Nutrition (PN) is a complex lifesaving treatment that is also associated with a high risk for significant adverse events when used inappropriately. The 2014 ASPEN Parenteral Nutrition Safety Consensus Recommendations and other published research were used to inform the development of a medication use evaluation (MUE) to assess the parenteral nutrition process at our institution. Findings will be used to develop interventions, propose changes to institutional policies, and educate staff.

Methods: This project was a retrospective audit of randomly selected patients that received PN from December 2018 to December 2019 within our institution. The data was collected from the facility's electronical medical record (EMR). A course of treatment was defined as the time from initiation to the termination of a PN regimen; thus, a single patient could receive several courses in a single inpatient admission. Data collected

included patient demographic information, PN indication, duration route, documentation, administration, and laboratory values. Data was analyzed using descriptive statistics in Microsoft Excel. This evaluation was exempt from IRB review.

Results: Thirty patients received a total of 42 courses (553 doses); demographic information is presented in Table 1. MUE results across different criteria are shown in Table 2. A review of prescribing practices indicated that 18 (42.9%) courses lasted less than 5 days and in 13 (31%) of the PN courses the treatment was inappropriately prescribed. Preventable wasted doses amounted to 27 (4.9%) bags out of 553 dispensed. While no instances of central line-associated bloodstream infections (CLABSI) were found in the sample, 24 out of 30 (80%) patients had missing medication administration record (MAR) documentation. Evaluation of monitoring parameters identified 12 (28.5%) instances of phosphate levels below 2 mg/dL, suggesting occurrence of refeeding syndrome. In addition, the analysis detected 8 (19%) courses in which glucose levels were above 300 mg/dL and indicated that glucose point of care (POC) tests were ordered every 6 hours (Q6H) in only 8 (19%) courses of treatment.

Conclusion: The criteria evaluated in our MUE identified several elements of the PN process that fell below our desired goals. Further research needs to be done to establish standardized quality improvement (QI) metrics for PN. Areas identified for intervention at our facility include appropriateness of PN indication, utilization of peripheral route, PN template form, EMR documentation, likely high incidence of refeeding syndrome, and laboratory monitoring. Initial interventions undertaken as a result of this project include developing a new peripheral "standard" formula that is less than 900 mOsm/L, adding an entry of "parenteral nutrition" to our medication error reporting system, and developing a PN appropriateness checklist for prescribers. Further interventions (e.g. staff education, training on improving EMR documentation) are planned with a goal of repeating the MUE one year after initiation of these interventions.

Financial Support: n/a

Results Table 1 – Patient Demographics

Patients	30
Age, Mean ± SD	51.6 ± 11.76
Male gender, n (%)	20 (66.7%)
Past Medical History	GI Disease - 17 (56%); GI Surgical History – 13 (43%); Diabetes – 6 (20%); HTN – 3 (10%); Gyn/Onc – 3 (10%); Oncology - 3 (10%); CKD - 2 (7%); HD/PD - 1 (3%)
Prescribing Service	General Surgery – 17 (40%); Medicine – 7 (17 %); ICU – 7 (17 %); Heme/Onc – 6 (14%); TB Service – 4 (9.5%); Gyn Onc – 1 (2.4%)
Courses of therapy	42
# Distinct Admissions	36
Total Doses	553
Doses per course, Mean ± SD	13.17 ± 22.54
Receiving PN at home prior to admission	7 (16.7%)
Discharged from OVMC on PN therapy	8 (19%)

Results Table 2 – MUE results

Criteria	Frequency (%) N=42 courses of therapy unless otherwise indicated	Comment
Prescribing		
Appropriate PN indication documented	29 (69%)	
Peripheral Route	12 (28.6%)	5/12 of peripheral doses had an appropriate indication documented
# Courses lasting <5 days	18 (42.9%)	8/18 had an appropriate indication documented
Cyclic PN	7 (16.7%)	1/7 (14%) not on home PN
Dextrose < 150 g/day within first 24 hours	6 (14.3%)	Mean dextrose dose received 231 g
Dispensing		
Waste Doses (% of total doses)	27 (4.9%)	
Administration		
CLABSI	0	
Patients with Missing MAR documentation	24 (80%)	
Monitoring		
PN contaminated labs	1 (2.4%)	
Daily BMP resulted	37 (88.1%)	
Phosphate NOT ordered	4 (9.5%)	
Phosphate < 2 ever during PN therapy	12 (28.5%)	Mean phos nadir 1.38
POC Glucose NOT ordered	6 (14%)	
POC Glucose ordered Q6H	8 (19%)	
POC Glucose ordered ACHS	9 (21.4%)	
POC Glucose ordered other	19 (45.2%)	
Glucose >300 ever during PN therapy	8 (19%)	

P8 - Effect of perioperative immunonutrition on discharge disposition, complications, and readmissions following total knee and total hip arthroplasty

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Purpose: Purpose We compared health outcomes of patients who underwent total arthroplasty of the hip (THA) or knee (TKA) and consumed enhanced immunonutrition with patients who did not consume the supplement.

Methods: Methods Patients who underwent a primary THA or TKA between May, 2017 and May, 2019 were offered 15 drinks (Ensure Immunonutrition Surgery) to consume three times a day, for the 5 days before and after their surgery. Patients who did not complete consumption of the supplement were classified as the control group. Logistic regression analyses were used to assess the odds of discharge to a skilled nursing facility rehabilitation, or long-term care facility, presence of a complication, and 30-day readmissions.

Results: Results A total of 1,517 (927 TKA and 590 THA) cases from 1,368 unique patients were included in the study. The indication for surgery was osteoarthritis for 89.8% of cases. Age was associated with an 11% increased odds of discharge to a SNF (OR 1.11; 95%CI = 1.09, 1.13). The use of immunonutrition was associated with a reduction in discharge to a SNF but it was not statistically significant (OR = 0.75; 95%CI = 0.55, 1.03). The final model indicated that diabetes increased the odds of a post-operative complication (OR = 2.48; 95%CI = 1.04, 5.92) while immunonutrition (OR = 0.41; 95%CI = 0.18, 0.97) decreased the odds of a complication. Only admission 6 months prior to surgery was associated with increased odds of a readmission (OR = 2.96; 95%CI = 1.68, 5.27).

Conclusion: Conclusions Enhanced immunonutrition products consumed before and after TKA and THA may significantly reduce the odds of a complication and in turn reduce healthcare costs. Although future research is needed, this finding highlights the importance of nutrition support for patients undergoing THA or TKA.

Financial Support: This study is funded by a grant from Abbott Laboratories

P9 - Efficacy and cost savings associated with use of sublingual selenium in patients requiring home parenteral nutrition

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Purpose: The purpose of this retrospective chart review was to evaluate the efficacy on maintaining serum Se concentrations within reference range with SL Se when used alone or in combination with MTE in patients requiring home PN (HPN). Cost savings associated with this clinical intervention was also evaluated.

Methods: Starting August 2019, patients requiring IV Se supplementation in addition to or in lieu of the MTE product provisions were converted to SL Se. Patients were educated to administer the medication via the SL route for optimal absorption. A retrospective chart review of adult TPN patients (≥ 18 years old) who received SL Se and had at least one serum Se level drawn after the conversion was performed. The primary outcome was to evaluate what percentage of patients receiving SL Se had serum concentrations within reference range. Cost savings was evaluated based on the change in IV Se requirements pre- vs post-intervention.

Results: A total of 15 patients met criteria for inclusion. On average, patients were 55.3 + 14.5 years old, female (66.7%), white (53.3%), 123.2 ± 30.4% ideal body weight (IBW), and had a body mass index (BMI) of 26.7 ± 5.9 kg/m2. The most common indication for PN was short bowel syndrome (SBS) (73.3%). Nutritional provisions were 1.4 + 0.5 g/kg/day of protein and 17.925.8 + 9.5 kcal/kg/day of calories, meeting 103.8 ± 15.7% and 71.6 ± 27.5% of estimated protein and calorie requirements, respectively (Table 1). An average PN prescription consisted of 2471.3 + 1022.8 ml/day. In addition, patients received 933.3 + 232.0 mL/day of scheduled hydration and required anti-motility medications (Table 1). Over half of the patients received 60 mcg/day of Se from MTE with an additional 73.3 + 23.5 mcg/day from IV Se at baseline (Table 2). During the intervention period, patients received 80.0 + 29.3 mcg/day of SL Se. Post-intervention, patients received 16.0 + 27.5 mcg/day of IV Se and 52.0 + 44.6 mcg/day of SL Se. The primary endpoint of serum Se within reference range was met in 73% of patients which corresponds with a 65% reduction in supplemental IV Se requirements for the entire study population. Based on the current pricing of IV Se ($0.57/mcg), Duke Infusion Pharmacy realized cost savings of more than $178,000 in patients who were successfully transitioned to SL Se in lieu of supplemental IV Se (Figure 1).

Conclusion: Patients included in this retrospective chart review had high nutrient and fluid requirements due to various malabsorptive disorders. In spite of characteristics which put these patients at high risk for Se deficiency, the majority (73%) of patients maintained serum Se concentrations within reference range when converted from additional IV Se supplementation to SL Se supplementation. This clinical intervention resulted in significant cost savings to the organization and presents a viable option for patients with intestinal failure of varying etiologies. To the knowledge of the investigators, this chart review is the first to evaluate the clinical role of alternative routes of Se administration in HPN patients.

Financial Support: n/a

Nutritional Requirements and Medications

Table 1. Nutritional Requirements and Medications

Nutritional Requirements and Medications	
Estimated Nutritional Requirements	
Protein (g/day)	98.3 ± 30.2
Protein (g/kg/day)	1.4 ± 0.45
Calories (kcal/day)	1763.8 ± 422.7
Calories (kcal/kg/day)	25.8 ± 6.8
PN Prescription	
PN volume (ml/day)	2471.3 ± 1022.8
Protein (g/day)	96.0 ± 29.3
Protein (g/kg/day)	1.4 ± 0.5
% protein of estimated requirements	103.8 ± 15.7
Calories (total kcal/day)	1219.2 ± 564.5
Calories (kcal/kg/day)	17.9 ± 9.5
% calories of estimated requirements	71.6 ± 27.5
Medications	
Scheduled hydration, ml/day	933.3 ± 232.0
Loperamide, n (%)	5 (33.3)
Diphenoxylate-atropine, n (%)	4 (26.7)
Octreotide, n (%)	2 (13.3)
Teduglutide, n (%)	2 (13.3)

PN=parenteral nutrition

Selenium Provisions

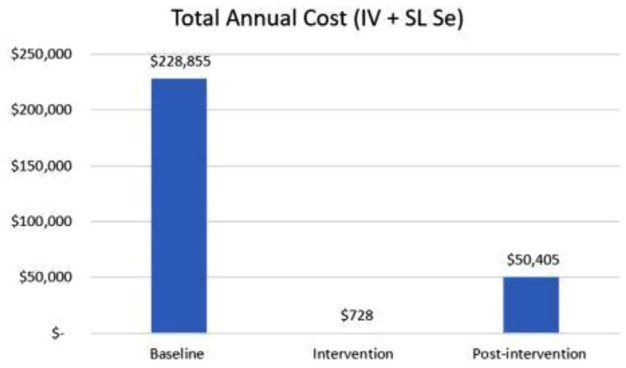
Table 2. Selenium Provisions

Selenium Provisions	Baseline	Intervention	Post-Intervention
Receiving MTE (60 mcg/day), n (%)	8 (53.3)	8 (53.3)	6 (40.0)
Additional IV dose (mcg/day)	73.3 ± 23.5	-	16.0 ± 27.5
Total IV dose (mcg/day)	105.3 ± 20.7	-	40.0 ± 29.3
SL dose (mcg/day)	-	80.0 ± 29.3	52.0 ± 44.6
Total from all sources (mcg/day)	105.3 ± 20.7	112.0 ± 21.1	92.0 ± 38.4

MTE=multiple trace element, IV=intravenous, SL=sublingual

Total annual cost of IV selenious acid and SL selenium

Figure 1. Total annual cost of IV selenious acid and SL selenium



P10 - A Multidisciplinary Approach to Reducing Errors in Total Parenteral Nutrition Management

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Purpose: Total Parenteral Nutrition (TPN) is considered a high-alert nutritional support modality with studies providing evidence of a multidisciplinary approach regarding the provision of specialized nutritional support in reducing TPN errors. The current standard of care at Wellstar Atlanta Medical Center – Downtown Campus (WAMC-DT) involves the management of TPN by clinical pharmacists, while dieticians monitor enteral nutrition. In July 2019, a multidisciplinary nutritional support team was assembled to round on patients receiving TPN and enteral nutrition in the critical care units. The purpose of this study is to evaluate the effectiveness of the recent implementation of a multidisciplinary nutritional support team at WAMC-DT in reducing errors in total parenteral nutrition management.

Methods: This was a single-center, observational study involving a historical control group and an interventional group observed over six months at WAMC-DT. The historical control group contained TPN patients admitted from July 1, 2018 to December 31, 2018 prior to the implementation of a multidisciplinary nutritional support team. The intervention group contained TPN patients admitted from July 1, 2019 to December 31, 2019 during the implementation of a multidisciplinary nutritional support team. The inclusion criteria were non-neonate patients initiated on TPN for at least 24 hours during the desired study period. Exclusion criteria were patients on either enteral nutrition or by mouth (PO) diet only, and patients who were receiving home TPN. The intervention included multidisciplinary rounds during the weekdays (Monday through Friday), with nutritional support education provided by the rounding pharmacist referencing American Society of Parenteral and Enteral Nutrition (ASPEN) guidelines. Interventions made by the team were logged and reviewed. Interventions were also reviewed during nutritional support subcommittee meetings for physician oversight.

Results: 44 patients were enrolled in the control group, and 41 in the intervention group. Baseline characteristics between the groups were similar. Statistical significance was shown regarding the percentage of days with presence of electrolyte abnormalities, with the intervention group favored at 40.3% versus 45.9% in the control group (p-value of 0.005). Also, statistical significance was shown regarding the total number of ordering errors, with the intervention group favored at 18 (43.9%) versus 21 (47.7%) in the control group (p-value of 0.005). Although not statistically significant, a numerical improvement was observed in favor of the intervention group regarding energy and protein requirements met, total number of complications, hospital length of stay, and 30-day mortality. The single outcome that favored the control group was the total number of administration errors that occurred, which was 3 (6.8%) in the control group versus 5 (12.2%) in the intervention group. However, this was not statistically significant (p-value of 0.360).

Conclusion: This study showed that a multidisciplinary nutritional support team effectively reduced ordering errors and decreased the amount of days patients experience electrolyte abnormalities during the duration of TPN therapy. When these errors are identified and corrected, we can prevent potential harm from reaching the patient leading to improved patient outcomes.

Financial Support: n/a

P11 - Clinical Application of Fish Oil Intravenous Lipid Emulsion in Adult Home Parenteral Nutrition Patients

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Purpose:

High n-6 polyunsaturated fatty acids (PUFA) are noted to contribute to development of intestinal failure associated liver disease (IFALD) in home parenteral nutrition (HPN). Fish Oil (FO) has been added to latest generation of intravenous lipid emulsions (ILE) to increase the n-3:n-6 PUFA content, however appropriate dose of FO to treat IFALD is not known.

Methods:

After approval of 100% FO ILE in the United States for pediatric patients, we noted two patients with ongoing IFALD despite transition to mixed oil (MO) ILE. A review of literature was conducted for studies evaluating use of 100% FO ILE in adult HPN patients to guide management.

Results:

The first case is a 40-year-old female on HPN with IFALD refractory to MO ILE. Mixed approach was used with FO ILE being provided at 50 g/day 3 days/week and MO ILE provided at 50g/day 4 days/week. This allowed for decrease in dextrose calories, increase in calories from ILE and resulted in improvement in liver function studies and resolution of steatosis and liver stiffness on MR Elastography. The second case is a 49-year-old male on HPN due to complications of necrotizing pancreatitis who developed IFALD. 100% FO ILE was used as sole source of lipids and improvement in liver numbers was noted. No evidence of essential fatty acid deficiency was found in either case.

Conclusion:

Current case presentations and review of literature support the use of 100% FO to further increase the n-3:n- 6 PUFA content in patients with IFALD refractory to MO ILE. Additional research is necessary to delineate the dose of FO ILE necessary to achieve benefit.

Financial Support: No financial support was received for this work.

Figure 1: Case 1 Liver Function Studies

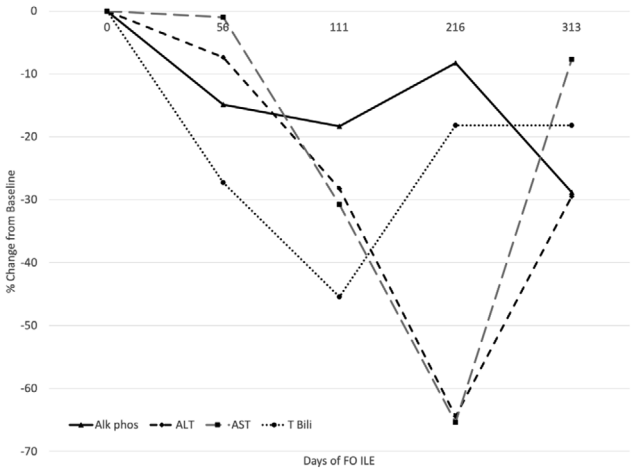
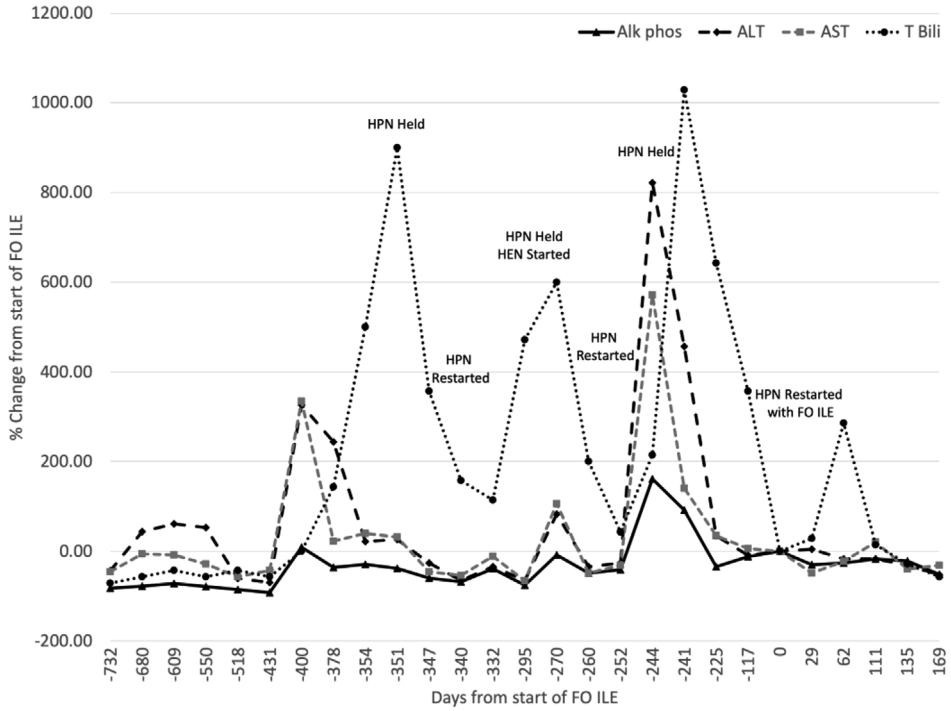


Figure 2: Case 2 Liver Function Studies



International Poster of Distinction

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Publication: Comerlato PH, Stefani J,Vercoza Viana M, Vercoza Viana L. Infectious complications associated with parenteral nutrition in intensive care unit and non-intensive care unit patients. Braz J Infect Dis. Mar-Apr 2020;24(2):137-143. https://doi.org/10.1016/j.bjid.2020.02.002. **Epub 2020 Mar 20.**

P12 - Infectious complications associated with parenteral nutrition in intensive care unit and non-intensive care unit patients

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Purpose: Malnutrition is associated with an increased risk of complications in hospitalized patients. Parenteral nutrition (PN) is used when oral or enteral feeding is not possible. However, PN is not free of adverse effects, often associated with infectious complications. This study aims to analyze associations between PN characteristics and infectious complications in hospitalized patients.

Methods: This is a retrospective cohort study conducted in a tertiary-care university hospital. Data from consecutive intensive care unit (ICU) and general ward adult patients submitted to PN from January 2016 to December 2017 were reviewed through an electronic database. Patient's clinical characteristics, PN prescription, and central vascular catheter (CVC) insertion procedure data were extracted and analyzed. Statistical analysis was conducted appropriately and included generalized estimating equations, multivariable analysis, and Cox regression adjustments for time-dependent covariables (CVC time in days). The primary outcome was the development of central line-associated bloodstream infections (CLABSI). The secondary outcomes were other infectious complications, mortality, and factors associated with CLABSI.

Results: We analyzed 165 patients and 247 catheters used for parenteral nutrition infusion (Image 1). Most patients were males, 56.3 ± 16.6 years old, overweight, with a median Charlson index of 4 and the most frequent comorbidity was cancer. Mean nutritional prescription, caloric, and proteic, was adequate (Table 1). The CLABSI rate was 6.47 per 1000 catheter-days. The most prevalent pathogens were Coagulase-negative staphylococci in 13 cases (46.4%), followed by fungal infections (Candida) in eight cases (28.6%), and Staphylococcus aureus in two cases (7.1%). In the univariable analysis (Table 2), CLABSI was associated with longer hospitalization time, longer PN time, longer catheter time, catheter insertion performed by a surgeon or a surgical resident, and procedures performed outside the ICU. No association was found with total calories of PN, proportion of macronutrients, hyperglycemia, supplemental PN, use of ultrasound, or comorbidities at the beginning of PN. Furthermore, no CLABSI occurred in less than 5 days of CVC use (median of 15 days), and inserting a new CVC when starting PN was not associated with a lower rate of CLABSI. In an extended time-dependent Cox regression, no variable was associated with a higher risk of CLABSI, and additional PN days did

not increase the rate of CLABSI (Image 2). About secondary outcomes, the most prevalent infectious complication during PN administration was abdominal infection, and the overall mortality rate was 24.8%. In univariable analysis, higher Charlson index, starting PN in ICU, development of any infection during PN administration, and abdominal infection development during PN administration were significantly associated with death. However, only patients' comorbidity index remained associated with death in the multivariable analysis.

Conclusion: In our study, patients who needed PN had an overall CLABSI rate of 6.47 per 1000 catheter-days. These outcomes were not associated with PN and catheter characteristics studied after adjustment for catheter time. The overall mortality rate was 24.8%, associated with Charlson comorbidity index but not with PN, after adjusting for possible confounders.

Financial Support: n/a

Table 1: Characteristics of the Included Patients (n = 165):

Characteristics	Value
Age (years)	56.3 (± 16.6)
Male	92 (55.8%)
Weight (kg)	70.15 (± 16.6)
BMI (kg/m²)	25.42 (± 5.6)
Surgical admission	132 (80%)
Abdominal surgery	119 (72.1%)
PN started in the ICU	71 (43%)
Hospitalization time (days)	43 (27.5-64.5)
Charlson (comorbidity index)	4 (2-6)
SAPS 3 ¶	63.4 (± 14.5)
SOFA ¶	5 (3-7)
Vasoactive drugs ¶	21 (12.7%)
PN time (days)	15 (9-25)
Total PN	125 (75.7%)
Supplemental PN	40 (24.2%)
Comorbidities	
DM	35 (21.2%)
Coronary artery disease	16 (9.7%)
Heart failure	6 (3.6%)
Stroke	16 (9.7%)
Pulmonary disease	20 (12.1%)
Hepatic disease	8 (4.8%)
Cancer	73 (44.2%)
Chronic kidney disease	13 (7.9%)
PN daily prescription	
Calories (kcal)	1598 (± 423.3)
Calories (kcal/kg)	25.2 (20.2-27.6)
Protein (g/kg)	1.5 (1.24-1.61)
Glucose (g/kg)	3.08 (2.52-3.52)
Lipids (g/kg)	0.8 (0.58-0.91)
Outcomes	
Mortality	41 (24.8%)
Hyperglycemia	62 (37.6%)
Any infection	107 (64.8%)
Pulmonary infection	28 (17%)
Abdominal infection	60 (36.4%)
Operative wound infection	7 (4.2%)
Urinary infection	9 (5.5%)
Bacteremia not related to CVC	7 (4.2%)
CLABSI	24 (14.5%)
Fungemia	12 (7.3%)

Table 2: Univariable Analysis for Evolution to CLABSI at Hospitalization

Variables:	CLABSI (24 patients)	No-CLABSI (141 patients)	P
Age (years)	55.9 ± 16.1	56.4 ± 16.7	.77
BMI (kg/m²)	26.4 ± 5.7	25.2 ± 5.6	.36
Charlson (comorbidity index)	5.5 (2-6)	4 (2-6)	.29
Postoperative	18 (75%)	113 (80.1%)	1
Hospitalization time (days)	66 (53.5-82)	38 (27-59)	.0001
PN time (days)	30 (11.5-43)	14 (9-23)	.003
DM	5 (20.8%)	30 (21.3%)	1
Hyperglycemia	8 (33.3%)	54 (38.3%)	.81
PN started in ICU	9 (37.5%)	61 (43.9%)	.719
Supplemental PN	2 (8.3%)	38 (27%)	0.09
Calories infused / day (kcal)	1537 ± 402.7	1608 ± 427	.448
Proportion of calories from glucose (%)	45 (42 - 47.5)	45 (42 - 48)	.74
Procedure performed by a surgeon ¶ †	81 ± 7.9% (61-92%)	56 ± 3.7% (49-64%)	.025
Procedure performed in ICU †	16 ± 7.4% (6-36%)	39 ± 3.6% (32-46%)	.03
CVC time (days) †	20.6 ± 1.6 (17.4-23.7)	17.27 ± 0.8 (15.7-18.8)	.034
Double-lumen †	96 ± 3.5% (78-100%)	95 ± 1.5 (91-97%)	.741
Subclavian-site †	39 ± 8.5% (24-56%)	38 ± 3.3% (32-45%)	.933
Ultrasound-guided †	37 ± 8.3% (23-54%)	52 ± 3.6% (45-59%)	.123
PN infused in a recently inserted (< 48h) CVC †	82 ± 7.5% (63-93%)	77 ± 2.8% (71-82%)	.55

Image 1: Flowchart of Included and Excluded Patients

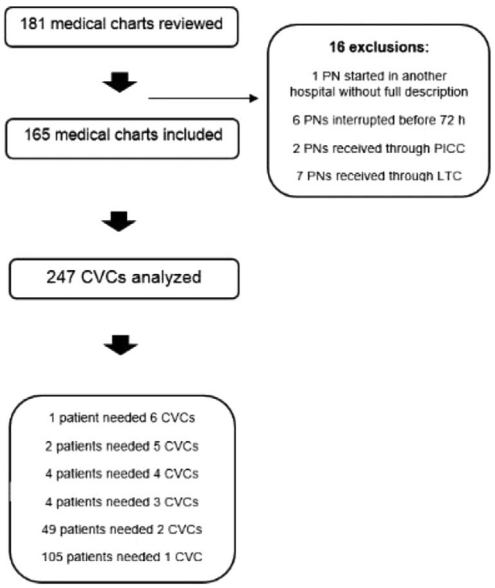
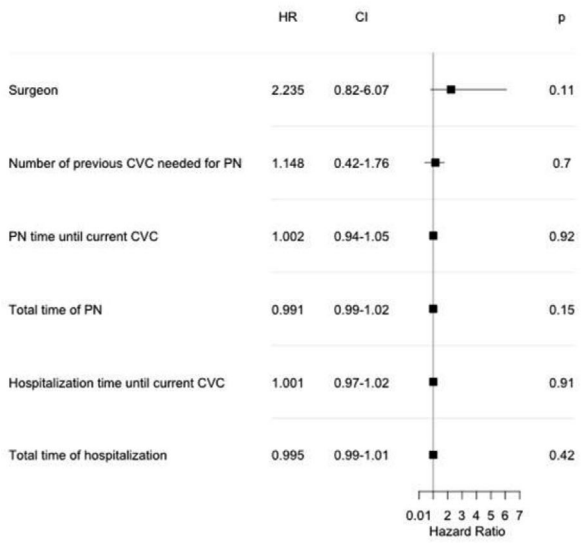
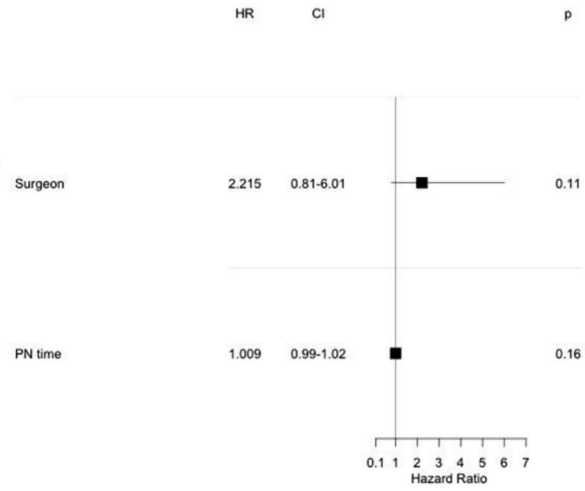


Image 2: Evolution to CLABSI in a time-dependent Cox regression

Univariable:



Multivariable:



Extended Cox model for time-dependent covariates, through "R" survival package. HR: Hazard Ratio; CI: 95% confidence interval. R square = 0.019. Concordance = 0.566. Likelihood ratio test = 4.38. Wald test 4.28. Logrank test 4.54 p = 0.1

P13 - Utilization of Parenteral Nutrition in Major Gastrointestinal Surgery: An Opportunity for Quality Improvement

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Purpose: Parenteral nutrition (PN) is commonly utilized to support patients in the peri-operative period surrounding major gastrointestinal (GI) surgical procedures. It is unclear how frequently PN is initiated in concordance with established American Society of Parenteral and Enteral Nutrition (ASPEN) consensus recommendations. This study sought to evaluate PN utilization (initiation based on malnutrition status and duration of PN use) in a surgical subspecialty practice to evaluate baseline recommendation concordance and identify opportunities for implementing quality improvement.

Methods: In a pilot quality improvement study, patients who underwent major GI surgical oncology procedures at a single academic institution and received PN peri-operatively were identified over a 6-month period (February-July 2020). The medical charts were reviewed for clinicopathologic variables, nutrition status, and the initiation and duration of PN in accordance with ASPEN recommendations. The Academy of Nutrition and Dietetics/ASPEN malnutrition criteria were used to assess patient nutrition status. The Journal of Parenteral and Enteral Nutrition (JPEN)/ASPEN

2017 consensus recommendations for PN initiation time frame, established by expert panel, were interpreted and applied to the cohort (Table 1). The cohort was stratified by PN recommendation concordance, and intergroup comparisons were made to identify factors associated with non-concordant utilization of PN.

Results: The query identified 81 patients (Table 2). Pancreatectomy was performed in 38% of patients, hepatectomy in 15%, other GI surgery in 41%, and cytoreduction/HIPEC in 6%. Severe or moderate protein-calorie malnutrition was present in 68% of patients on dietitian assessment. The most common indication for PN was dysmotility in 38% of patients, followed by anastomotic leak (27%), mechanical obstruction (19%), and failure to thrive (16%). Median length of stay was 15 days. Median duration of PN was 8 days, and 22% of patients were discharged on PN. Non-concordant PN utilization was identified in 68% of patients (Figure 1). The most frequent reason for "non-concordance" was initiation outside the recommended time frame based on the severity of malnutrition ("too late" in 48% and "too soon" in 20%). "Premature" initiation of PN occurred most often in patients without malnutrition (6 of the 18 non-concordant in this group - 89%). Within this subgroup, PN was most commonly indicated for dysmotility (44%) (Figure 2). In 16% (13/81) of the overall cohort PN was administered for fewer than five days, including 5 of the 16 non-concordant "too early" patients without malnutrition (31%).

Conclusion: PN use surrounding major GI surgical oncology is frequently not concordant with established ASPEN recommendations. This suggests a clinical challenge of incorporating these recommendations into the dynamic care of complex surgical patients. It is thought that there is a clinical predisposition in these unpredictable cases to proactively intervene by providing nutritional support. In spite of this, nearly half of the patients in this cohort were initiated after the recommended time frame. Quality improvement efforts should focus on reduction of delayed PN initiation without increasing premature or truncated PN use.

Financial Support: n/a

Recommended Timeframe for Initiating PN based on Protein-Calorie Malnourishment (PCM) Assessment

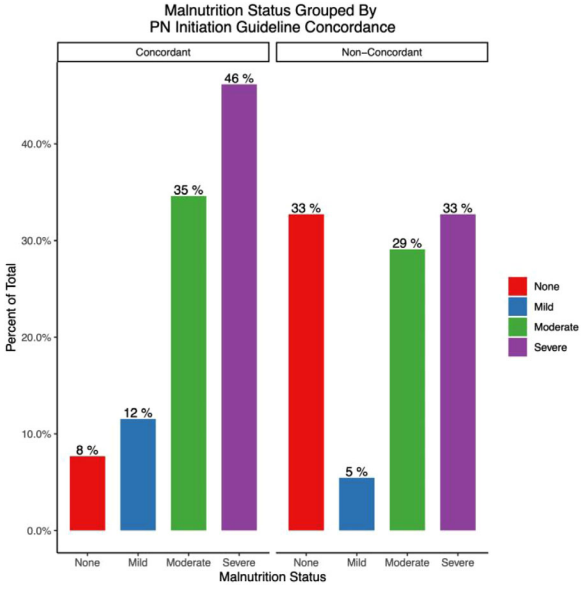
Protein-Calorie Malnourishment	Recommended Timeframe for Initiation PN	JPEN 2017 Guidelines for PN Initiation Timeframe
Well Nourished/ No PCM	7-10 days	>7 days
Mild PCM	3-5 days	3-5 days
Moderate or Severe PCM	Within 2 days	ASAP

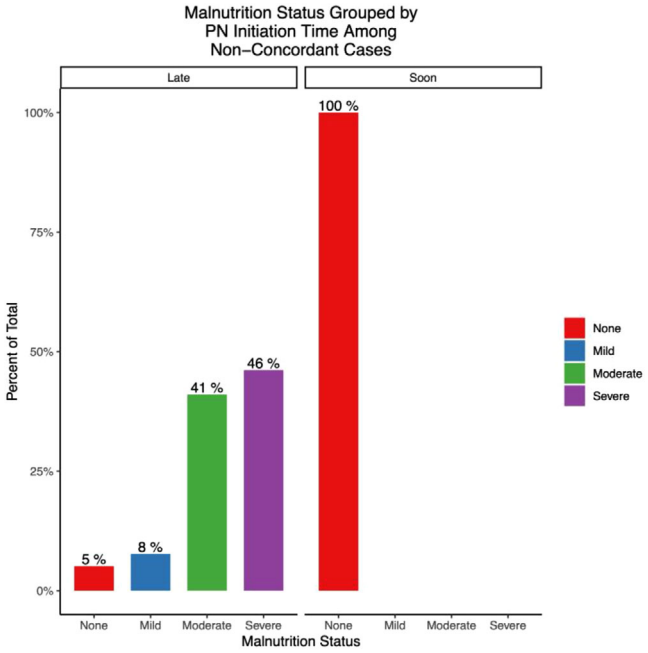
Recommended PN initiation timeframe for patients who are unable to receive their estimated nutritional requirements via oral or enteral route. Timeframe calculated from date of dietitian's PCM assessment.

Summary Data Table

Variable	Results
N	81
Female Gender (%)	34 (42.0)
Age (median [IQR])	66.8 [58.1, 73.6]
Surgery (%)	
Cytoreduction With HIPEC	5 (6.2)
Hepatectomy	12 (14.8)
Other GI Surgery	33 (40.7)
Pancreatectomy	31 (38.3)
Indication for PN	
Dysmotility	31 (38.3)
Failure to Thrive	13 (16.0)
Intra-Abdominal Leak	22 (27.2)
Mechanical Obstruction	15 (18.5)
Feeding Jejunostomy Placement (%)	6 (7.4)
Length of Stay (median [IQR])	15.0 [10.0, 19.0]
Patients Discharged with PN (%)	18 (22.2)
PN Duration (median [IQR])	8.0 [5.0, 8.0]
PCM Assessment (%)	
None	20 (24.7)
Mild	6 (7.4)
Moderate	25 (30.9)
Severe	30 (37.0)
Days with Inadequate PO Prior to PN (median [IQR])	5.0 [2.0, 6.0]
POD PN was Initiated (median [IQR])	5.0 [1.0, 7.0]
PN Used < 5 days (%)	13 (16.0)
Timing of Non-Concordant PN based on PCM Assessment (%)	
Initiated Too Late	39 (48.1)
Initiated Too Soon	16 (19.7)
Overall Non-Concordant Use	55 (67.9)

Abbreviations: PN= Parenteral Nutrition, PCM= Protein-Calorie Malnourishment, HIPEC= Hyperthermic Intraperitoneal Chemotherapy, POD= Post-Operative Day.
Overall Concordance= Patients with PN Duration >5 days + Patients Initiated PN within recommended timeframe based on PCM Assessment





P14 - Opportunities to Reduce Pharmaceutical Packaging Waste Associated with PN Compounding

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Purpose: Identify opportunities to reduce pharmaceutical packaging waste associated with parenteral nutrition compounding.

Methods: Estimates suggest that the US health care system produces 112 billion kilograms of waste per year, approximately 13.6 kg of waste per patient. This is largely due to the popularity of single use plastics and the need for sterile products. It is likely that over half of the waste generated by hospitals is recyclable. There is limited data available on recycling of pharmaceutical packaging waste. The majority of pharmacy studies focus on reducing drug waste. We elected to examine protocols put in place for intensive care units and operating room recycling programs since they generate a similar type of waste as an infusion pharmacy (single use, sterile products). We identified 9 sources of waste associated with PN compounding: Cardboard boxes that IV solutions are shipped in (outer and inner box) Overwrap for solution bags Solution bags (sterile water, dextrose, amino acids, lipids) Vials, stoppers, caps Needles Syringes Tubing Protective garb (gowns, shoe covers, masks, gloves) Empty cleaning solution bottles We elected to focus on cardboard and plastic overwrap (plastic #2 & #5) since they contributed to the majority of the waste, they seemed most likely to be recyclable, and recycling of these products would not involve a major change in our current processes. Each PN component was identified: sterile water, dextrose, amino acids, lipid, electrolytes, MVI, and MTE. The overwrap, packaging, and vials for each component were emptied and weighed individually. An inventory report from August 1, 2020-August 30, 2020 was used to determine average monthly usage. Data was extrapolated to determine weight of waste over a one-year period and is shown in Table 1.

Results: We sought to identify costs associated with recycling (financial, additional preparation of items and location) and potential partners in our local service area. Possible partners were identified and contact was made by members of our clinical team. Estimated costs to recycle cardboard and plastic #2 and #5 is $800+ per month and in some instances required rental or purchase of additional equipment (i.e. baler or compactor). The relatively small volume of recyclables (less than a truckload) and limited storage space available onsite were also identified as barriers to implementation. Cardboard can be recycled by our current waste removal company with proper sorting.

Conclusion: Implementation of a program to reduce pharmaceutical packaging other than cardboard appears to be cost prohibitive at this time given our relatively small volume of recyclable products and need for additional equipment and space. Further opportunities to explore include identifying ways to repurpose items that cannot be cost effectively recycled (put on hold temporarily due to the pandemic).

Financial Support: n/a

Material	Weight (Kg)
Cardboard	2889.4
Plastic #2	418.6
Plastic #5	34.9
Glass	1563.6
Paper	48.0

Table 1: Estimated annual waste by product type

Material	Weight (Kg)
Cardboard	2889.4
Plastic #2	418.6
Plastic #5	34.9
Glass	1563.6
Paper	48.0

Table 1: Estimated annual waste by product type

P15 - Safe Initiation of Home Parenteral Nutrition in Patients at Risk for Refeeding Syndrome Using Evidence-based Protocols

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Purpose: Refeeding syndrome (RS) is well described in the literature, however; incidence is unknown due to the lack of standard definition. Recent RS consensus recommendations provide criteria and guidance surrounding definition and prediction of risk. It is imperative to identify risk for RS before the start of parenteral nutrition in the home setting (HPN), as the level of refeeding risk informs a safe initiation and advancement of feeding. HPN also requires close clinical monitoring of the patient by a home nutrition support team (NST) in order to prevent potential readmission and optimize nutrition outcomes. The primary objective of this study was to evaluate the incidence of RS in patients initiated on HPN and to determine the influence of risk for RS on clinical outcomes. A secondary objective was to evaluate the efficacy of existing HPN start protocols on the safe initiation of HPN in patients at risk for RS.

Methods: This retrospective study examined patients 18 years of age and older who initiated HPN between May 15, 2020 and August 14, 2020 with a national home infusion provider. Assessments completed by the home infusion Registered Dietitian were evaluated. Patients were stratified by degree of risk for RS (high risk, moderate risk, low/no risk) using recent ASPEN consensus criteria. Other data collection categories included the need for fluid and/or electrolyte replacement prior to HPN initiation, characteristics of RS after initiation of HPN, days to achieve goal HPN and incidence and reason for readmission within 2 weeks of PN initiation. Outcomes were compared between the three study groups.

Results: A total of 142 patients were identified during the review period. Twenty-three patients were excluded due to short duration on PN (less than 2 weeks). Therefore, a total of 119 patients were included in the analysis. Overall risk for RS was present in 80% of the patients: 45% high risk and 34% moderate risk (Figure 1). In addition, 25.2% required fluid and/or electrolyte replacement prior to HPN initiation and 11.8% exhibited some type of characteristic of RS within 5 days post-PN initiation. There was a trend toward patients at high risk for RS to require more frequent fluid/electrolyte replacement prior to HPN initiation ($p = 0.06$) (Table 1). Patients at high risk for RS also had significantly higher days to achieve goal nutrition ($p = 0.01$) (Table 2). There was no difference in incidence of RS between the groups ($p = 0.42$). Lastly, 16% ($n = 19$) of patients were admitted to the hospital or emergency department within 2 weeks of HPN initiation. However, only two patients (1.7%) were hospitalized for a nutrition-related reason.

Conclusion: Risk of RS is a common assessment finding among patients who initiate HPN. However, actual incidence of RS is low. Our study demonstrated that patients can be safely initiated and advanced on HPN when using evidence-based protocols, despite level of RS risk. In addition, read-

mission rate was low and most commonly related to the patient's underlying disease state. Patients at risk for RS may be safely initiated on HPN when evidence-based clinical protocols are used and close clinical monitoring by a NST is provided.

Financial Support: n/a

Table 1: Fluid and Electrolyte Replacement Requirements Among HPN Patients at Risk for Refeeding Syndrome

	Required Fluid/Electrolyte replacement before HPN Initiation [a]		
Risk for RS	**Yes**	**No**	**p-Value [b]**
High Risk	18 (60)	36 (40)	p=0.06
Moderate Risk	10 (33)	31 (35)	
Low/No Risk	2 (7)	22 (25)	

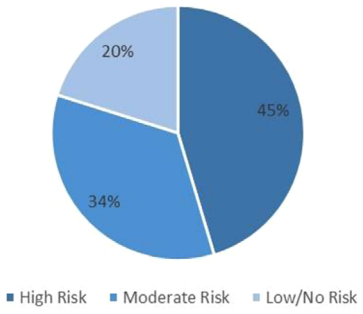
RS = Refeeding Syndrome
[a] data presented as n (%)
[b] Chi-square test, SPSS

Table 2: Effect of Refeeding Syndrome Risk on Time to Achieve Goal Nutrition

Risk for RS	Days to Achieve Goal PN Infusion [a]	P-Value [b]
High Risk	15	p=0.01 [c]
Moderate Risk	12	
Low/No Risk	8	

RS = Refeeding Syndrome
[a] data presented as Median days
[b] Friedman Test, SPSS
[c] statistical significance set at p < 0.05

Figure 1: Risk of Refeeding Syndrome Among Patients Initiated on HPN



P16 - Parenteral Nutrition Clinical Interventions Made by a Home Infusion Nutrition Support Team

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Purpose: Home parenteral nutrition (HPN) is a lifesaving therapy requiring close monitoring for safety and optimization and to avoid common metabolic complications. Interventions are common and may include changes to the HPN volume, macronutrients, micronutrients, infusion days or hours, or other additive adjustments. The frequency of clinical follow up is determined by each patient's clinical acuity. Appropriate and ongoing interventions made by an experienced home nutrition support team (NST) managing the patient's therapy have the potential to prevent readmission, allow for quicker weaning from therapy, and improve clinical and financial outcomes. The purpose of this study was to identify the most common interventions, and whether there was any association between indication for HPN and intervention type. For the purpose of this study, interventions were defined as adjustments to the HPN solution only.

Methods: HPN patients 18 years of age and older managed by the NST from a national home infusion provider between June 15, 2020 and August 15, 2020 were evaluated. Data were collected on the frequency, type, and reason for intervention made during routine clinical follow-up. Chi-square tests were used to determine clinical significance between intervention types across patient groups.

Results: A total of 6,715 assessments were completed on 1,898 patients during the review period with 8,302 separate interventions recommended. Interventions were recommended during 59.4% of follow-up assessments. Macronutrient (40.4%) and electrolyte (31.3%) adjustments were the most common interventions followed by infusion time/days (13.9%), volume (7.6%), and micronutrients/other additives (6.9%) (Figure 1). The most common reason for HPN intervention was abnormal nutritional/electrolyte laboratory values, which accounted for 43.8% of interventions (Figure

2). The top five HPN indications requiring interventions were bowel obstruction, complications related to bariatric surgery, fistula, gastroparesis, and intestinal malabsorption. Patients requiring HPN for bowel obstruction were more likely to require changes to amino acids ($p = 0.001$), lipid ($p = 0.002$) and volume ($P < 0.001$) compared to other patients. In addition, patients requiring HPN for complications related to bariatric surgery were more likely to require intervention to HPN additives ($p = 0.003$) and infusion time/days ($p < 0.001$) (Table 1).

Conclusion: Clinical interventions are very common among HPN patients and tend to be more related to macronutrient and electrolyte content in the HPN solution. These clinical interventions are imperative to the ongoing care of the HPN patient as this prevents potential readmission and improves overall patient outcomes. Results indicated patients with a HPN indication of bowel obstruction were more likely to require changes to amino acids, lipid, and volume, which are major components of the PN solution. This could indicate that these patients may be more clinically complex; however, data was not collected on whether these patients initiated HPN in the home setting or advanced to goal in the home or how long they were receiving HPN. Another limitation is that patients were grouped by reason for HPN rather than primary diagnosis. For example, patients with bowel obstruction or fistula may have a primary oncology diagnosis; however, they were grouped in terms of their indication for HPN. Future research should examine the number of interventions and changes in intervention type between short and long-term HPN patients as well as between those managed by an NST in comparison to those who are not.

Financial Support: n/a

Table 1: Association Between Reason for HPN Indication and Intervention Category

HPN Indication	HPN Intervention Category[a]						
	Amino Acids	*Dextrose*	*Lipid*	*Volume*	*Electrolytes*	*Additives*	*Infusion Time/Days*
Bowel Obstruction	17.1[b]	17.1	22.5[c]	14.5[d]	40.7	6.9	13.3
Complications s/p Bariatric Surgery	15.7	17.0	17.7	12.7	37.7	12.2[e]	20.9[d]
Fistula	15.1	15.6	19.3	11.4	39.5	7.8	10.6
Gastroparesis	11.0	15.9	16.1	6.5	34.7	8.4	10.2
Intestinal Malabsorption	11.8	13.7	16.1	9.2	36.3	6.5	8.9

[a] data represented as %
[b] p=0.001
[c] p=0.002
[d] p<0.001
[e] p=0.003

Figure 1: Types of HPN Interventions

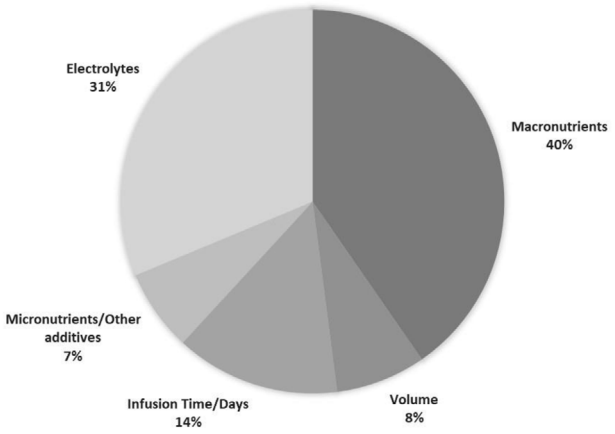
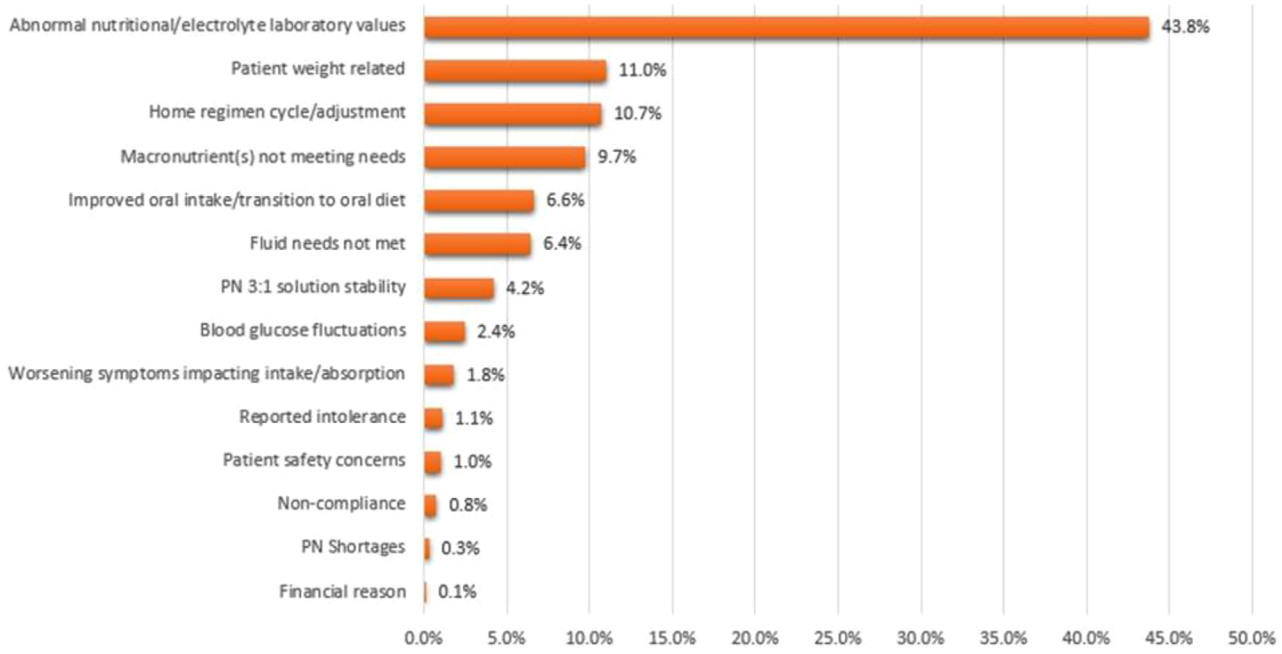


Figure 2: Reason for HPN Intervention



P17 - A case study of an anaphylactic intravenous lipid emulsion reaction in a patient who previously tolerated propofol

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Purpose: Allergies to intravenous lipid emulsion (ILE) are rare. Though allergies to soy, peanut, or eggs, can make providers wary of including ILE as part of the balanced parenteral nutrition (PN) formula. Providers have the challenge of discerning whether an allergy is true or whether it could be challenged, especially given that PN is typically only pursued when the enteral route is not available. This case study describes an adult woman with a history of anaphylactic egg reaction, though had previously tolerated propofol, who did not tolerate ILE for PN.

Methods: A 61-year-old female was admitted to the inpatient general medicine service due to sudden onset leg weakness and pain, thought to be peripheral neuropathy related to ongoing nutritional deficiencies. The patient had significant unintentional weight loss and due to the patient's history of Roux-en-Y gastric bypass, a gastrostomy tube was not recommended. A surgical jejunostomy tube was recommended to the patient; however, nutrition would have to be optimized prior to surgery. Patient refused temporary feeding tube placement; thus, PN was utilized. The patient had a reported history of dyspnea after consuming eggs 40 years prior; however, since had tolerated various doses of propofol for multiple surgeries. Propofol, an intravenous medication indicated for sedation, contains soybean oil, egg lecithin, and glycerol, just as ILE does. Given that the patient would rely on PN for the next several months and had a very high risk of essential fatty acid deficiency, an ILE trial was attempted. A trial dose of 20% intravenous lipid emulsion 5 mg (25 ml) was ordered to be infused over one hour. Ninety seconds into the ILE infusion, the patient endorsed a globus sensation in her throat and shortness of breath. The patient's oxygen saturation decreased from 100 to 82 percent and heart rate increased from 80 to 92 beats per minute. Epinephrine 0.3 mg was administered intramuscularly, and vital signs returned to baseline within one minute. The patient did not have any further symptoms or complications. The patient was discharged the following day without ILE in her PN formula, and encouraged to consume high fat foods orally, as able.

Results: Ideally the situation could have been avoided if the patient would have been amenable to a temporary feeding tube, given a presumably functional gastrointestinal tract. The decision to pursue PN was not taken lightly, nor was the decision to trial ILE, which occurred a week into the patient's PN therapy. Patient confirmed that she had received and tolerated propofol on many occasions and was comfortable trialing ILE, knowing that there would be nursing staff and anti-anaphylactic medication available at bedside. Given that propofol contains similar components to ILE, the assumption was that she would also tolerate ILE. But because she did not, the question is: did she really tolerate the propofol?

Conclusion: This is an unusual case of an adult woman who had previously tolerated propofol though did not tolerate ILE. Providers may consider a trial dose of ILE when approaching anaphylaxis to lipid emulsion ingredients.

Financial Support: n/a

P18 - Quality improvement project for HPN patients (QIP-PN): impact on laboratory monitoring

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Purpose: ASPEN guidelines for home parenteral nutrition (HPN) include routine hematology/chemistry and specialized laboratory studies biannually or as clinically indicated [table 1]. Adherence to these guidelines is a recognized standard of care. In this report, we examined compliance to laboratory guidelines as part of a corporate QIP-PN program.

Methods: A QIP-PN protocol was developed to examine 17 aspects of care for HPN patients at Amerita, Inc. The protocol was granted IRB exemption under NIH guidelines (45CFR 46.104(d)(2)) and was instituted at 7 branches. Patients that were expected to remain on HPN > 3 months were offered enrollment. Those who agreed provided signed informed consent. Their treating physicians signed QIP-PN participant agreements. Baseline data on the study parameters was collected for 30 days. Intensive analysis was performed for 90 days by a QIP-PN committee, which consisted of a physician nutrition specialist, certified nutrition support dietitians and pharmacists, HPN clinicians and administrators. Compliance with ASPEN's recommended laboratory protocol was reviewed.

Results: A total of 73 patients were offered participation. Of these, 35 agreed and were enrolled into the study. 25 of the 35 completed 50 or more days in the study. Compliance to routine lab recommendations for hematology/chemistry was found in 22 of 25 cases (92%). Compliance to specialized biannual lab recommendations was found in 11 of 25 cases (44%). Reasons for non-compliance included: inadequate handling of sample for specialized testing (n = 5), fear of allowing visiting RN into home and/or fear of leaving home due to COVID risk (n = 4), RN missed specialized lab orders (n = 2), insurance denial and cost to the patient (n = 3).

Conclusion: Guideline-based laboratory monitoring is an important aspect to caring for long term HPN patients. We found that compliance to routine laboratory recommendations was high (>90%). However, compliance to specialized laboratory recommendations was lower than expected (44%). Compliance was impacted by 4 factors, 2 of which were addressable by strategic planning: communication and pre-analytical errors. We modified our policy and procedures to improve compliance by utilizing three new methods: 1. We established a protocol for contacting the patient's RN on the day of scheduled lab draw with detailed instructions on the specimen collection, tubes required, special handling, transportation and storage techniques. 2. We changed the shipping order for the week before the scheduled lab draw to include the specific specimen tubes needed for each request. Light protection and cold storage packaging was provided if necessary. 3. We communicated lab draw request with MD offices to coordinate specialized lab draws while the patient was at the office, infusion suite or out-patient laboratory.

In conclusion, the QIP-PN program helped identify and address non-compliance to standards of care in laboratory monitoring of HPN patients. Strategic planning was utilized to favorably adjust policy and procedures with a beneficial effect.

Financial Support: n/a

Table 1. Routine and specialized laboratory monitoring for patients receiving home parenteral nutrition. Modified from (1).

	New Patients		Stable Patients	
Parameter	Baseline	Weeks 1, 2, 3, and 4	Monthly	Every 3–12 Months[a]
Basic metabolic panel: sodium, chloride, carbon dioxide, potassium, glucose, blood urea nitrogen, creatinine, calcium	X	X	X	
Hepatic function panel: total protein, albumin, total bilirubin, AST, ALT, alkaline phosphatase	X	X	X	
Magnesium	X	X	X	
Phosphorus	X	X	X	
CBC with differential	X	X	X	
Trace elements: zinc, copper, chromium, selenium, whole blood manganese	X			X
Phospholipid fatty acid profile	X			X
Water-soluble vitamins B_6, B_{12}, MMA, RBC folate	X[b]			X
Fat-soluble vitamins A, 25(OH)D, and E	X[b]			X
Iron indices: iron, ferritin, transferrin saturation, TIBC	X[c]			X

P19 - Safety and efficacy of multi-champer bag parenteral nutrition in hospitalized patients

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Purpose: To evaluate commercial available MCB-PN regarding nutrition safety and efficacy.

Methods: This was a retrospective study of hospitalized patients aged 18 years old and above who have been on MCB-PN for seven consecutive days and more at a tertiary hospital from January 2015 until December 2019. Patients who received MCB-PN for less than seven days were excluded from the study. Laboratory parameters were evaluated before PN started and used as a baseline and every seven days while on PN. The primary endpoints were the percentage of patients who achieved calculated nutritional targets (calories & protein) and the rate of patients who developed electrolyte abnormalities. These endpoints were tested in subgroup subjects (underweight, normal weight, overweight, and obese) by using Chi-Square tests. Secondary endpoints were the percentage of MCB-PN related adverse drug reactions and metabolic abnormalities during the treatment period.

Results: Results are stated as proportions and percentages. We reviewed 229 patients that met the inclusion criteria. 119 male (51.9%) 112 female (48.9%). Among the included subjects, a total of 101 (44%) achieved target calories; 29 (12.6%) underweight 33 (14.3%) normal weight 5 (2.2%) overweight and 4 (1.7%) obese subgroups with p-value < 0.01. A total of 191 (83.4%) developed electrolytes imbalance; 39 (16.9%) underweight 87 (37.7%) normal weight 34 (14.7%) overweight and 34 (14.7%) obese subgroups with p-value 0.085 during the treatment period. Low electrolytes serum levels were replaced by boluses or IV maintenance fluids. 100 (43.3%) were on potassium IVF maintenance, 34 (14.7%) on magnesium IVF maintenance, 5 (2.2%) on phosphate IVF maintenance, and 1 (0.4%) on calcium IVF maintenance.

A total of 52 (22.7%) were transitioned to customized PN; 37 (71.2%) Electrolytes imbalance, 5 (9.6%) fluid overload, 12 (23.1%) target calories/protein not achieved, 2 (3.8%) AKI and 2 (3.8%) other reason. No incidence of CLABSI has been reported during the treatment period. 18 (7.8%) uncontrolled hyperglycemia, 5 (2.2%) had hypoglycemia episodes, 27 (11.8%) Parenteral Nutrition-associated Liver Disease (PNALD), 7 (3%) MCB-PN associated volume overload developed and 3 (1.3%) refeeding syndrome.

Conclusion: In this study, among receiving MCB-PN, only 44% achieved targets calories, and 29.6% achieved the target protein dose. Less percentage of patients were experienced adverse drug reactions and metabolic abnormalities during the treatment period.

Financial Support: not financial support provided

Table 1: Patient's demographic data

	Mean	Std. Deviation	Minimum	Maximum
Age (years old)	53.57	17.19	18	93
Weight (kg)	62.08	17.18	18	124.9
Height (cm)	161.97	9.97	131	188
BMI (kg/m^2)	23.67	6.37	10.49	50
BEE (kcal/day)	2614.63	346.71	1869.17	3517.24
BEE*1.3 (kcal/day)	3393.61	450.12	2429.92	4572.42
BEE * 1.5 (kcal/day)	3915.71	519.85	2803.75	5275.87
Treatment period (days)	15.79	16.76	7	230

Table 2: Baseline characteristics

	Frequency (N)	Percentage (%)
Male	119	51.1
Female	112	48.1
Underweight	50	21.5
Normal weight	103	44.2
Overweight	43	18.5
Obese	35	15
Admitted electively for surgery	180	77.9
Gastrointestinal surgeries	107	46.72
Others procedure done	126	54.5
Admitted for nutritional support	5	2.2
Admitted with a chief complaint of GI symptoms	83	35.9
Other reason for hospital admission	33	14.3
Cardiovascular disease comorbidities	40	17.3
Diabetes	38	16.5
Kidney disease	3	1.3
Kidney disease on IHD*	1	0.4%
Others comorbidities	206	89.2
Medically free	16	6.9%

*IHD: Intermittent Hemodialysis Underweight: BMI of less than 18.5 kg/m2 Normal weight: BMI 18.5-24.9 kg/m2 Overweight: BMI 25-29.9 kg/m2 Obese: BMI 30 kg/m2 and above BMI: Body Mass Index

*IHD: Intermittent Hemodialysis Underweight: BMI of less than 18.5 kg/m2 Normal weight: BMI 18.5-24.9 kg/m2 Overweight: BMI 25–29.9 kg/m2 Obese: BMI 30 kg/m2 and above BMI: Body Mass Index

Table 3: PN indications & volume used

	Frequency (N)	Percentage (%)
Post operative nutritional support	162	70.1
Gastrointestinal symptoms*	45	19.5
Decreased oral intake and poor Appetit	35	15.2
Inflammatory Bowel Disease (IBD)	27	11.7
Bowel obstruction or ischemia	19	8.2
Lower gastrointestinal tract perforation or leak	7	3
High output fistula (volume >500 mL/day)	4	1.7
Short Bowel Syndrome with sever malabsorption	1	0.4
Gastrointestinal bleeding	1	0.4
Sever oral mucositis after chemotherapy	3	1.3
Other indications	37	16
Smofkabiven 1080 ml	5	2.2
Smofkabiven 1200 ml	8	3.5
Smofkabiven 1320 ml	28	12.1
Smofkabiven 1440 ml	33	14.3
Smofkabiven 1560 ml	51	22.1
Smofkabiven 1680 ml	41	17.7
Smofkabiven 1800 ml	39	16.9
Smofkabiven 1920 ml	28	12.1

* Gastrointestinal symptoms (diarrhea and vomiting, etc.)

* Gastrointestinal symptoms (diarrhea and vomiting, etc.)

Table 4: Primary Endpoint Results

	Underweight	Normal weight	Overweight	obese	Value	df	Asymp. Sig. (2-sided)
Target calories achieved	29 (12.6%)	40 (17.3%)	18 (7.8%)	14 (6.1%)	5.400	3	0.145
Target protein achieved	26 (11.3%)	33 (14.3%)	5 (2.2%)	4 (1.7%)	24.620	3	0.000
Electrolytes imbalance	39 (16.9%)	87 (37.7%)	34 (14.7%)	34 (14.7%)	6.626	3	0.084

P20 - A Retrospective Analysis of Medicare Referrals Requiring Home Parenteral Nutrition

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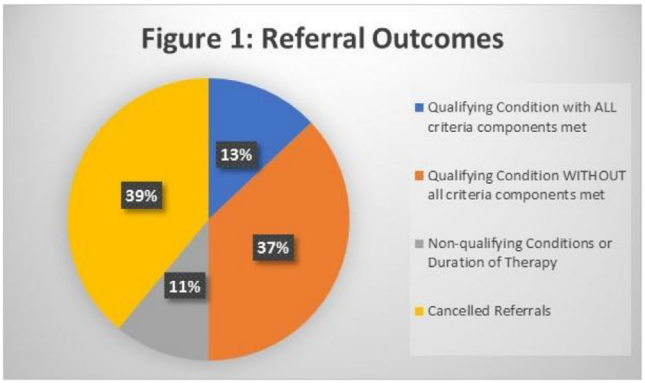
Purpose: Home Parenteral Nutrition (HPN) is covered for Medicare beneficiaries who meet the requirements outlined under the part B Prosthetic Device benefit. Under this benefit, patients must have a permanent GI condition, which is defined as "of long and indefinite duration (ordinarily at least 3 months)" per the verbiage in Medicare policy.ź Furthermore, this GI condition must fit into one of the seven Medicare coverage categories referenced as criteria A-H, which have additional specific component requirements under each criteria.ź The purpose of this study was to determine the most common criteria Medicare HPN patients qualify for Medicare coverage and review the outcomes of the HPN study referrals.

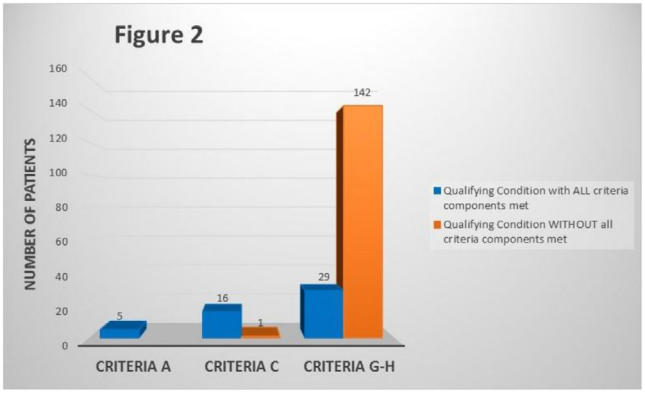
Methods: The database and medical records of a large national home infusion company were utilized to conduct a retrospective review of Medicare referrals received during a three-month period in 2019. ş

Results: A total of 386 new Medicare referrals between October 1, 2019 – December 31, 2019 were reviewed. Of these referrals, only 50 referrals (13%) met the stringent requirements outlined by Medicare coverage criteria. The remaining referral outcomes were as follows (Figure 1): 152 referrals (39%) were cancelled for various reasons, such as discharging to a skilled nursing facility, starting hospice care and or weaning off TPN therapy. 41 referrals (11%) did not have a Medicare qualifying condition and/or only required TPN short term. 13% of referrals fully met Medicare coverage under criteria A (n = 5), C (n = 16), and G-H (n = 29). This study also revealed 143 referrals (37%) had a Medicare qualifying condition, but were missing criteria components to fully meet Medicare requirements (Figure 2). The most common missing criteria components included the 10% weight loss requirement prior to the initiation of TPN, an albumin level of < 3.4, and objective testing. Overall, this study showed the most common situation patients qualified under was criteria G-H.

Conclusion: Medicare is the largest health insurance program in the United States and the provider of 96% of patients who are 65 years or older, who have had a disability for > 2 years, end-stage renal disease, or ALS.š It is astonishing to see that many patients with a qualifying condition do not meet the stringent coverage criteria required for HPN. Even more challenging is that the outdated criteria has been in place for >25 years and does not follow current clinical practice guidelines. For example, criteria E, F and G-H requires an albumin level of < 3.4 to define malnutrition; however, per current clinical practice standards this lab value is no longer recognized as a reliable or a specific biomarker for malnutrition.ź'[4] Of note for this study, out of 387 patients reviewed, the only criteria this large amount of referrals met criteria were criteria A, C, and G-H. Consideration should be made in updating Medicare coverage criteria to thereby serve the larger growing patient population of Medicare beneficiaries requiring HPN services and to meet current clinical standards.š References Center for Medicare and Medicaid Services. Local Coverage Article: Parenteral Nutrition- Policy Article (A52515) https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/ncd103c1_Part3.pdf Institute of Medicine (US) Committee to Design a Strategy for Quality Review and Assurance in Medicare; Lohr, KN editor. Medicare: A Strategy for Quality Assurance: Volume 1. Washington (DC): National Academies Press (US); 1990. 3, The Elderly Population. Available from: https://www.ncbi.nlm.nih.gov/books/NBK235450/ Option Care Data on file 2019. Accessed August 31, 2020. Soeters, P. B., Shenkin, A. (2019), Hypoalbuminemia: Pathogenesis and Clinical Significance. Journal of Parenteral and Enteral Nutrition, 43: 181–193.

Financial Support: n/a





P21 - Oral Selenium Maintains Normal Serum Selenium Status in Adult and Pediatric Patients Receiving Home Parenteral Nutrition

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Purpose: The intravenous (IV) formulation of selenium (Se) was changed in 2019 with little data to support long term stability when used in home parenteral nutrition (HPN). Since a stable solution of Se in HPN was not available, oral Se was initiated as an alternative to the IV preparation of Se. This study was done to determine if oral Se could maintain serum Se status in adult and pediatric HPN patients.

Methods: Data was collected from 57 long term HPN patients - 46 adults and 11 children. Baseline serum Se levels while receiving HPN with IV Se were compared to Se levels after oral supplementation. The recommended daily intake of oral Se is 70 micrograms (mcg) per day for adults and 1–2 mcg/kg/d based on weight for pediatric patients with 40–60 mcg/day for adolescents >40 kilograms. Oral Se was provided in drop, capsule or tablet form based on patient preference or presumed absorptive capacity to be taken daily. One drop contains 95 mcg, one tablet contains 50 mcg and one capsule contains 200 mcg of Se.

Results: Results are summarized in Table 1. Overall, the patients received 368 mcg/week of IV Se and 644 mcg/week of oral Se. Serum Se levels for all patients while receiving IV Se in HPN was 118 mcg/L. After initiating oral Se supplementation, average Se levels at follow up (avg 2.7 months later) were 111 mcg/L. When separating adult and pediatric patients, pediatric patients received 190 mcg/week of IV Se and 298 mcg/week of oral Se and had an average serum Se of 102 mcg/L on IV Se and 88 mcg/L on oral Se. Adults received 411 mcg/week IV Se and 727 mcg/week of oral Se and had an initial serum Se of 124 mcg/L (on IV Se) and follow up of 120 mcg/L. Normal Se level was maintained with oral supplementation for 38 of 46 adult and 8 of 11 pediatric patients. Follow up with the patients who had low serum Se levels revealed noncompliance as the primary factor. Of interest, the average laboratory value range for serum Se was 23–340 mcg/L due to variations in normal reference ranges. Table 1. Selenium Intake and Serum Levels by Age Age (yrs) mean +/- SD IV Selenium (mcg/week) mean +/- SD Initial serum Se (mcg/L) mean +/- SD Oral Selenium (mcg/week) mean +/- SD Follow up serum Se (mcg/L) mean +/- SD All patients (57) 45.8 (22.4) 368 (200) 120 (25) 644 (338) 113 (54.5) Adult (46) 53.9 (16.5) 411 (197) 124 (23) 727 (318) 120 (54) Pediatric (11) 11.8 (5.1) 190 (73) 102 (30) 298 (149) 88 (50)

Conclusion: Oral Se can be successfully used to maintain Se stores. After supplementation, Se should be re-checked at 2 months and if within normal range, then every 6 months. Taking oral Se as ordered is a key factor in the maintenance of a normal Se level. When patients exhibit a lower level, the clinician should assess for compliance and tolerance. Dosage adjustment may be necessary and consideration to more frequent monitoring may be warranted.

Financial Support: n/a

P22 - Association of Health-System Change to SMOF with Calorie Delivery and Hospital Length of Stay among Critically Ill Adults Requiring Parenteral Nutrition

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Purpose: Previous research has suggested that in patients receiving parenteral nutrition (PN), the use of a balanced lipid emulsion containing Soybean oil, Medium-chain Triglycerides (MCT), Olive Oil, and Fish Oil (SMOF) may improve clinical outcomes. The Duke University Health System made a full change to SMOF balanced lipids in May 2017. We examined patient characteristics and length of stay in critically ill patients pre- and post- health system change from a pure soybean oil emulsion to SMOF as part of PN.

Methods: We conducted a retrospective study using electronic health record data from 2016–2018, one year prior to switch to SMOF (SMOFlipid) and one year following the switch to SMOF among 505 critically ill adult (age $\geq$ 18 years) patients requiring PN. Our primary exposure was time period (pre-switch and post-switch) and the outcome was hospital length of stay. We used descriptive statistics to examine demographic/clinical characteristics, adequacy of nutrition delivery (calorie delivery), and length of hospital stay pre- and post-switch to SMOF.

Results: Table 1 shows demographic, clinical, and nutrition delivery characteristics of the cohort. 129 (26%) patients were hospitalized pre-SMOF switch and 376 (74%) were hospitalized post-SMOF switch. Similar proportions of female patients (44% pre-switch and 40% post-switch), and similar proportions of race/ethnicities were treated pre- and post-switch. The median (IQR) body mass index was 26.8 (22.0-30.8) pre-switch and 26.7 (22.3-30.9) post-switch. More patients post-switch had diagnoses of intestinal malabsorption (9% versus 6%) and malnutrition (65% versus 57%). Cumulative total calorie delivery was similar between time periods [median (IQR) 21,305 (10,126-33,436) calories pre-switch versus 19,218 (10,426-39,328) calories post-switch, $p = 0.68$]. Hospital length of stay was decreased post-switch [median (IQR) 34 (23-47) days pre-switch versus 29 (18-48) days post-switch, $p = 0.04$].

Conclusion: A switch to SMOF was successfully implemented among critically ill adult patients at Duke University Health System in 2017. Despite treating patients with more nutritional co-morbidities during the time period, the switch to SMOF showed a significant decrease in hospital length of stay while patients received similar amounts of calories.

Financial Support: Senior PI has funding from Abbott Nutrition, Fresenius, Baxter,

	SMOF			
	No (pre)	Yes (post)	Total	P Value
	(N = 129)	(N = 376)	(N = 505)	
Demographics				
Female	57 (44.19%)	151 (40.16%)	208 (41.19%)	
Age at Encounter				
Median (IQR)	59.0 (47.0 – 70.0)	61.0 (48.0 – 69.0)	61.0 (48.0 – 69.0)	0.76
Race				
Black or African American	42 (32.56%)	111 (29.52%)	153 (30.30%)	0.18
Other	7 (5.43%)	41 (10.90%)	48 (9.50%)	
White/Caucasian	80 (62.02%)	224 (59.57%)	304 (60.20%)	
Hispanic	0 (0.00%)	13 (3.46%)	13 (2.57%)	
Median BMI				
Median (IQR)	26.8 (22.0 – 30.8)	26.7 (22.3 – 30.9)	26.8 (22.3 – 30.9)	0.97
LOS [days]				
Median (IQR)	34.3 (23.0 – 47.3)	29.1 (17.3 – 48.0)	30.8 (18.6 – 47.8)	0.038**
Emergency Department	41 (31.78%)	142 (37.77%)	183 (36.24%)	0.22
Comorbidities				
Malnutrition	74 (57.36%)	243 (64.63%)	317 (62.77%)	
Intestinal Malabsorption	8 (6.20%)	35 (9.31%)	43 (8.51%)	
Acute Pancreatitis	11 (8.53%)	33 (8.78%)	44 (8.71%)	
Peritonitis	26 (20.16%)	64 (17.02%)	90 (17.82%)	
Gastrointestinal fistula	2 (1.55%)	3 (0.80%)	5 (0.99%)	
Malignancy	31 (24.03%)	104 (27.66%)	135 (26.73%)	
Cirrhosis/chronic liver failure	19 (14.73%)	64 (17.02%)	83 (16.44%)	
Renal Failure	79 (61.24%)	179 (47.61%)	258 (51.09%)	
Diabetes	21 (16.28%)	65 (17.29%)	86 (17.03%)	
Pneumonia	14 (10.85%)	44 (11.70%)	58 (11.49%)	
Bacteremia/Septicemia	61 (47.29%)	179 (47.61%)	240 (47.52%)	
All Cause Infection	68 (52.71%)	200 (53.19%)	268 (53.07%)	
TPN Data				
Total Days On TPN				
Median (IQR)	12.0 (6.0 – 19.0)	11.0 (6.0 – 21.0)	11.0 (6.0 – 21.0)	0.97
Total Days receiving Lipids: Median				
Median (IQR)	9.0 (6.0 – 14.0)	10.0 (5.0 – 19.0)	10.0 (5.0 – 17.0)	0.46
Calorie Summary Data				0.37
Median Daily Protein Based Calories				
Median (IQR)	452.4 (385.2 – 514.8)	475.2 (399.6 – 550.8)	475.2 (396.0 – 540.0)	0.13
Cumulative Protein Based calories				
Median (IQR)	5446.8 (2952.0 – 9558.0)	5401.2 (2908.8 – 10786.8)	5424.0 (2914.8 – 10641.8)	0.61
Median Daily Lipid Based Calories				
Median (IQR)	504.0 (496.8 – 504.0)	504.0 (499.2 – 504.0)	504.0 (499.2 – 504.0)	0.11
Cumulative Lipid Calories				
Median (IQR)	4550.4 (3019.2 – 7083.6)	5028.0 (2520.0 – 9777.6)	5012.8 (2520.0 – 8585.4)	0.23
Median Daily Dextrose Based Calories				
Median (IQR)	742.8 (595.0 – 936.0)	842.4 (676.8 – 939.0)	833.1 (672.0 – 937.8)	0.11
Cumulative Dextrose Calories				
Median (IQR)	10202.4 (4194.0 – 15774.0)	8666.4 (4550.4 – 18230.4)	9045.4 (4469.9 – 17398.1)	0.91
Median Daily Total Calories				
Median (IQR)	1590.0 (1372.8 – 1815.6)	1710.0 (1491.6 – 1908.0)	1692.0 (1449.9 – 1887.6)	0.005**
Cumulative Total Calories				
Median (IQR)	21304.8 (10125.6 – 33435.6)	19218.8 (10425.6 – 39327.6)	19545.8 (10329.0 – 37358.3)	0.68

P23 - Home Parenteral Nutrition in South East Asia: The Singapore Experience.

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Purpose: Home parenteral nutrition (HPN) is a life sustaining therapy for patients with chronic intestinal failure. Reported outcomes for Asian patients receiving HPN is scarce. We aim to characterise and review the clinical outcome of adult HPN patients in our cohort which caters for 95% of HPN patients in Singapore.

Methods: Retrospective review of HPN patients from an adult cohort from 2002 to 2017 seen at Singapore General Hospital was performed. Patient demographics and clinical outcomes were reviewed. Descriptive statistics were performed and Kaplan Meier Survival Analysis was performed. Results were expressed in median (standard deviation).

Results: There were 41 HPN patients identified. Median age was 55 (±15.2). Median duration of HPN was 2.6 (±0.5) years. Indications for PN were short bowel syndrome (n = 19, 46.3%), dysmotility (n = 5, 12.2%), mechanical obstruction (n = 9, 22%) and others (n = 5, 12.2%). 13 (31.7%) of HPN patients had underlying malignancy. There were 27 patients (65.9%) with an intact small bowel, 23 (56.1%) had an intact colon, 10 (24.4%) with a hemi-colon and 8 (19.5%) without a colon. Eventually, 9 patients (22%) achieved enteral autonomy. Baseline albumin was 27.7 (±1.2) g/l, bilirubin 33.3 (±21.9) umol/l, alkaline phosphatase 190.3 (± 39.5) u/l, alaninine transaminase 49.5 (± 8.8) u/l), aspartate transaminase 51.3 (± 7.1) u/l. By the end of HPN, the mean change of albumin was 1.3 (± 10.3, $p < 0.05$) g/l, bilirubin 48.5 (±123.3, $p < 0.05$) umol/l, alkaline phosphatase 28.6 (±340.4, NS) u/l, ALT -9.32 (±53.2, $p < 0.05$) u/l, AST 9.6 (±66.5, NS) u/l. Central line-associated bloodstream infection (CLBSI)/1000PN days was 1.00(±2.1). Venous thrombosis/1000PN days was 0.13(±0.4). Median Survival for the entire cohort was 90.0 months (±43.8. 95%CI), with overall actuarial survival probability was 70.7% and 39.0% at 1 and 5 years respectively (Figure 1). Median Survival for the patients with malignancy 6 months (±1.8, 95%CI), with actuarial survival of 30.7% and 7.7% at 1 and 5 years (Figure 2). Median survival for patients without malignancy was 151 months (±72.77, 95%CI), with actuarial of 92.8% and 53.5% at 1 and 5 years (Figure 2). Only 1 patient died from PN related complications.

Conclusion: In the largest national cohort in Singapore, we report low rates of CLBSI and venous thrombosis. The actuarial survival probability in non-malignant adult HPN is comparable to reported international outcomes. In conclusion, HPN in our local experience, was safe and had good survival outcomes for the non-malignant cohort.

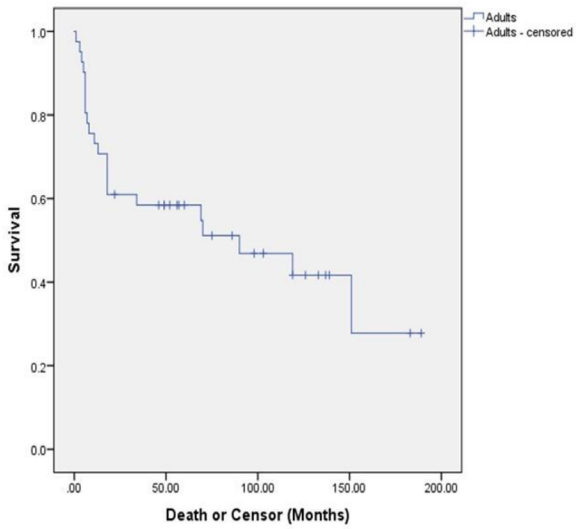
Financial Support: n/a

Table 1: Patient Demographics

	Adult HPN Patients, (n=41)			
Age (median)	55.0			
Male (%)	23 (56.1%)			
BMI	18.8 (±4.06)			
Duration on PN (Years)	2.67 (±0.54)			
Indication of PN				
SBS	19 (46.3%)			
Dysmotility (Including pseudo-obstruction)	5 (12.2%)			
GI mechanical obstruction	9 (22.0%)			
ECF	3 (7.3%)			
Others	5 (12.2%)			
Underlying Cancer	13 (31.7%)			
Small Bowel Length				
Intact Small Bowel	27 (65.9%)			
Residual Small Bowel Length (If resection done)	74.5 (±44.1)			
Colon in continuity				
Hemi-colon	10 (24.4%)			
No Colon	8 (19.5%)			
Colon intact	23 (56.1%)			
Liver Enzymes				
	Baseline	Last Liver Enzymes	Mean Change	P value
Albumin	27.7 (±1.2)	28.9 (±1.5)	1.30	p<0.05
Bilirubin	33.3 (±21.9)	81.8 (±21.9)	48.5	p<0.05
Alkaline Phosphatase	190.3 (±39.5)	218.9 (±42.9)	38.6	NS
Alanine Transaminate	49.5 (±8.8)	40.7 (±4.3)	-9.32	p<0.05
Aspartate Transaminase	51.3 (±7.1)	60.9 (±8.6)	9.6	NS
PN Related Complicatons				
Enteral Autonomy	9 (22%)			
CLABSI per 1000 PN days	1.00 (±2.1)			
Venous thrombosis per 1000 PN days	.013 (±0.4)			

BMI: Body Mass Index, ECF: Enterocutnaeous Fistula, GI: Gastrointestinal, SBS: Short Bowel Syndrome

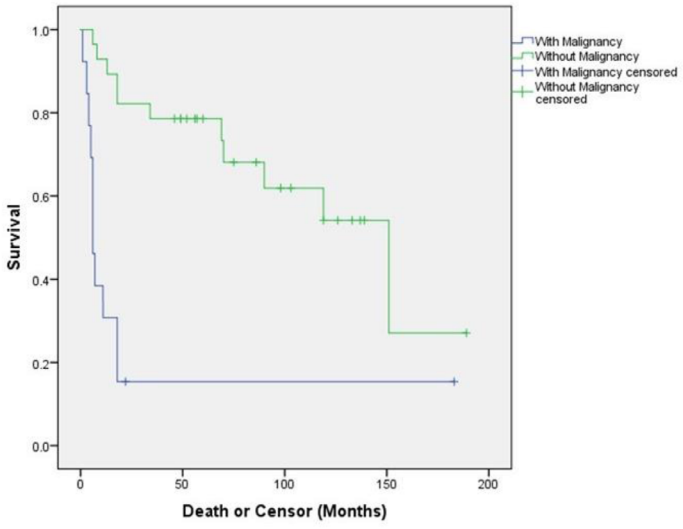
Figure 1: Kaplan Meier Survival Plot, All Adult Home PN Patients



Median Survival: 90.00 months (±43.75. 95%CI)
1 Year Survival: 70.7%
5 Year Survival: 39.0%

Median Survival: 90.00 months (±43.75. 95%CI) 1 Year Survival: 70.7% 5 Year Survival: 39.0%

Figure 2: Kaplan Meier Survival Plot, Adult, With Malignancy vs Without Malignancy



Median survival:
Patients with malignancy: 6 months (±1.77, 95%CI),
Patients without malignancy: 151 months (±72.77, 95%CI)
1 Year Survival:
Patients with malignancy: 30.7%
Patients without malignancy: 92.8%
5 Year Survival:
Patients with malignancy: 7.7%
Patients without malignancy: 53.5%

Median survival: Patients with malignancy: 6 months (±1.77, 95%CI), Patients without malignancy: 151 months (±72.77, 95%CI) 1 Year Survival: Patients with malignancy: 30.7% Patients without malignancy: 92.8% 5 Year Survival: Patients with malignancy: 7.7% Patients without malignancy: 53.5%

P24 - Comparison of Intravenous Lipid Emulsions in Adult Trauma Patients Receiving Parenteral Nutrition: A Pilot Study

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Purpose: The purpose of this study was to determine the effect of a four lipid blend emulsion containing soybean oil, medium-chain triglycerides, olive oil, and fish oil on incidence of infection, ICU length of stay, hospital length of stay, and mortality in adult trauma patients as compared to parenteral nutrition utilizing 100% soybean oil emulsion or a lipid-free, dextrose and amino acid administration.

Methods: A retrospective chart review was conducted for adult trauma patients admitted to Eskenazi Health's surgical intensive care unit (SICU) that received PN from May 2017 to May 2020. Patients admitted during the first 18 month period received a lipid-free, dextrose and amino acid PN administration. A 100% soybean oil emulsion was added at day seven of PN therapy unless otherwise contraindicated per physician recommendations. During the second 18 month period, patients received a 3-in-1 PN administration that included SMOF lipid emulsion. Patient outcomes were assessed including energy delivery, incidence of infection, ICU length of stay, hospital length of stay, and mortality. Data were collected from the EHR and trauma registry. Data analysis was conducted via SPSS software utilizing independent sample t-tests for numerical data and Pearson chi-square tests for categorical data. Statistical significant was defined as $p < 0.05$.

Results: A total of 29 patients were included who met study criteria: 17 patients in the soybean (traditional) lipid cohort and 12 in the four lipid blend cohort. The length of PN therapy was comparable between the traditional lipid and four lipid blend groups, 13.9 days (± 11.5) and 13.3 days (± 14.3) respectively. All 12 patients in the four lipid blend treatment group received intravenous lipid emulsion (ILE) compared to 42% (n = 7) of traditional lipid group patients (p = 0.001). Patients in the four lipid blend treatment group were provided 100% of estimated energy needs via PN compared to an average of 94% (± 9.7) of estimated energy needs in the traditional lipid treatment group (p = 0.036). Incidence of infection during initial hospitalization was significantly lower in the four lipid blend treatment group (n = 3, 25%) compared to the traditional lipid treatment group (n = 13, 76%). A trend towards reduced ICU length of stay was observed in the four lipid blend treatment group (9.8 days ±7.2) compared to the traditional lipid treatment group (13.2 days ±11.2), however the result was not statistically significant (p = 0.363). There was no difference observed in hospital length of stay. Mortality was decreased in the four lipid blend treatment group (0%) when contrasted to the traditional lipid treatment group (23.5%), p = 0.04.

Conclusion: Adult trauma patients receiving a four lipid blend emulsion within PN therapy had better clinical outcomes compared to those receiving a soybean oil lipid emulsion or a dextrose and amino acid administration.

Financial Support: n/a

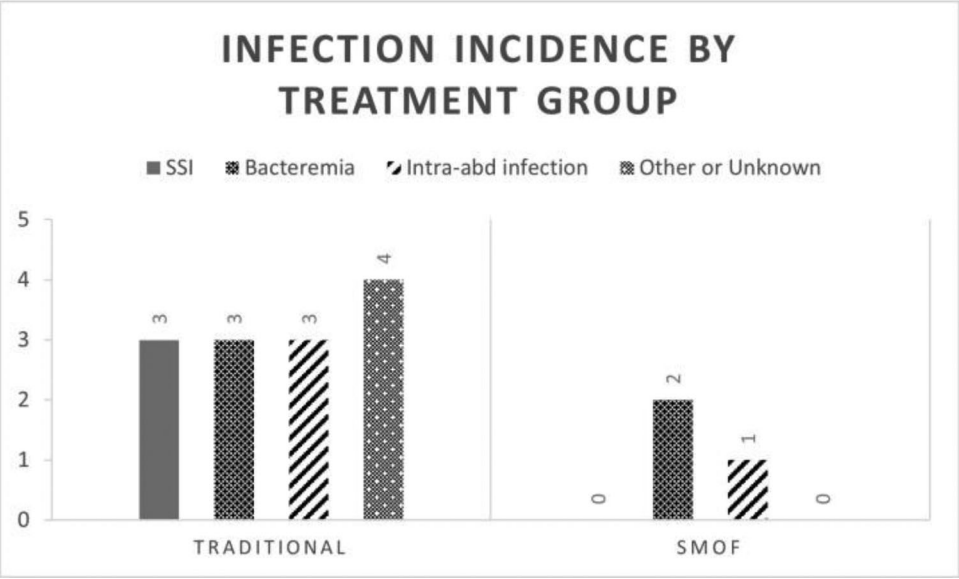
Table 1: Patient Demographics and Baseline Information

	Traditional (n=17)	SMOF (n=12)	p value
Age, mean ±std dev	35.47 ±14.0	39.83 ±19.0	0.483
Sex, n=male (%)	17 (100%)	9 (75%)	0.029
Injury type - penetrating, n (%)	14 (82.3%)	9 (75%)	0.630
Injury Severity Score, mean ±std dev	23.18 ±12.3	21 ±11.1	0.486
Body weight kg (admit), mean ±std dev	100.66 ±32.1	86.72 ±24.8	0.218
BMI, mean ±std dev	30.3 ±9.7	27.2 ±6.0	0.329
Prealbumin, mean ±std dev	10.8 ±5.2	10.9 ±3.0	0.974
CRP, mean ±std dev	14.7 ±6.2	14.1 ±5.6	0.780
Dx of malnutrition, n (%)	2 (12%)	3 (25%)	0.353
Dx at risk of malnutrition, n (%)	6 (40%)	3 (33%)	0.555

P value < 0.05

Table 2: Results and outcomes			
	Traditional (n=17)	SMOF (n=12)	p value
Length of PN therapy ±std dev	13.9 d ±11.5	13.3 d ±14.3	0.91
Subjects received lipids, n (%)	7, (42%)	12, (100%)	0.001
Energy prescription, % ±std dev	94% ±9.7	100% ±0	0.036
Energy delivered week 1, % ±std dev	29% ±24.7	40% ±33.6	0.325
ICU LOS, days ±std dev	13.2 ±11.2	9.8 ±7.2	0.363
Mean total cost for ICU room and board, per patient	$78,184	$58,045	0.093
Hospital LOS, days ±std dev	27.3 ±16.1	27.2 ±16.9	0.984
Infection, % positive	13 (76%)	3 (25%)	0.006
Mortality, n (%)	4 (23.5%)	0, (0%)	0.041

Figure 1: Infection Incidence per Treatment Group



A bar graph that depicts the significant difference in infection rate between the traditional lipid group and the four lipid blend group.

P25 - A Prospective, Multicenter Registry for Patients With Short Bowel Syndrome (SBS Registry): Long-term Effectiveness Analysis in the Context of Teduglutide Treatment

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Purpose: Patients with short bowel syndrome (SBS) may need long-term parenteral support (PS). Decreasing patients' dependence on PS by increasing the absorptive capacity of the remaining intestine is a therapeutic goal in SBS. Teduglutide (TED) is approved in the USA, Canada and Europe for the treatment of PS-dependent patients ≥1 year of age with SBS. This analysis evaluates the long-term safety of TED in a routine clinical setting using data from the ongoing prospective, observational, multinational SBS registry.

Methods: The registry (NCT01990040; EUPAS7973) includes TED-treated and untreated patients with SBS of any age. This analysis compared long-term safety outcomes between adult patients treated with TED ("ever-treated") and those receiving standard of care and never exposed to TED ("never-treated"). All never-treated patients had to have received PS for ≥6 months for inclusion. The occurrence and incidence rates (IR) of confirmed colorectal cancer (CRC: primary safety outcome) and of new or worsening colorectal polyps between study entry and follow-up were analyzed for the primary outcome analysis set (POS: all patients with any remnant colon and without CRC at baseline); other safety outcomes were analyzed for the per protocol analysis set (PPS: enrolled patients who met the inclusion/exclusion criteria). Mortality was assessed using a time-dependent Cox proportional hazard model and p-value in this interim analysis indicates a trend rather than hypothesis testing. Registry start date was June 23, 2014. Results are presented cumulatively since registry enrollment as of the data cutoff (June 30, 2020).

Results: The PPS included 467 ever-treated and 675 never-treated patients; 306 and 461 patients, respectively, were included in the POS. Table 1 shows demographics and baseline characteristics for the PPS. Mean ± SD follow-up was 2.64 ± 1.33 years (range, 0–6) for ever-treated and 2.72 ± 1.53 years (range, 0–6) for never-treated patients; TED exposure was 30.7 ± 22.5 months (range, 0.2–117.1) in the ever-treated group. No cases of CRC were reported in either patient group during follow-up. In total, 16 ever-treated patients experienced ≥1 event of new or worsening colorectal polyps compared with 1 never-treated patient (IR, 28.9 vs 1.1 per 1000 patient-years [PY]; Table 2). A higher proportion of ever-treated patients had a colonoscopy compared with never-treated patients (23.1% vs 7.1%). During follow-up, IR for a new or worsening diagnosis of any type of malignancy was similar in the ever-treated and never-treated groups (17.9 vs 19.2 per 1000 PY). A new or worsening diagnosis of benign neoplasia of the gastrointestinal tract (other than colorectal polyps) was reported for 12 ever-treated and 3 never-treated patients (IR, 19.8 vs 2.8 per 1000 PY); few patients in either group had benign neoplasia of the hepatobiliary system or pancreas (Table 2). Overall, 79.0% of ever-treated and 64.9% of never-treated patients had ≥1 adverse event (AE) and 55.7% and 45.9%, respectively, had ≥1 serious AE (SAE). Among ever-treated patients, 27.6% and 9.0% had a TED-related AE and SAE, respectively, and 19.9% had an AE leading to treatment interruption or discontinuation. All-cause mortality rate appeared to be lower in the ever-treated group than in the never-treated group (27/467 vs 60/675; IR, 25.5 vs 42.7 per 1000 PY; hazard ratio [95% CI] 0.89 [0.78, 1.00]; p = 0.050).

Conclusion: There were no occurrences of CRC in either group as of the data cutoff (June 30, 2020), but more ever-treated patients experienced new or worsening colorectal polyps than never-treated patients. Overall, observed AEs and SAEs are consistent with previously reported safety data for TED and no new safety signals have been identified.

Financial Support: Shire Human Genetic Therapies, Inc., a Takeda company, Cambridge, MA, USA.

Table 1. Patient demographics and baseline characteristics (PPS).

	Teduglutide ever-treated (N = 467)	Teduglutide never-treated (N = 675)
Age, years, mean (SD)	53.1 (15.07)	57.4 (15.08)
Male, n (%)	196 (42.0)	265 (39.3)
Body mass index (kg/m^2), mean (SD)	*n = 415* 22.69 (4.752)	*n = 610* 23.02 (4.697)
Duration between onset/diagnosis of SBS and enrollment, years, mean (SD)	*n = 452* 9.2 (10.24)	*n = 634* 8.3 (9.91)
Cause of major intestinal resection, n (%)	*n = 456*	*n = 641*
Crohn's disease	171 (37.5)	148 (23.1)
Intestinal ischemia	54 (11.8)	75 (11.7)
Mesenteric infarction	35 (7.7)	47 (7.3)
Intestinal volvulus	35 (7.7)	33 (5.1)
Motility disorder	12 (2.6)	49 (7.6)
Cancer	6 (1.3)	37 (5.8)
Length of remaining small intestine (cm), mean (SD)	*n = 378* 83.70 (71.368)	*n = 533* 107.51 (84.843)
Type of stoma, n (%)[a]	*n = 173*	*n = 360*
Ileostomy	153 (62.2)	178 (49.4)
Jejunostomy	63 (25.6)	129 (35.8)
Colostomy	44 (17.9)	67 (18.6)
Other[b]	7 (2.8)	26 (7.2)
Colon status, n (%)	*n = 455*	*n = 641*
Intact	94 (20.7)	150 (23.4)
Remnant	233 (51.2)	338 (52.7)
No colon	128 (28.1)	153 (23.9)
Medical history at baseline, n (%)	*n = 467*	*n = 675*
Colorectal cancer	10 (2.2)	42 (6.6)
Colorectal polyps	41 (8.8)	61 (9.0)
Benign neoplasia of the gastrointestinal tract (other than colorectal polyps)	12 (2.6)	20 (3.0)
Cancer of any type	77 (16.5)	187 (27.7)

[a]Among patients with stoma, patients may have multiple specified stoma types.
[b]Other included gastrostomy, duodenostomy, gastroduondenostomy and cecostomy.

Table 2. Malignancies and benign neoplasias: occurrence and incidence rate.

	Teduglutide ever-treated (N = 467)		Teduglutide never-treated (N = 675)	
	No. (%) pts with ≥1 event	IR[a] (per 1000 PY)	No. (%) pts with ≥1 event	IR[a] (per 1000 PY)
Confirmed colorectal cancer (POS)[b]	0	0	0	0
Colorectal polyps (POS)[b]	16 (5.23)	28.9	1 (0.22)	1.1
Colonoscopy (PPS)	108 (23.13)	146.0	48 (7.11)	42.0
Other malignancy of any type (PPS)	18 (3.85)	17.9	25 (3.70)	19.2
Benign neoplasia of the gastrointestinal tract other than colorectal polyps (PPS)	12 (2.57)	19.8	3 (0.44)	2.8
Benign neoplasia of the hepatobiliary system (PPS)	1 (0.21)	0.9	1 (0.15)	0.7
Benign neoplasia of the pancreas (PPS)	3 (0.64)	2.8	2 (0.30)	1.4

IR, incidence rate; POS, primary outcome analysis set; PPS, per-protocol analysis set; PY, patient-years.
[a]IR = number of events observed/total number of PY observed × 1000. If the first dose of TED occurs after enrollment, PY before the first dose are included in the PY of the never-treated cohort and PY after/at the first dose are included in the PY of the ever-treated cohort.
[b]Data analyzed for the POS: ever-treated, n=306; never-treated, n=461.

P26 - A Prospective, Multicenter Registry for Patients With Short Bowel Syndrome (SBS Registry): Long-term Safety Analysis in the Context of Teduglutide Treatment

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Purpose: Patients with short bowel syndrome (SBS) are heterogeneous in their clinical presentation, disease progression and treatment needs, and they may require long-term parenteral support (PS). A therapeutic goal for patients with SBS is to decrease patients' dependence on PS through increasing the absorptive capacity of the remaining intestine. Teduglutide (TED) has been approved in the USA, Canada and Europe for the treatment of PS-dependent patients ≥1 year of age with SBS. This analysis aimed to evaluate the effectiveness of TED in a routine clinical setting using data from the ongoing prospective, observational, multinational SBS registry.

Methods: The registry (NCT01990040; EUPAS7973) includes TED-treated and untreated patients with SBS of any age. This analysis compared effectiveness outcomes between adult patients treated with TED ("ever-treated" patients) and those treated with standard of care and never exposed to TED ("never-treated" patients). All never-treated patients had to have received PS for ≥6 months at the time of inclusion in the registry. Effectiveness outcomes included absolute and relative changes in PS volume (L/week) and the frequency of PS (days/week), and the proportion of patients weaned off PS between study entry and follow-up. Results are presented for the effectiveness analysis set, consisting of all never-treated patients and all ever-treated patients who started TED either before, at or after study entry and who were receiving TED at the time of the analysis data cutoff or study end (e.g. patient death, withdrawal or other loss to follow-up). Data are shown for patients with a PS volume assessment at the given time point. Study start date was June 23, 2014, and the data cutoff for this analysis was June 30, 2020. The comparison between treatments is conducted by using summary statistics rather than hypothesis testing, and thus no p-values appear in this interim analysis.

Results: A total of 328 ever-treated patients and 675 never-treated patients were included in the analysis. Patient demographics and baseline characteristics are shown in Table 1. Mean reductions in absolute PS volume (L/week) from baseline were larger in ever-treated patients compared with never-treated patients at 1, 2, 3 and 4 years of follow-up (Figure 1). Ever-treated patients showed mean percentage reductions in PS volume from baseline at each time point compared with mean percentage increases for never-treated patients (Figure 2). The proportion of patients who experienced a reduction in PS volume of at least 20% from baseline was greater in the ever-treated group (48.2%–57.1%) than in the never-treated group (12.0%–15.2%) at follow-up (Table 2). At each time point, a lower proportion of ever-treated patients had an increase in PS volume compared with never-treated patients (Table 2). The percentage of patients weaned off PS at 1, 2 and 3 years was higher in the ever-treated group (7.2% [n = 6], 6.7% [n = 6] and 3.3% [n = 2], respectively) than in the never-treated group (2.4% [n = 8], 2.2% [n = 6] and 1.0% [n = 2], respectively); at 4 years, none of the ever-treated patients and one never-treated patient (3.0%) were weaned off PS. As of the data cutoff, there were no occurrences of new colorectal cancer during the study period. No unexpected safety signals were observed during follow-up.

Conclusion: The results of this registry analysis show the clinical benefits of TED after up to 4 years of treatment in a real-world setting. Reductions in PS volume are greater in patients treated with TED than in those not receiving TED therapy.

Financial Support: Shire Human Genetic Therapies, Inc., a Takeda company, Cambridge, MA, USA

Table 1. Patient demographics and baseline characteristics.

	Teduglutide ever-treated (N=328)	Teduglutide never-treated (N=675)
Age, years, mean (SD)	54.1 (14.85)	57.4 (15.08)
Male, n (%)	139 (42.4)	265 (39.3)
Body mass index (kg/m^2), mean (SD)	*n=295* 22.88 (5.037)	*n=610* 23.02 (4.697)
Duration between onset/diagnosis of SBS and enrollment, years, mean (SD)	*n=317* 8.4 (9.17)	*n=634* 8.3 (9.91)
Cause of major intestinal resection, n (%)	*n=320*	*n=641*
Crohn's disease	114 (35.6)	148 (23.1)
Intestinal ischemia	39 (12.2)	75 (11.7)
Mesenteric infarction	28 (8.8)	47 (7.3)
Intestinal volvulus	25 (7.8)	33 (5.1)
Motility disorder	6 (1.9)	49 (7.6)
Cancer	5 (1.6)	37 (5.8)
Length of remaining small intestine (cm), mean (SD)	*n=270* 80.01 (51.922)	*n=533* 107.51 (84.843)
Type of stoma, n (%)[a]	*n=173*	*n=360*
Ileostomy	100 (57.8)	178 (49.4)
Jejunostomy	50 (28.9)	129 (35.8)
Colostomy	35 (20.2)	67 (18.6)
Other[b]	5 (2.9)	26 (7.2)
Colon status, n (%)	*n=319*	*n=641*
Intact	59 (18.5)	150 (23.4)
Remnant	166 (52.0)	338 (52.7)
No colon	94 (29.5)	153 (23.9)
Volume of PS (L/week), mean (SD)	*n=218* 9.687 (5.928)	*n=547* 11.981 (7.812)[c]
Number of days of PS (days/week), mean (SD)	*n=223* 5.215 (1.820)	*n=551* 5.612 (1.791)

[a]Among patients with stoma, patients may have multiple specified stoma types.

[b]Other included gastrostomy, duodenostomy, gastroduondenostomy and cecostomy.

[c]PS volumes for 4 patients were judged to be clinically unrealistic (>50 L/week) so were excluded from the calculation.

Table 2. Patients achieving reductions in PS volume from baseline.

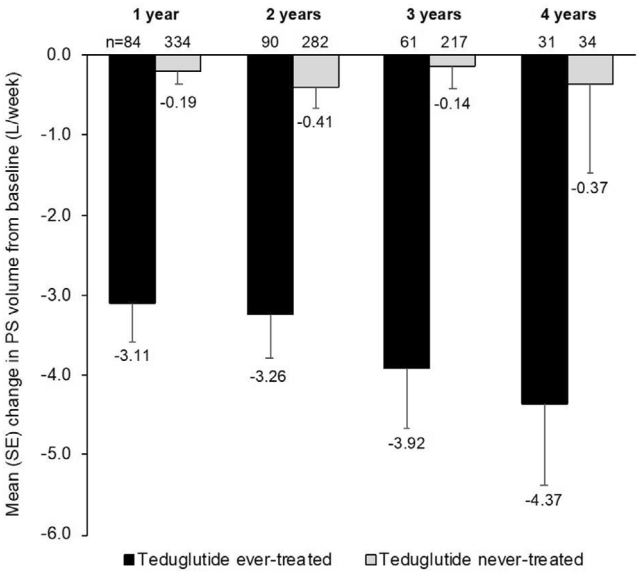
	Teduglutide ever-treated (N=328)	Teduglutide never-treated (N=675)
Patients achieving reductions in PS volume from baseline, % (n)		
1 year, n	83	333
≥20% reduction	48.2 (40)	12.0 (40)
0 – <20% reduction	43.4 (36)	70.6 (235)
<0% reduction[a]	8.4 (7)	17.4 (58)
2 years, n	90	277
≥20% reduction	52.2 (47)	14.1 (39)
0 – <20% reduction	34.4 (31)	65.0 (180)
<0% reduction[a]	13.3 (12)	20.9 (58)
3 years, n	60	197
≥20% reduction	53.3 (32)	14.7 (29)
0 – <20% reduction	31.7 (19)	59.4 (117)
<0% reduction[a]	15.0 (9)	25.9 (51)
4 years, n	28	33
≥20% reduction	57.1 (16)	15.2 (5)
0 – <20% reduction	35.7 (10)	57.6 (19)
<0% reduction[a]	7.1 (2)	27.3 (9)

[a]i.e. volume increase.

Data are presented for patients with a PS volume assessment at the given time point.

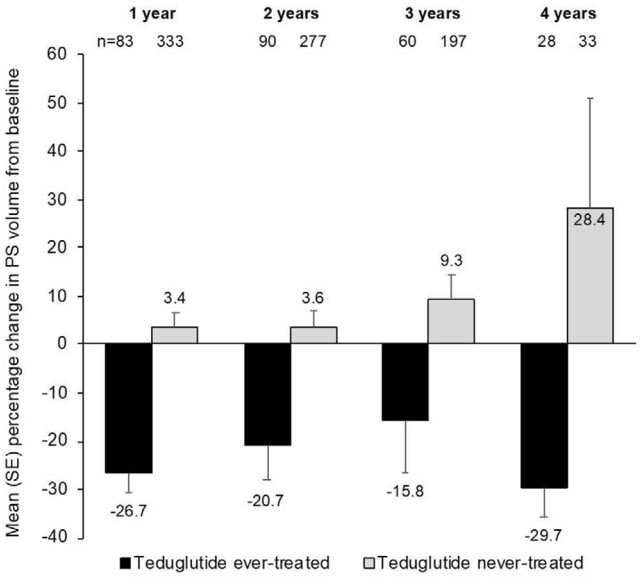
Baseline is PS use at registry enrollment for never-treated patients, immediately prior to treatment initiation for patients starting teduglutide after enrollment, or within 3 months prior to starting teduglutide for patients on teduglutide at enrollment.

Figure 1. Mean change in absolute PS volume from baseline.



Data are presented for patients with a PS volume assessment at the given time point. Baseline is PS use at registry enrollment for never-treated patients, immediately prior to treatment initiation for patients starting TED after enrollment, or within 3 months prior to starting TED for patients on TED at enrollment.

Figure 2. Mean percentage change in PS volume from baseline.



Data are presented for patients with a PS volume assessment at the given time point. Baseline is PS use at registry enrollment for never-treated patients, immediately prior to treatment initiation for patients starting TED after enrollment, or within 3 months prior to starting TED for patients on TED at enrollment.

P27 - Intraoperative Parenteral Nutrition: Is it really unsafe?

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Purpose: Multiple studies have demonstrated that preoperative malnutrition is associated with poor outcomes. A small percent of patients who are not candidates for enteral feeding benefit from Central Parenteral Nutrition (CPN) in the perioperative period. The safety of continuing CPN intraoperatively has been questioned, and transitioning to a 5% or 10% dextrose infusion has been recommended in the anesthesia literature. We have observed two patient safety issues that have resulted from interrupting CPN during surgery. Stopping CPN at the start of surgery has led to episodes of intraoperative hypoglycemia. There have also been instances of central venous access devices dedicated to CPN being contaminated when disconnected during surgery. We hypothesized that CPN infusion can be safely continued during surgery and potentially prevent these issues. We retrospectively reviewed the medical records of 3 patients who continued CPN infusion while undergoing major surgery. A brief summary of their perioperative course is provided. Case 1 An 81-year-old female with gastric outlet obstruction secondary to pancreatic adenocarcinoma. Since she had ongoing weight loss despite receiving enteral nutrition via a feeding jejunostomy tube for several weeks, CPN was added to her nutrition support regimen 15 days prior to planned pancreaticoduodenectomy. HbA1c = 5.8%. CPN contained 140 grams dextrose and no insulin. She successfully underwent a pancreaticoduodenectomy. The surgery lasted 340 minutes. She required a phenylephrine infusion during surgery. She also required an insulin infusion during surgery since she had persistent hyperglycemia despite receiving 6 units of insulin. The phenylephrine and insulin infusions were stopped prior to completing surgery. She recovered well, and CPN was stopped 13 days after surgery. Case 2 A 61-year-old female with gastric outlet obstruction secondary to gastric adenocarcinoma. CPN was started 6 days prior to a planned gastrectomy. HbA1c = 5.4%. CPN contained 280 grams dextrose and no insulin. She successfully underwent a radical distal gastrectomy. The surgery lasted 219 minutes. She had mild hyperglycemia (233 g/dL, 251 g/dL) during surgery, but no insulin was given. Hyperglycemia resolved immediately after surgery. She recovered well, and CPN was stopped 7 days after surgery. Case 3 A 76-year-old female with gastric outlet obstruction secondary to pancreatic adenocarcinoma. CPN was started 10 days prior to a planned pancreaticoduodenectomy. HbA1c = 6.2%. CPN contained 210 grams dextrose and no insulin. She was found to have peritoneal carcinomatosis, so she only underwent a loop gastrojejunostomy and hepaticojejunostomy. The surgery lasted 160 minutes. Blood glucose remained normal during surgery. She recovered well, and CPN was stopped 6 days after surgery. This case series suggests that CPN can be safely continued during major surgery. There is a risk of significant hyperglycemia, which is likely secondary to insulin resistance from the stress of surgery. This could be exacerbated by exogenous catecholamines administered for hypotension. Therefore, blood glucose must be monitored during surgery and supplemental insulin should be given as needed. Other than mild hypocalcemia, which was noted in all three of these patients during surgery, electrolytes remained normal. Glucose was monitored by blood gas analysis which also measured ionized calcium. Low ionized calcium has been previously reported in patients undergoing abdominal surgery and likely goes unnoticed, so we do not believe that hypocalcemia was secondary to intraoperative CPN infusion. A larger study would be necessary to confirm the benefits of continuing CPN during surgery and refute the dogma that this practice is unsafe.

Methods: n/a

Results: n/a

Conclusion: n/a

Financial Support: n/a

P28 - Hypophosphatemia Incidence in Parenteral Nutrition Patients Receiving Ferric Carboxymaltose Injection

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Purpose: Ferric carboxymaltose (FC) injection is used to treat adults with iron deficiency anemia who cannot tolerate an oral formulation. The dosage recommendation for patients weighing greater than 50 kg is 750 mg per dose, up to 2 doses separated by at least 7 days. Hypophosphatemia has been reported as a side effect to FC therapy, however, orders to initiate patients on FC therapy do not always include monitoring of serum phosphorus levels. The purpose of this study was to identify the incidence of hypophosphatemia among home parenteral nutrition (HPN) patients who received concomitant FC therapy.

Methods: This retrospective study reviewed 28 adult HPN patients from a national home infusion provider who received at least 1 FC dose between 11/15/2019 and 11/14/2020 and had serum phosphorus levels available following FC administration. Hypophosphatemia was defined as a serum phosphorous level of less than 2.6 mg/dL in adults. The time frame of these serum values were recorded with the timing of the FC dose administration. Patients who received multiple doses were included multiple times if their doses were given at least six weeks apart. When doses were given less than six weeks apart, hypophosphatemia was only recorded from the initial dose.

Results: Of the 28 HPN patients who received FC, 12 unique patients (43%) experienced hypophosphatemia following administration. Four patients out of 12 received multiple doses, two in consecutive weeks, and two several months apart. Sixteen unique doses that led to hypophosphatemia were included for laboratory evaluation. The median serum phosphorus level of patients who developed hypophosphatemia was 3.5 prior to FC dose (range 2.3-4.6), 2.4 at 1 week s/p FC dose (range 1.7-3.8, 27% of levels were $\leq$ 2.0), 2.2 at 2 weeks post (range 1.2-3.4, 30% $\leq$ 2.0), 1.9 at 3

weeks post (range 1.4-3.4, 64% ≤ 2.0), 2.1 at 4 weeks post (range 1.0-3.4, 55% ≤ 2.0), 2.1 at 5 weeks post (range 1.4-2.6, 50% ≤ 2.0), and 2.3 at 6 weeks post (range 1.3-3.3, 33% ≤ 2.0) (Table 1, Figure 1).

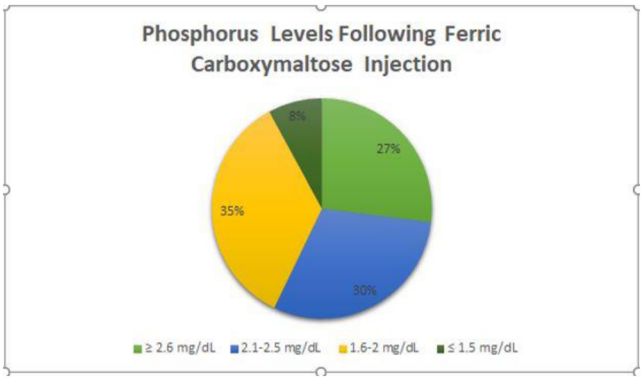
Conclusion: Hypophosphatemia appears to be a complication of FC therapy. It may be best practice that all patients receiving FC injections have serum phosphorus levels monitored for several weeks following FC therapy, with guidelines for supplementation included in the initial treatment plan. A limitation of this study is that data was only collected on HPN patients, knowing that they would have serum phosphorus levels available. Also, patients may have received phosphate supplementation in some instances, but that information was not collected as part of the retrospective review. Future research should evaluate the incidence and treatment success of hypophosphatemia among all patients receiving FC and not just HPN patients. Results of this study will be used to evaluate the addition of serum phosphorus monitoring protocols to FC treatment guidelines.

Financial Support: n/a

Table 1. Serum Phosphorus Levels Following Ferric Carboxymaltose Injection

Serum Phosphorus Level	Initiation	Week 1 Post	Week 2 Post	Week 3 Post	Week 4 Post	Week 5 Post	Week 6 Post
Median	3.5	2.4	2.2	1.9	2.1	2.1	2.3
Range	2.3-4.6	1.7-3.8	1.2-3.4	1.4-3.4	1.0-3.4	1.4-2.6	1.3-3.3
≤ 2.0	0%	27%	30%	64%	55%	50%	33%
n	15	11	10	14	11	8	9

Serum Phosphorus Levels Following Ferric Carboxymaltose Injection



ENCORE

Presentation: Vizient Pharmacy Network Meeting, December 01, 2020, Virtual-New Orleans, LA

P29 - Evaluation of Parenteral Nutrition Protein Dosing in Critically Ill Patients

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Purpose: The provision of early and appropriate nutrition support to patients during critical illness is known to improve health outcomes. Specifically, a negative protein balance in critically ill patients may be associated with poor wound healing, muscle weakness, reduced likelihood of survival, and increased length of hospitalization. The main goal of nutrition support therapy is to preserve lean body mass by achieving adequate quantities of protein during the acute phase of illness. The Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition guidelines for nutrition support in critically ill adults recommend a protein intake of 1.2-2 grams/kg/day of actual body weight for most patients with a body mass index (BMI) of < 30 in the intensive care unit (ICU) while patients who are obese (BMI > 30) should receive 2-2.5 grams/kg/day of ideal body weight. Furthermore, available evidence suggests that provision of 1.5 to 2.5 grams/kg/day of protein is associated with the least negative total protein balance. Protein doses for adult patients receiving nutrition support at Vanderbilt University Medical Center (VUMC) with a BMI ≥ 25 (overweight or obese) are calculated using 10% above ideal body weight (IBW). This dosing strategy is contrary to guideline recommendations for the use of actual weight for protein estimations and could result in substantially lower than recommended protein intake for overweight, non-obese critically ill patients (BMI 25–29.9). The purpose of this study was to evaluate if our institutional practices for protein dosing result in lower than recommended protein intake in overweight, critically ill patients.

Methods: A retrospective electronic chart review of 100 patients who received parenteral nutrition (PN) in an ICU at VUMC from November 3, 2018 to August 14, 2020 was performed to assess protein dosing. The primary endpoint was the percentage of patients who did not meet at least 90% of total protein doses in accordance with guideline and literature recommendations of 1.5 grams/kg/day of actual body weight. Comparison of

protein dosing using institutional dosing weight (10% above IBW) vs. actual body weight was performed using the Wilcoxon Signed Rank test with significance set at $p < 0.05$.

Results: Of the 326 patients admitted to a VUMC ICU, 226 were excluded based on their BMI falling outside of the range of 25–29.9. The remaining 100 patients were included. The most common indication for PN was ileus. Protein doses prescribed using our institutional dosing weight ranged from 70 to 190 grams/day. A total of 45 out of 100 patients (45%) did not receive at least 90% of protein requirements using guideline and literature recommendations of at least 1.5 grams/kg/day of actual body weight. Our current institutional dosing weight only provides a median protein dose of 1.39 grams/kg/day [IQR 1.25-1.50 grams/kg/day] when utilizing actual body weight. The median total protein dose received using current institutional dosing was 115.5 grams [IQR 94.5-127.9 grams] versus 122.5 grams [IQR 112.2-138 grams] if using guideline recommended protein dosing of actual body weight ($p < 0.05$).

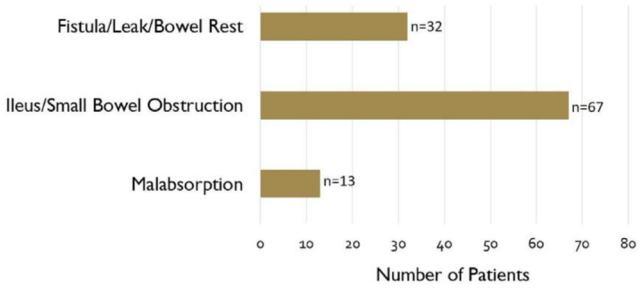
Conclusion: Current practices for protein dosing at our institution result in significantly lower than recommended protein intake in overweight, critically ill patients.

Financial Support: n/a

Table 1: Baseline Characteristics

Demographics (n = 100)	
Gender, n (%)	
Male	70 (70%)
Female	30 (30%)
Median Age, years [IQR]	64 [50-70]
Median Weight, kg [IQR]	81.7 [74.8-92]
ICU Department, n (%)	
Cardiac	15 (15%)
Medical	10 (10%)
Neurosciences	1 (1%)
Surgical	58 (58%)
Trauma	16 (16%)
BMI Ranges, n (%)	
25-25.9	20 (20%)
26-26.9	16 (16%)
27-27.9	26 (26%)
28-28.9	18 (18%)
29-29.9	20 (20%)

Chart 1: Indications for Parenteral Nutrition



P30 - Carbamazepine Reduces Parenteral Nutrition Associated Liver Disease in a Piglet Model of Total Parenteral Nutrition

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Purpose: Total parenteral nutrition (TPN) remains a critical therapeutic option for providing nutrition to patients who cannot tolerate enteral feeding. However, while lifesaving, it is associated with significant side effects including liver injury, the etiology of which remains unknown. Carbamazepine (CBZ), an anti-epileptic medication and an enhancer of autophagy, has previously been shown to reduce hepatic fibrosis and hepatocellular injury through its autophagy-enhancing properties. We hypothesized that CBZ could mitigate parenteral nutrition associated liver disease (PNALD), which we tested using our ambulatory TPN piglet model.

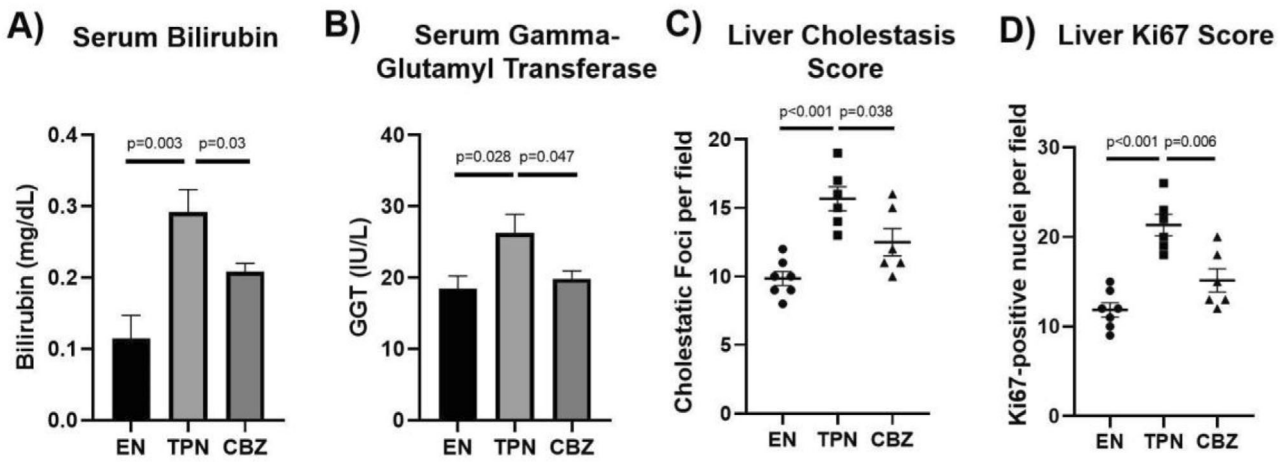
Methods: Piglets were fitted with jugular catheters and infusion pumps for TPN administration and randomly assigned to either enteral milk feeding (EN, n = 7), TPN administration (TPN, n = 6), or TPN with enteral CBZ (CBZ, n = 6) for 2 weeks. Blood samples and liver tissue were collected at euthanasia. Samples were analyzed via light microscopy, quantification of serum liver injury markers, Ki67 and CK-7 indexing, lipid profiling, and RT-qPCR. Statistical analysis was conducted through Mann-Whitney U tests and t-tests for histological samples, and descriptive statistics were generated with GraphPad Prism IQR. All tests were 2-sided with a significance level of 0.05.

Results: PNALD was confirmed in the TPN-fed piglets by increases in mean serum bilirubin (0.11 vs 0.29 mg/dL, p< 0.01), γ-glutamyltransferase (GGT) (18.4 vs 26.3 IU/L, p = 0.03), liver cholestasis (9.9 vs 15.7 cholestatic foci per field, p< 0.01), and Ki67 expression (11.9 vs 21.3 nuclei per field, p< 0.01) compared to EN animals (Figures 1A-1D). Relative to TPN-only animals, the co-administration with CBZ yielded no significant difference in daily weight gain (104.4 vs 106.5 g, p = 0.75). CBZ therapy decreased mean serum bilirubin levels (0.29 vs 0.21 mg/dL, p = 0.03), serum GGT levels (26.3 vs 19.8 IU/L, p = 0.047), liver cholestasis (15.7 vs 12.5 cholestatic foci per field, p = 0.04), and Ki67 expression (21.3 vs 15.2 nuclei per field, p = 0.01) (Figures 1A-1D). No differences in serum bile acids or CK-7 staining were noted. Lipid profile demonstrated no change in serum cholesterol, low-density lipoproteins, or triglycerides between TPN and CBZ animals. RT-qPCR data noted increased gene expression of SREBP-1 (1.07 vs 4.82, p = 0.02), PPAR (0.24 vs 1.13, p = 0.004), and FABP (0.79 vs 4.61, p = 0.025) in TPN animals receiving CBZ. No significant changes were found in BSEP, CAR, MRP2, HNF4, FGFR4, SHP, and HRT1 gene expression.

Conclusion: CBZ administration mitigates the severity of PNALD, suggesting a novel pathway for autophagy regulators as a therapeutic strategy targeting TPN associated side effects.

Financial Support: n/a

Effects of CBZ Administration on Hepatic Inflammation and Injury Reduction in TPN animals.



Serum bilirubin (A), GGT (B), liver cholestasis score (C), and Ki67 score (D) were quantified in EN, TPN, and CBZ animals. Differences between EN/TPN and TPN/CBZ are based on two-tailed t-tests; all significant findings with P < 0.05 are noted on the figure.

P31 - A tale of two analyses: administrative versus primary review of Nutrition Support Team (NST) performance

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Purpose: Economic strain encourages scrutiny of hospital services; the NST is no exception. A University Hospital Department of Pharmacy medication-use evaluation assessed duration of parenteral nutrition (PN) using administrative data. They found that 31.6% (185/586) of NST patients received less than the recommended 5 days of PN, with 120 of these patients receiving PN for < 3 days. This report questioned NST prescribing practices and recommended an educational program for referring services. Given that our NST reviews all PN requests for appropriateness, this critique prompted an in-depth review of the primary data to identify reasons behind short duration PN prescriptions.

Methods: Adult patients receiving PN following NST consultation between January 1, 2019 and March 25, 2020 included in the medication use evaluation were reanalyzed with in-depth chart review by the NST with particular focus on patients who received PN for < 3 days. Specific attention was paid to the indication for initiation, reasons for discontinuation and nutritional status of patients at the time of consult.

Results: 120 of 586 patients (20.5%) received PN for < 3 days. Of these, 40 patients (33.3%) were either admitted and/or discharged with short stays on PN, including our chronic home PN patients and those newly discharged on PN after hospitalization. 11 of the 120 (9.2%) patients were transitioned to palliative care shortly after PN initiation. Most of the remaining patients (42/69; 60.8%) had been NPO > 6 days with ileus or contraindications to enteral feeding, which resolved shortly after starting PN. Of these patients, 15 (35.7%) had moderate or severe protein calorie malnutrition. Another 4 patients had difficulty obtaining enteral access in a timely manner while 6 patients did not tolerate tube feeds or had concern for malabsorption. Of the remaining 17 patients, 11 (64.7%) of them had documented moderate or severe protein calorie malnutrition.

Conclusion: Pharmacy review of administrative data implied inappropriate use of PN while in-depth chart review demonstrated little room for change in at least 42.5% of these patients. One potential avenue to reduce short duration PN was in patients with prolonged NPO status with either ileus or contraindication to enteral feeding (42/120; 35%); however recovery from gastroparesis and ileus or the ability to transition to enteral feeding in this population is difficult to predict and further delays might exacerbate existing malnutrition. The review of primary data 1) suggests that most patients receiving < 3 days of PN were appropriate consults, if not delayed and 2) remains the most appropriate method to assess appropriateness of PN usage.

Financial Support: n/a

P32 - Home Parenteral Nutrition in advanced cancer patients can contribute to the quality of life?

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Purpose: Home Parenteral Nutrition (HPN) is a useful treatment for oncological patients that suffer from gastrointestinal obstruction and cannot meet their expected nutrition by the enteral route. If HPN can improve quality of life (QoL) and survival in malignant bowel obstruction (MBO) is still questionable.

Methods: We realized a retrospective study using database analysis of patients using HPN from October 2012 to November 2020 in Brasilia's private setting. A descriptive profile of advanced cancer patients with MBO was reported. Two subgroups were performed: those who used less than 60 days of HPN (G1) and those with survival greater than 60 days (G2). Association between HPN, albumin level, and QoL were performed, using Fisher's exact test.

Results: A total of 22 patients with malignant bowel obstruction (MBO) were followed and received HPN on 2497 catheter days. The mean age was 55 (range: 42–84 years old), 77% were female. The central line catheters used were PICC® (85,70%) and Hickman® (14,30%). In G1, the mean use of HPN was 18,4 days; 12,5% improved albumin, and none improved QoL. This group was older (mean age = 65y, range 45–84), mean BMI = 20,5 Kg/m2 (SD:4,67), and with poor status performance measured by the ECOG scale (mode:3). The subgroup G2 used 167 days of HPN, 71% improved QoL, and 78% enhanced albumin levels. The mean age of this subgroup was 49y (range 35–56), BMI = 22,81 kg/m2 (SD:7,84), and status performance measured by the ECOG scale was better than in subgroup 1 (mode:2). G2 have improved QoL compared with G1 (71% x 0; p = 0,0062) and better response in albumin level (78% x 12,5%; p = 0.026), suggesting that this response may be dependent of time of HPN.

Conclusion: These results show that HPN is an appropriate palliative therapy for a subgroup of patients with advanced cancer patients, and best practices to indicate HPN must be defined. Characteristics like age, status performance, and nutritional status may help determine those who benefit most from HPN.

Financial Support: n/a

P33 - Metabolic Complications in Elderly Patients (Above 80 Years Old), Receiving Central Parenteral Nutrition (CPN) at an Academic Medical Center

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Purpose: Limited guidelines are available for providing nutrition support for geriatric patients, and few studies have focused exclusively on metabolic outcomes of CPN patients ≥ 80 years old. The 2009 ESPEN Guidelines on Parenteral Nutrition: Geriatrics notes that insulin resistance and a higher prevalence of cardiac and renal comorbidities could contribute to the increased risk of complications when elderly patients are administered CPN. A recent study examined metabolic complications in patients ≥ 65 years old, and found a higher incidence of complications during CPN support, most notably hyperglycemia, when compared to a younger cohort. Parenteral Nutrition at our hospital is managed by a Nutrition Support Team comprised of physicians, physician assistants, and dietitians, in collaboration with pharmacists. Our service has a notable percentage of patients ≥ 80 years old. This review of quality metrics was conducted for the purpose of identifying and preventing metabolic complications in this high-risk patient population.

Methods: Quality metrics were obtained by a retrospective review of patient charts from January 1, 2019 – December 15, 2020. Metabolic complications were identified in patients > 80 years old receiving CPN for ≥ 2 consecutive days. Complications included hypo-/hyperglycemia, electrolyte abnormalities, acid-base disturbance, and hypertriglyceridemia. Patient characteristics prior to initiation of CPN included BMI, malnutrition diagnosis by a registered dietitian, and laboratory values (albumin, prealbumin, HbA1c, GFR, and glucose).

Results: A total of 38 patients ≥ 80 years old were identified and all were included in the analysis. The mean age was 86 years (range 80–98). Patient characteristics prior to initiation of CPN are presented in Table 1. Metabolic complications after initiation of CPN are presented in Table 2. Patients were prescribed CPN for an average of 14 days (range 4–39 days). Patients received an average of 26.7 kcal/kg, and 1.7 gm/kg of protein. The average percent of calories provided by protein, carbohydrate, and lipid were 26.2%, 50.1%, and 23.7% respectively. Twenty patients (53%) had a length of stay ≥ 30 days, and 10 expired during admission (26%).

Conclusion: Studies are warranted to assess the safety of CPN in the geriatric population. The most common metabolic complication in our elderly cohort was hyperglycemia (>200 mg/dL), which occurred at least once in 50% of patients. Similarly, a recent study on CPN in patients ≥ 65 years old found a 36.8% incidence of hyperglycemia. Better blood glucose control should be the primary goal for managing CPN in the elderly population. The majority of elderly patients in this analysis were diagnosed with malnutrition prior to starting CPN. This indicates an opportunity for earlier nutrition intervention, as the patients were nutritionally depleted and at high risk for refeeding syndrome. In response to published data suggesting that elderly patients have increased insulin resistance, but minimal decline in lipid oxidation, our team made an effort over the past year to increase the lipid provision (26.6± 4.7% vs 20.1± 4.6%, p = 0.0001) and reduce calories from carbohydrate (46.6± 5.4% vs 54.3± 5.5%, p = 0.0001). Despite these changes, hypertriglyceridemia remained a rare event, with no patients exhibiting triglycerides ≥400 mg/dL. We attribute this to our team's vigilance in monitoring triglyceride levels and liver function tests, and adjusting lipid dosages accordingly. We did not see a decrease in patients experiencing hyperglycemia, but this may be secondary to a small sample size. Further study is warranted on the benefits of manipulating macronutrient composition in CPN to improve metabolic outcomes in elderly patients.

Financial Support: n/a

Table 1. Patient Characteristics Prior to Initiation of CPN

Characteristics	Number of patients (n=38)	Percent of patients (%)
Male	17	45
Female	21	55
BMI < 19 kg/m^2	7	18
BMI 30-39 kg/m^2	9	24
Malnutrition- Severe	25	66
Malnutrition-Non-Severe	9	24
Low Albumin (< 3.3 g/dL)	28	74
Low Prealbumin (< 20 mg/dL)	34	89
Hypoglycemia prior to CPN (≤ 60 mg/dL)	4	11
Hyperglycemia prior to CPN (> 200 mg/dL)	10	26
HbA1c > 6.5%	2	5
GFR < 60 mL/min/1.73m^2 prior to CPN	13	34

Table 2. Metabolic Complications After Initiation of CPN

Metabolic Complication	Number of patients with 1 or more occurrences (n=38)	Percent of patients with 1 or more occurrences (%)
Hypoglycemia (glucose ≤ 60 mg/dL)	1	3
Hyperglycemia (glucose > 200 mg/dL)	19	50
Acid-Base Disturbance (pH < 7.35; pH > 7.45; pCO_2 > 45 mmHg)	15	39
Hypertriglyceridemia (triglycerides > 400 mg/dL)	0	0
Hypochloremia (chloride < 85 mEq/L)	0	0
Hyperchloremia (chloride > 115 mEq/L)	3	8
Hypokalemia (potassium < 3 mEq/L)	3	8
Hypophosphatemia (phosphorus < 2 mg/dL)	7	18
Hypernatremia (sodium > 150 mEq/L)	0	0

Enteral Nutrition Therapy

International Poster of Distinction

P34 - A Bayesian Multiple Treatment Comparisons Meta-analysis of Antioxidant Micronutrient Supplements for Adult Critically Ill Patients

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Purpose: Antioxidant micronutrients (AxMs) have been extensively studied among critically ill adults as monotherapies or in varied combinations with conflicting results. To our knowledge, the relative efficacies of AxMs have not been studied. Therefore, we conducted a Bayesian network meta-analysis to identify the best AxM treatment regimen.

Methods: A comprehensive systematic search across Medline/PubMed, EMBASE/Ovid, Web of science and Cochrane databases was conducted from the inception of the respective databases through August 2020, to identify randomized controlled trials (RCTs) comparing AxMs supplementations with placebo among critically ill adults. We performed a Bayesian multi-treatment comparison using gemtc package in R version 3.6.2. Just Another Gibbs Sampler (JAGS) was used for Gibbs sampling. We used random effects model and non-informative priors. The number of Markov chains used was set as 4 for each endpoint. Further, for each endpoint during Markov Chain Monte Carlo (MCMC) simulation the burn in iterations was set at 5000 and actual simulation iterations was set at 100,000. The 10th interactions of each MCMC simulation was used for estimating posterior distribution. The convergence of the model was assessed using Gelman-Rubin-Brooks plot and by interpreting the Potential Scale Reduction Factor (PSRF). PSRF less than 1.05 was set to signify convergence. AxMs treatment effect on clinical outcomes (mortality, infection rates, ICU and hospital stays and ventilator days) were represented by absolute risk differences (ARD) [for dichotomous outcomes] and mean differences (MD) [for continuous outcomes] with 95% credible intervals (CrI). The surface under the cumulative ranking curve (SUCRA) score was used to obtained ranking probabilities.

Results: Of the 10247 records that were identified after removing duplicates, 37 RCTs (4905 patients) met our inclusion criteria. With respect to mortality, the ARD for "vitamin E" compared with placebo was centred at -0.19[95% CrI: -0.54,0.16] and was ranked the best treatment for mortality reduction as per SUCRA score, followed by combination of "selenium, zinc and vitamin E", the ARD for which was centred at -0.18[95% CrI: -0.53,0.16]. However, considering the overlap of CrIs of SUCRA scores for treatments, there is substantial uncertainty present in the rankings [figure 1a]. Relative treatment effects for mortality are presented in table 1 as comparison matrix. With respect to length of ICU stay, a combination of "selenium, zinc and copper" was ranked the best for lowest ICU stay with MD centred at -9.40[95% CrI: -20.0,1.50], as per SUCRA score [figure 1b]. A combination of "selenium, zinc, copper and vitamin E" was ranked the best treatment for infection risk reduction as per SUCRA score, with ARD being centred at -0.22[95% CrI: -0.61,0.17] [figure 1c]. The MD of ventilator days for combination of "selenium, zinc and manganese" compared with placebo was centred at -2.80[95% CrI: -6.30,0.89] [figure 1d]. The MD of hospital stay for combination of "selenium, zinc and copper" compared with placebo was centred at -13.00[95% CrI: -38.00;13.00] [figure 1e]. Further, the probability of a specific AxMs regimen being the best treatment with respect to any of the outcomes is low, due to wide and overlapping 95% CrIs of SUCRA.

Conclusion: From the present Bayesian network meta-analysis, we infer that, though certain AxMs supplementations were beneficial among critically ill patients compared with placebo, there is uncertainty with the evidence. This is because of limited studies with small sample size evaluating specific AxMs or their combinations. Therefore necessitating future studies.

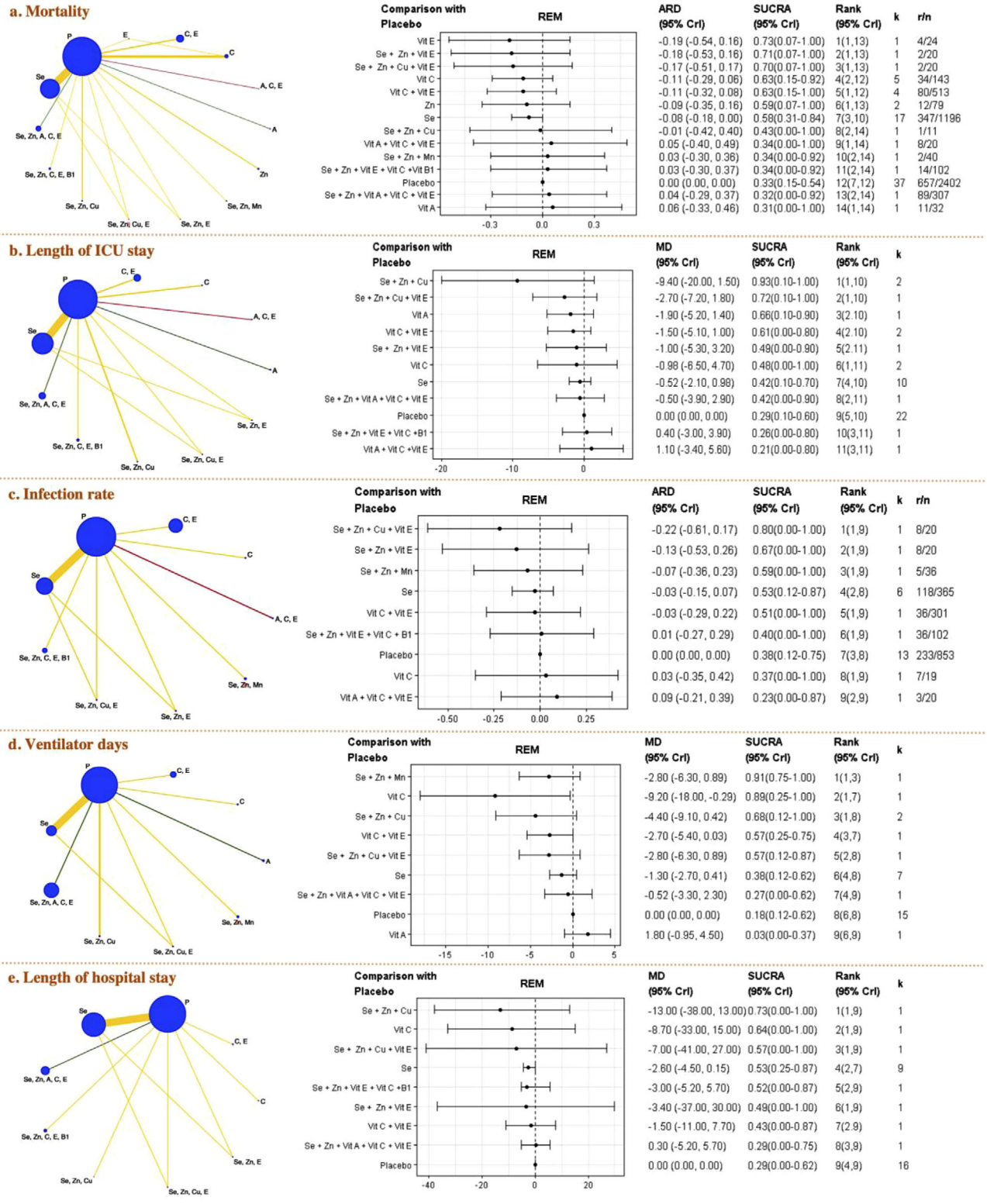
Financial Support: No financial support obtained to conduct this review.

Estimated absolute risk difference (95% Credible Intervals) between all treatments for all-cause mortality in the random effects network meta-analysis

Each column represent a micronutrient treatment regimen against which micronutrients/placebo mentioned in the rows were compared. A- Vitamin A, C- Vitamin C, Cu- Copper, E- Vitamin E, Se-Selenium, Mn- Manganese, Zn-Zinc.

Network plots (node size is proportional to the number of patients in particular treatment, edge width is proportional to number of studies comparing the elements it connect and edge colour denotes the predominant risk of bias of studies connecting a pair of interventions) and treatment effect estimates for direct comparison in network meta-analysis for: a) mortality, b) length of ICU stay, c) infection rate, d) ventilator days, e) length of hospital stay.

Comparison \ Treatment	Placebo	Se	Se+Zn+Cu	Se+Zn+Mn	Se+Zn+VitA +C+E	Se+Zn+VitE	Se+Zn+VitE+ C+B_1	Se+Zn+VitE+ Cu	Vit A	VitA+C+E	Vit C	Vit C+E	Vit E	Zn
Placebo		-0.086 (-0.178, 0.0005)	-0.011 (-0.416, 0.398)	0.028 (-0.300, 0.361)	0.039 (-0.294, 0.369)	**-0.178 (-0.529, 0.159)**	0.030 (-0.303, 0.368)	-0.169 (-0.514, 0.169)	0.061 (-0.332, 0.457)	0.049 (-0.397, 0.493)	**-0.114 (-0.285, 0.063)**	**-0.114 (-0.324, 0.088)**	**-0.187 (-0.536, 0.161)**	-0.098 (-0.354, 0.157)
Se			0.073 (-0.339, 0.496)	0.114 (-0.224, 0.462)	0.125 (-0.215, 0.470)	-0.091 (-0.437, 0.249)	0.116 (-0.22, 0.468)	-0.083 (-0.429, 0.261)	0.146 (-0.254, 0.554)	0.135 (-0.318, 0.589)	-0.028 (-0.218, 0.174)	-0.028 (-0.252, 0.196)	-0.102 (-0.457, 0.258)	-0.012 (-0.281, 0.263)
Se+Zn+Cu				0.041 (-0.486, 0.569)	0.049 (-0.480, 0.574)	-0.168 (-0.707, 0.359)	0.044 (-0.488, 0.574)	-0.159 (-0.695, 0.367)	0.072 (-0.497, 0.638)	0.060 (-0.543, 0.663)	-0.102 (-0.548, 0.341)	-0.104 (-0.560, 0.350)	-0.177 (-0.711, 0.365)	-0.084 (-0.575, 0.389)
Se+Zn+Mn					0.011 (-0.465, 0.476)	-0.207 (-0.688, 0.265)	0.002 (-0.469, 0.473)	-0.198 (-0.679, 0.269)	0.031 (-0.484, 0.538)	0.020 (-0.535, 0.569)	-0.144 (-0.515, 0.232)	-0.144 (-0.539, 0.239)	-0.217 (-0.698, 0.265)	-0.127 (-0.547, 0.292)
Se+Zn+VitA +C+E						-0.216 (-0.694, 0.253)	-0.009 (-0.477, 0.466)	-0.209 (-0.688, 0.265)	0.022 (-0.488, 0.541)	0.008 (-0.541, 0.571)	-0.154 (-0.524, 0.222)	-0.153 (-0.548, 0.235)	-0.227 (-0.706, 0.256)	-0.137 (-0.557, 0.284)
Se+Zn+VitE							0.208 (-0.263, 0.697)	0.009 (-0.471, 0.488)	0.239 (-0.282, 0.767)	0.227 (-0.324, 0.793)	0.063 (-0.315, 0.454)	0.064 (-0.330, 0.468)	-0.011 (-0.494, 0.487)	0.080 (-0.344, 0.511)
Se+Zn+VitE+ C+B_1								-0.201 (-0.683, 0.274)	0.031 (-0.489, 0.548)	0.018 (-0.545, 0.573)	-0.144 (-0.518, 0.235)	-0.145 (-0.545, 0.242)	-0.218 (-0.702, 0.260)	-0.129 (-0.553, 0.291)
Se+Zn+VitE+ Cu									0.231 (-0.289, 0.754)	0.218 (-0.338, 0.782)	0.056 (-0.326, 0.446)	0.055 (-0.343, 0.453)	-0.018 (-0.500, 0.470)	0.071 (-0.355, 0.499)
Vit A										-0.013 (-0.608, 0.580)	-0.175 (-0.603, 0.257)	-0.177 (-0.617, 0.263)	-0.249 (-0.774, 0.276)	-0.159 (-0.627, 0.305)
VitA+C+E											-0.164 (-0.641, 0.317)	-0.166 (-0.659, 0.327)	-0.236 (-0.797, 0.329)	-0.148 (-0.663, 0.365)
Vit C												-0.0009 (-0.278, 0.262)	-0.075 (-0.420, 0.264)	0.016 (-0.296, 0.323)
Vit C+E													-0.072 (-0.472, 0.333)	0.017 (-0.307, 0.349)
Vit E														0.088 (-0.345, 0.519)
Zn														



The surface under the cumulative ranking curve (SUCRA) scores and ranking probability with Credible Intervals (CrI) were mentioned for each treatment comparison. The total number of events (r), total sample size (n) and number of studies (k) per treatment is also provided. ARD- Absolute risk difference, MD- Mean difference, REM- Random effects model. A- Vitamin A, C- Vitamin C, Cu- Copper, E- Vitamin E, Se-Selenium, Mn-Manganese, Zn-Zinc.

Poster of Distinction

P35 - Best Practices: Use of Medication Administration Record and Bar-Code Scanning for Enteral Nutrition Therapy in a Veteran Affairs Health Care System (VHAHCS)

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Purpose: Malnutrition is common in hospitalized patients leading to increased patient complications and costs. Nutrition support therapies (NST) are effective in preventing and treating complications and reducing costs. Unfortunately, poor coordination of NST care has been reported in hospitals. In our health system, a random sampling of patients receiving enteral nutrition (EN) indicated gaps in the nutrition care process. The pharmacists, physicians and nurses were unaware of EN orders, leading to potential undesirable drug/nutrient interactions, missed doses and safety concerns. A look alike/sound alike enteral formula had been erroneously administered to a patient leading to potential for hyperglycemia and/or gastrointestinal intolerance. Therefore, strategies to optimize the electronic health record (EHR) were needed. The purpose of this presentation is to describe the process and outcomes of a quality improvement project to revise the enteral nutrition (EN) order using the existing Computerized Patient Record System (CPRS), Medication Administration Record (MAR) and Bar Code Medication System (BCMA) system to improve administration, documentation and safety of EN therapy for hospitalized veterans at a Veterans Affairs Health Care System.

Methods: A quality improvement approach was used to evaluate and revise the current process and workflow of the ordering, delivery, storage, documentation, and administration of EN. Evaluations of EN administration and documentation were conducted before and after the process change. Based on a review of the literature and best practices from other VA hospitals, EN was included as a medication therapy in the MAR and scanned in BCMA. This involved the creation of new medication order sets and training for all interdisciplinary team members. After adding EN to the MAR and BCMA system (September-October 2019) 415 observed EN orders were evaluated to assess improved quality documentation and administration.

Results: The baseline quality assessment prior to implementation of the change reviewed 31 patient charts. Only 81% of EN administration and 43% of protein modular administration were documented. After implementation, 30 days of outcome data were collected. There were 154 unique patients with 415 opportunities for administration of EN (including tube feeding and protein modular). Of these, 415 (100%) opportunities were documented and scanned into the BCMA system. 370 (89%) were documented as given and 45 (11%) were held. When held, nursing provided many valuable comments in the MAR to assist nutrition providers in adjusting nutrition care plans. Of these 154 unique patients, there were 90 patients who had orders for protein modular prescribed. 90 (100%) were documented either given/held/refused. There were 64 patients with TF orders prescribed. 64 (100%) were documented either given/held/refused. Prior to implementation of the change, a look alike/sound alike enteral formula had been erroneously administered to a patient. This event was entered into the EHR error reporting system. After implementation of process change, there have been no further EN safety issues reported.

Conclusion: Utilizing the existing EHR to optimize EN therapy led to improved administration, communication, monitoring and safety in one acute care hospital system. Specifics of the process change, lessons learned, and future directions will be discussed.

Financial Support: N/A

P36 - Elemental Enteral Nutrition for Common Variable Immunodeficiency (CVID) Enteropathy

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Purpose: Common variable immunodeficiency (CVID) is the most common symptomatic immunodeficiency. The GI tract is the largest lymphoid organ in the body that makes intestinal diseases common among immunodeficient patients. GI manifestations due to CVID enteropathy mimic diseases seen in the absence of immunodeficiency like celiac and IBD, but the pathology is not comparable and they often do not respond to conventional therapies. The most frequently reported GI symptom is diarrhea. Other symptoms are weight loss, bloating as well as malabsorption. We report a patient with CVID enteropathy manifested in chronic diarrhea and severe weight loss that improved with elemental enteral nutrition.

Methods: A 65 year old woman with CVID enteropathy presented to the GI Nutrition Clinic at Virginia Commonwealth University (VCU) Hospital due to chronic diarrhea leading to protein calorie malnutrition. She was experiencing diarrhea with 13–15 bowel movements per day with loose stool, despite being on weekly immunoglobulins therapy. She lost 70 lbs over a 9–12 months period. BMI decreased from 21 kg/m2 to 14.5 kg/m2. Stool studies were negative for bacterial or viral infection, normal fecal calprotectin and protein, few stool WBCs. Celiac serologies were negative. She had micronutrients deficiencies with low vitamin D level, low Folate level but normal vitamin B6, B12 and iron, low copper levels but other trace elements were normal. Push enteroscopy showed abnormal duodenal mucosa with dropout of villi. Duodenal biopsies showed blunting of villi with chronic inflammation including increased epithelial lymphocytosis. Colonoscopy showed normal mucosa throughout the colon and terminal ileum. Biopsies showed mild inflammation and few epithelial lymphocytes. She tried gluten-free-diet with no benefit. She was using daily Loperamide, Prednisone 5mg daily for her underlying arthritis, dose was increased to 20mg, Budesonide 9mg daily was also tried but symptoms

continued to be uncontrolled. Other medications like Colistipol, Eluxadoline, and Cholestyramine were tried with no improvement. Gastro-Juenal feeding tube was placed and she was started on exclusive enteral feeding, an elemental formula with Vivonex was used. Bowel movements started to decrease with more formed stool consistency within 2 weeks. Weight continued to increase and BMI was 20 kg/m2 after 6 months. She started to reintroduce oral intake and diet, symptoms continued to be stable.

Results: N/A

Conclusion: CVID is characterized by loss of B-cell function and impaired antibody production accompanied by various immunologic changes, such as autoimmune cytopenias and abnormal T-cell function. The T-cell mediated defects and autoimmune phenomenon are thought to be the causes of CVID enteropathy. Therefore, immunoglobulins alone may not be effective. CVID enteropathy is histologically like celiac disease with villous atrophy, crypt hyperplasia, and increased intraepithelial lymphocytes, distinctive features are paucity of plasma cells and unresponsiveness to gluten-free-diet. Colonic inflammation with CVID enteropathy are more prevalent than upper GI inflammation. Giardiasis is the most common GI infection in CVID and can be challenging to treat when comparing with immunocompetent patients. Given that the pathophysiology of enteropathy in CVID is poorly understood, few therapeutic options are available. It is reported that corticosteroids improve diarrhea; however, systemic side effects limit their use. Immunomodulators such as azathioprine can be used, but the efficacy are not well documented, also the risk of malignancy in certain age groups should be considered. Current therapies are empiric and based on self-experience. To improve the quality of available therapies, well-designed prospective studies are needed.

Financial Support: n/a

P37 - Early Human Milk Fortification

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Purpose: The purpose of this study was to evaluate effects of early fortification on growth and feeding intolerance in premature infants.

Methods: Design: Retrospective cohort study using historical controls. Sample: Preterm infants born between January 1-December 31, 2015 & January 1-December 31, 2018. Inclusion criteria: received 2 packets of extensively hydrolyzed liquid human milk fortifier (bovine) and/or weighed less than 2000 grams. Statistical Analyses: SPSS for Windows version 24 An unpaired t-test or chi-square test Mann-Whitney U test P value of < 0.05 was significant

Results: 44 preterm infants, 26 Males and 18 Females. Mean gestational age 28 weeks and birth weight < 1500 grams. 29 in early fortification group; 15 in late fortification group. No significant differences between groups in weight, head circumference and length at birth, 4 weeks of age, 36 weeks, or discharge. No significant difference in total parenteral nutrition days or days to regain birth weight. Protein intake was higher in the early fortification group 3.26g/kg/day versus 2.76 g/kg/day (p value 0.00). There were no episodes of feeding intolerance. Two cases of Necrotizing Enterocolitis were identified in the early fortification group but were not statistically significant.

Conclusion: Our findings suggest that early fortification (< 80 ml/kg/day) does not significantly improve growth anthropometrics nor did it significantly increase the incidence of feeding intolerance and Necrotizing Enterocolitis. Future research is warranted on the topic of earlier human milk fortification with the extensively hydrolyzed liquid human milk fortifier at a volume of < 80ml/kg/day in order to determine its benefit.

Financial Support: n/a

Table 1. Demographic characteristics of sample			
	Early n=29	Late n= 15	Chi-square Test asymptotic significance (2-sided/tailed) (P value <0.05 significant)
Gestational Age	28.07 ± 2.34	28.87 ± 1.7	p= 0.25
Birth Weight (grams)	1105.5 ± 303	1275 ± 229	p= 0.06
Sex			
Male	18	8	p= 0.58
Female	11	7	p= 0.58
Gestational Age at Discharge	39.1 + 3.13	38.6 + 2.69	p= 0.29`
# TPN Days	9.9	8.87	p=0.22
Days to Regain Birth Weight	12.1	11.8	p=0.842

Table 2. Results			
	Early n=29	Late n= 15	Chi-square Test asymptotic significance (2-sided/tailed)
Mean Volume (mL/kg/day)	63.77	142.5	p= 0.00
Mean Protein Intake (g/kg/day)	3.26	2.76	p= 0.00
Number of TPN Days	9.9	8.87	p= 0.22
Days to Regain Birth Weight	12.1	11.8	p= 0.842
Cases of NEC	2	0	p= 0.298
Feeding Intolerance	0	0	p=0.00

ENCORE

Presentation: ESPEN Virtual Congress, September 2020

P38 - Nutrition Program Reduces Healthcare Use and Costs of Adult Outpatients at Nutritional Risk

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ENCORE

Publication: Sulo S, Williams D, Ohnuma T, Krishnamoorthy V, Raghunathan K, Cassady B, Wischmeyer P. M123 - Factors Associated with Early Use of Oral Nutritional Supplementation after Colorectal and CABG Surgery in US Hospitals (abstract). Supporting Information. ASPEN Nutrition Science & Practice Conference: March 28–31, 2020, JPEN J Parenter Enteral Nutr. 2020 Feb;44(2):253.

P39 - Utilization of Oral Nutritional Supplements in US Hospitals After CABG Surgery

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P40 - Utilization of Early Postoperative Nutritional Supplementation is Associated with Reduced Length of Stay in Malnourished Hip Fracture Patients

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Purpose: Malnutrition or its risk in elderly hip fracture patients is associated with poorer health outcomes including higher postoperative complication rates and increased mortality. Postoperative nutrition delivery is essential to surgical recovery, whilst postoperative enteral nutrition (EN) including oral nutritional supplements (ONS) or tube feeding formulas – can improve both health and economic outcomes in malnourished hip/femur fracture patients. The association between early EN utilization and hospital length of stay (LOS) was assessed in malnourished hip/femur fracture patients.

Methods: This retrospective cohort study utilized data from the Premier Healthcare Database. Patients assessed included malnourished hip/femur fracture patients undergoing surgical repair between October 2008 and September 2018. Patients were identified via International Classification of Diseases (ICD-9/ICD-10) codes. EN utilization was identified via hospital charge codes and was defined as early EN administration by postoperative day (POD) 1. Propensity matching (1:2) and univariable analysis were performed to compare hospital LOS as well as infectious complications, hospital mortality, intensive care unit (ICU) admission, and costs between the early vs later EN groups.

Results: A total of 160,151 hip/femur fracture surgeries were identified with a coded-malnutrition prevalence of 8.7%. Early postoperative EN utilization occurred in 1.9% of all patients and only 4.9% of malnourished patients. Propensity score matching demonstrated early EN was associated with significantly shorter hospital LOS (5.8 $\pm$ 6.6 days vs. 7.6 $\pm$ 5.8 days; $p < 0.001$) without an increase in hospital costs. No statistically significant differences were observed for infectious complications, hospital mortality, and ICU admission ($p > 0.05$).

Conclusion: Malnutrition in hip/femur fracture patients is underdiagnosed and early postoperative EN is underutilized. However, early EN exposure is associated with a significantly shorter LOS without an increase in hospital costs in a well-matched sample. Early EN in malnourished hip/femur fracture surgical patients could serve as a key target for perioperative quality improvement programs focusing on increasing malnutrition screening, diagnosis and early treatment.

Financial Support: Financial support for this project was provided by Abbott, USA

P41 - Nutrition Program for Adult Outpatients at Nutritional Risk in Colombia Improves Health Outcomes and Reduces Healthcare Utilization

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Purpose: One in four community-dwelling adults experience poor nutrition or are at malnutrition risk. These patients experience poor outcomes (eg, higher complications, hospitalizations, etc.) and increased healthcare costs. Comprehensive nutrition-focused programs have been found to be effective in improving the health outcomes and alleviating the economic burden of poor nutrition for patients receiving care in hospitals and post-acute care / home health care settings. Only a few studies have evaluated the impact of such programs among outpatients in US and European countries, while no studies to date have assessed such programs with outpatient cohorts in Colombia. Therefore, we assessed the impact of a nutrition-focused quality improvement program (QIP) on the clinical outcomes and healthcare resource use of outpatients at malnutrition risk receiving care at outpatient facilities in Bogota, Colombia.

Methods: This was a pre-post QIP study of patients ($\geq$60 years) receiving outpatient medical consultation at the different specialty clinics of the San Ignacio University Hospital in Bogota, Colombia. The QIP included 707 outpatients enrolled in the study between September 2019-July 2020; final sample size however consisted of 618 outpatients. Nutrition risk was assessed via the Mini Nutritional Assessment (MNA)-Short Form during the index outpatient clinic visit. Patients and caregivers were educated about the importance of nutrition and received a 60-day supply of disease-specific oral nutritional drinks (Ensure Advance or Glucerna; Abbott, USA) were provided to patients to consume while at home. Patients were followed for up to 90-days and either in-person or telephone visits to assess patient status and encourage compliance with the recommended nutrition regimen were conducted. Healthcare resource utilization included hospitalizations, emergency department (ED) visits, and outpatient visits over a 90-day period. In this analysis, we compare the results of the QIP group pre and post implementation of the QIP.

Results: The QIP patients were older adults (74.6 $\pm$ 8.7 years old), mainly female (70.4%), functionally independent (96.1%), with 6 ($\pm$1.7) comorbidities, and average medication utilization of 3.4 ($\pm$ 2.3). Most patients were normal weight (50.92%) and only 46.82% were overweight/obese. Significant reductions in the average number of hospitalizations, ED visits, and outpatient visits were observed at 30, 60, and 90-days post-QIP implementation (Table 1).

Conclusion: Nutrition QIP was associated with significant reduction in healthcare resource use over 90-days for outpatients at nutrition risk in Colombia. These results support the need for QIPs in outpatient clinics and highlight the importance of nutrition screening and assessment, contin-

uous patient education and follow-ups as well as disease-specific oral nutritional supplementation. Future research is needed to compare the QIP patient data with those of a non-QIP comparative cohort.

Financial Support: Financial support for this project was provided by Abbott, USA

Table 1. Healthcare resource use pre and post-QIP implementation

	30 days*		60 days*		90 days*	
	Pre Mean (SD)	Post Mean (SD)	Pre Mean (SD)	Post Mean (SD)	Pre Mean (SD)	Post Mean (SD)
Hospitalizations	0.07(0.27)	0.01(0.15)	0.14(0.39)	0.03(0.21)	0.17(0.45)	0.03(0.22)
Emergency Department Visits	0.10(0.32)	0.03(0.20)	0.22(0.52)	0.09(0.32)	0.28(0.6)	0.1(0.33)
Outpatients Visits	1.25(1.13)	0.56(0.8)	1.73(1.51)	1.18(1.25)	2.16(1.85)	1.35(1.41)

* $p < 0.00$

P42 - Essential Fatty Acids Deficiency in A Pediatric Patient Diagnosed with Intestinal Lymphangiectasia: A Case Report

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Purpose: Essential Fatty Acids Deficiency (EFAD) is rare, however, certain patients are at risk of developing it, including those with malabsorptive disorders. In our case, we report a detectable EFAD as proven by biochemical assessment and physical examination in a pediatric patient who was commenced on parenteral nutrition (PN) and minimal Long-Chain Triglycerides (LCT) feeding regimen, in which EFA levels and Trienie: Tetraene ratio improved after administrating an adequate dose of intravenous lipids. Background: A 7 years old female patient, diagnosed with intestinal lymphangiectasia, with a recurrent history of admissions due to carpopedal spasm, diarrhea, and severe electrolytes disturbances that required PN.During one of her admissions, she was started on full PN support and intravenous lipids due to diarrhea and electrolyte disturbances. One month after her admission and unsuccessful PN weaning trials, Nasogastric (NG) feeding was initiated due to poor oral intake and to facilitate weaning of PN. Minimal LCT formula choice was decided, due to fat malabsorption. Once the feeding goal was reached, she continued receiving PN without intravenous lipids. Three weeks later, patient had significant hair loss with noticeable alopecia. Skin and nails were physically normal. Other possible nutritional deficiencies contributing to hair loss were ruled out. EFAD was suspected due to multiple risk factors including fat malabsorption, minimal LCT feeding regimen, and administering PN without intravenous lipids, in which serum EFA profile was sent. A noteworthy point is that while EFA profile result was pending, replacement of intravenous fat-soluble vitamins was given due to depletion in serum fat-soluble vitamins that was added to a minimal dose of intravenous lipid 0.3 g/kg/day. Initial laboratory analysis revealed low levels of linoleic acid and arachidic acid, elevated. Triene:Tetraene ratio and mead acid (Table.1). These biomedical changes confirm deficiency of EFA.

Methods: Intravenous lipid dose increased to 1.8 g/kg/day and the type of lipid emulsion was changed from mixed lipid emulsion to LCT/MCT Lipid emulsion to provide higher amounts of EFA (Table.2). All of which provided adequate EFA intake (Table.2). Patient remained on this regimen for ten days, then post-treatment EFA profile was sent on the day of discharge. Supplementation of her diet with adequate EFA was ensured. (Table.2).

Results: Post-treatment laboratory analysis showed a remarkable increase in linolenic acid level, improvement of arachidic acid level, and significant reduction in Triene:Tetriene ratio and mead acid level, yet both remained high. (Table.1)

Patient's mother reported that hair loss was resolved three days after nutritional intervention was implemented.

Conclusion: We conclude that clinicians should be aware of EFAD in patients with risk factors. Therapeutic choice of enteral feeds should not be overlooked as it may subsequently affect the intake of essential nutrients. Based on this case, we recommend ensuring adequate dosing of intravenous lipids for patients at risk,in addition to supplementation of minimal LCT diets with adequate EFA intake. Further research aiming at establishing nutritional requirements to treat deficiency of EFA is recommended, as we followed requirements to prevent EFAD in Pediatric population.

Financial Support: N/A.

Table.1 Pre Nutritional Intervention Laboratory Analysis of Essential Fatty Acids and Post Nutritional Intervention Laboratory Analysis.

Laboratory Data	Pre-intervention lab Analysis Sent (16 May 2019) *	Post-Intervention Lab Analysis Sent (23 June 2019) *	Reference Values
Linoleic Acid C18:2W6	1136 nmol/mL "Low"	2047 nmol/mL	1600-3500 nmol/mL
Alpha-Linolenic Acid, C18:3W3	21 nmol/mL "borderline Low"	33 nmol/mL	20-120 nmol/mL
Arachidic Acid, C20:0	17 nmol/mL "Low"	29 nmol/mL "Low"	30-90 nmol/mL
Mead Acid, C20:3W9	70 nmol/ml	38 nmol/mL	7-30 nmol/mL
Triene: Tetraene Ratio	0.114 "High"	0.053 "Borderline High"	0.013-0.050

*Indicates date the sample was collected :Pre-treatment lab was received in sent out lab on:22 May 2019 and Reported on 24 May 2019. Post Treatment lab was received in sent out lab on 26 June 2019 and Reported on 2nd of July 2019.

Table.2 Essential Fatty Acids Amount Per mL in Two Lipid Emulsions Used in Our Institution and Comparison of EFA Intake After IV Lipid (1.8 g/kg/day) Dose Initiation To Our Patient's Essential Fatty Acids Requirements Needed To Prevent Deficiency.

Essential Fatty Acids	EFA amount per mL of mixed Soybean, MCT, Olive Oil, Fish Oil 20% Lipid Emulsion	EFA amount per mL of MCT/LCT 20% lipid Emulsion	Total Intake of EFA After Increasing To (1.8 g/kg/day) dose of MCT/LCT IV lipid Per Day	Patient's Requirements of EFA Per Day To Prevent Deficiency	Percent of Essential Fatty Acids Provided From Patient's Daily Energy Intake to Prevent Deficiency
Linoleic acid	35 mg/mL (mean of 28 to 50 mg/mL)	53 mg/mL (mean of 48 to 58 mg/mL)	8904 mg/day	5063 mg/day	3-4% Linoleic acid of daily energy intake.
Alpha-Linolenic acid	4.5 mg/mL (mean of 3 to 7 mg/mL).	8.0 mg/mL (mean of 5.0-11.0 mg/mL)	1344 mg/day	1687mg/day	1% alpha-linolenic acid of daily energy intake.

*MCT: Medium chain Triglycerides, LCT: Long-Chain Triglycerides.

P43 - Reinfusion of gastrointestinal secretions via J tube in the home setting: A case study and illustration

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Purpose: Gastrointestinal (GI) secretions collected via drainage contain gastric, pancreatic, and biliary secretions, which are critical for the digestion and absorption of nutrients. Inadequate amounts of bile, particularly, can lead to fat malabsorption, weight loss, vitamin deficiencies, and electrolyte abnormalities. With severe abdominal trauma or surgical complications, bile may become inaccessible to the small intestine; these rare cases may require supplementation with bile salts or reinfusion of GI secretions via J tube.

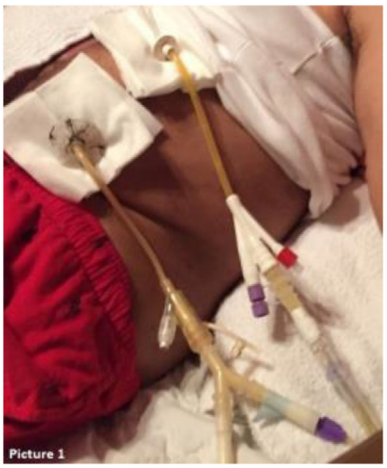
Methods: 59-year-old male with surgical history of resection of 40cm proximal jejunum and discontinuity of intestine related to mesenteric ischemia. Patient prescribed enteral therapy and reinfusion of collected GI secretions in preparation for reconstructive surgery. Access devices included a gastroduodenal tube for GI secretion drainage, with collection from the distal duodenum, and a 16FR direct jejunostomy tube for enteral feeds (picture 1). Initial hospital discharge plan was admission to a skilled care facility until reconstructive GI surgery date. Discharge to home arranged with home infusion company per caregiver request. Drainage and Feeding Regimen: GI secretions collected via drainage bag attached to gastroduodenal tube, measured, and reinfused via J tube every 4 hours via feeding pump. (i.e. 200 ml collection flushed at 50 ml/hr) Standard 1.2 calorie non-fiber formula via J tube at 65ml/hr with 100ml water flush every 6 hours. Flushes later changed to 17ml flush every hour for tube clog prevention. Supplies: • 2 enteral feeding pumps (picture 2) • Feed and flush bags (formula and water infusion, pump #1) • Spike and flush sets (gastrointestinal secretion infusion, pump #2) • 60 ml catheter tip syringes • Uro drain bags (gastrointestinal fluid drainage from duodenal tube) • Universal 5 in 1 connector (picture 3) Clinical Intervention: Routine clinical follow up by home care dietitian included phone and video chat with monitoring of weight and tolerance, reinforcement of GI secretion infusion calculations and rates, identifying appropriate supplies, tube site care education, tube clog and pump alarm troubleshooting, optimal flushing protocol and education, and oral diet advancement support.

Results: Reconstructive GI surgery was performed after seven months of home tube feeding and GI secretion re-infusion. The gastroduodenal tube used for drainage was converted to a gastric tube for enteral feeds and J tube was removed. Oral diet advanced from clear liquids to regular diet as tolerated. One month later, home enteral feeds were discontinued due to successful oral diet transition. Patient remains healthy and successful on exclusive oral diet now 19 months after discontinuation of home enteral feeds and GI secretion reinfusion.

Conclusion: Enteral feeds with concurrent reinfusion of drained GI secretions in the home setting is a safe alternative to hospital or skilled nursing facility admission when complex GI rehabilitation is required. Home care is also cost-effective, saving this patient approximately $50,000 over seven months. Home care dietitians skilled in enteral nutrition are an important part of this home care solution.

Financial Support: Coram CVS/specialty infusion services

Picture 1



Access Devices

Picture 2

Feeding Pumps

P44 - Development of a population pharmacokinetic (PK) and pharmacodynamic (PD) model for apraglutide using data from two randomized phase I studies

Katy Pocock, RN[1]; Federico Bolognani, MD, PhD[2]; Christian Meyer, MD, PhD[2]; Annelieke Kruithof, PhD[3]; Marieke de Kam, PhD[3]; Kirsten Bergmann, PhD[3]; Max Van Gent, PhD[3]; Pim Gal, MD, PhD[3]; Matthijs Moerland, PhD[3]; Pascal Crenn, MD, PhD[4]; Matthias Machacek, PhD[5]; Pascal Schulthess, PhD[5]; Gerard Greig, PhD[6]

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Purpose: Apraglutide is a novel long-acting glucagon-like peptide-2 (GLP-2) analogue that promotes intestinal growth and increases intestinal absorption. It is in clinical development for the treatment of short bowel syndrome intestinal failure (SBS-IF), a chronic condition with significant morbidity and mortality. Apraglutide has been shown to be well tolerated in phase I and phase II clinical studies. Pharmacokinetic (PK) and pharmacodynamic (PD) characterization revealed a predictable linear PK profile and a dose-dependent PD relationship. The present PK/PD model enables characterization of apraglutide PK and PD relationships at the population level.

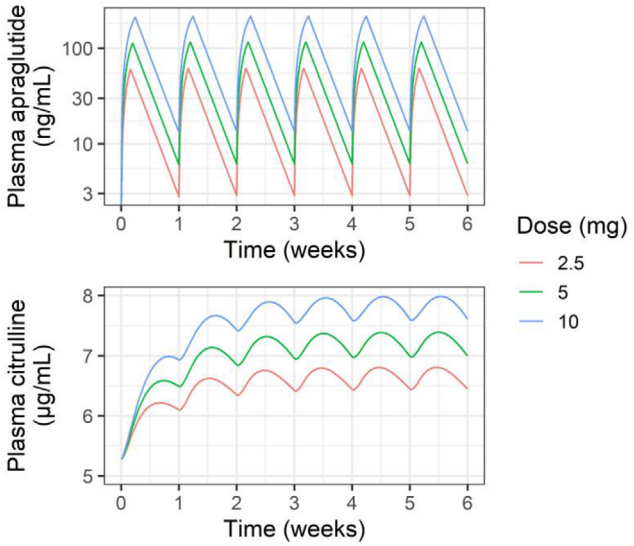
Methods: The population PK/PD model was created by combining PK and citrulline data from two randomized, placebo-controlled, phase I studies of apraglutide in healthy adult volunteers . In the first study, 40 volunteers received a single ascending dose of apraglutide (2.8, 5.7, 11.4, 28.4, or 56 mg) or placebo by subcutaneous injection. In the second study, 24 volunteers received 6 weekly subcutaneous administrations of apraglutide (1, 5 or 10 mg) or placebo. A one-compartmental structural model with first-order absorption and linear clearance was used to describe apraglutide PK. PD evaluation was based on plasma citrulline levels, a biomarker of small intestine functional enterocytic mass. Population PK and PD parameters were estimated using the stochastic approximation of expectation-maximization algorithm implemented in Monolix Suite 2019 R1. Simulations included the effects of covariates. Inter-subject variability in PK and PD parameters was modelled using log-normal distributions.

Results: Actual PK observations were best matched by a model with correlation between V1/F and Cl/F and a dose covariate on absorption duration as well as body weight covariates on V1/F and Cl/F. PD observations were then added to this model to create the final PK/PD model. Plasma citrulline was well described by a turnover model and maximal PD effect model. The population PK/PD model estimated that a 70-kg individual who received apraglutide 5 mg subcutaneous injection would achieve a volume of distribution of 31.3 L and peak plasma concentration (Cmax) at 1.39 days. Simulated apraglutide and citrulline plasma concentration profiles with weekly subcutaneous injection of apraglutide 2.5, 5, or 10 mg are shown in Figure 1. The PK/PD model did not indicate any accumulation of apraglutide over time. Although accumulation of citrulline was apparent during the first three weeks of treatment, a steady state concentration was subsequently reached. Simulated apraglutide concentration-time profiles by body weight indicated a lower area-under-the curve (AUC) and Cmax at steady state with increasing body weight.

Conclusion: This population PK/PD model enables accurate prediction of the effect of different apraglutide doses on plasma citrulline levels as well as the impact of covariates, such as body weight, on its PD effects at the population level. This further demonstrates apraglutide's predictable pharmacokinetic profile with no accumulation during once weekly subcutaneous dosing and its ability to induce a dose-dependent citrulline increase.

Financial Support: This research was funded by VectivBio AG.

Figure 1. Predicted plasma apraglutide and plasma citrulline concentrations for a 70 kg individual receiving weekly subcutaneous apraglutide



P45 - Characteristics of COVID-19 Patients Discharged to the Home Setting on Enteral Nutrition

Cynthia Reddick, RD, CNSC[1]; Brittany Buchholz, RD[2]; Laura Kashtan, RD[3]

[1]Coram/CVS Health, Sacramento, California; [2]Coram/CVS Specialty Infusion, Salida, Colorado; [3]Coram/CVS Specialty Infusion Services, Denver, Colorado

Purpose: To date, over 7 million people have been diagnosed with COVID-19 in the United States. According to the Centers for Disease Control, since March 1, 2020 the overall cumulative COVID-19 related hospitalization rates in the 65 and older age group are 270% of the general population which resides at 174.8 per 100,000*. Older patients with preexisting disease, sarcopenia, and malnutrition may experience prolonged illness and the need for home enteral nutrition (HEN) beyond their hospital admission. Provision of enteral nutrition support in the critical care setting has dominated most of the research thus far, and there is a lack of information available on long term enteral nutrition support needs in this patient population. One national home infusion company analyzed patient demographics, prescription data, tolerance, and length of enteral therapy in the hospital to better understand the characteristics of patients at home on enteral nutrition after being diagnosed with COVID-19 during a hospital admission.

Methods: Demographic, prescription and hospital admission data were collected on 61 patients admitted to service between April and August 2020 with a diagnosis of COVID-19.

Results: The data revealed that 55% were male and 45% were female which is consistent with our general HEN population. 65% of patients were over 65 years of age, and patient ages ranged from 1–99 years old with a median age of 69. Median length of enteral nutrition during hospitalization was 42 days. Patients had been intubated during their hospital stay in 46% of our population. During their COVID-19 hospital admission, 25% had a diagnosis of stroke and 32% had unstageable – stage III pressure ulcers. An evaluation of the prescribed HEN method of feeding revealed 54% were fed via syringe, 20% via gravity bag, and 26% via pump. Standard intact protein, nutrient dense formulas with 1.5 and 2.0 kcal/mL (B4152) dominated the prescriptions at 43%. Standard intact formulas with 1.0 and 1.2 kcal/mL (B4150) comprised 26% of prescriptions, and adult peptide formulas (B4153) were prescribed in 16% of our patients. Disease specific (B4154), pediatric standard (B4160) and pediatric peptide (B4161) were prescribed in the remaining 15% of patients.

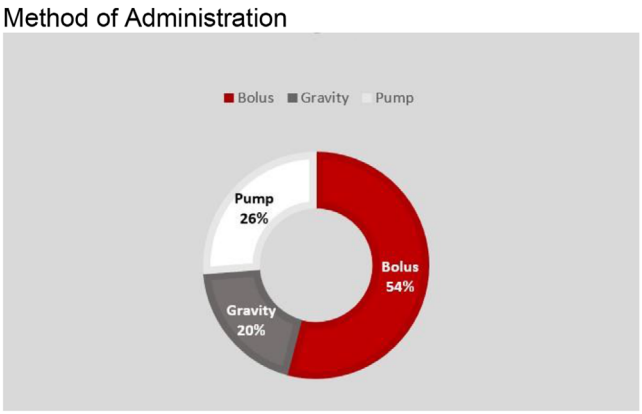
Conclusion: The majority of patients in this homecare sample were syringe or gravity bag fed standard intact protein formulations illustrating a stabilized tolerance to HEN. Our study population was predominately over 65 years of age with a journey including a prolonged hospital admission

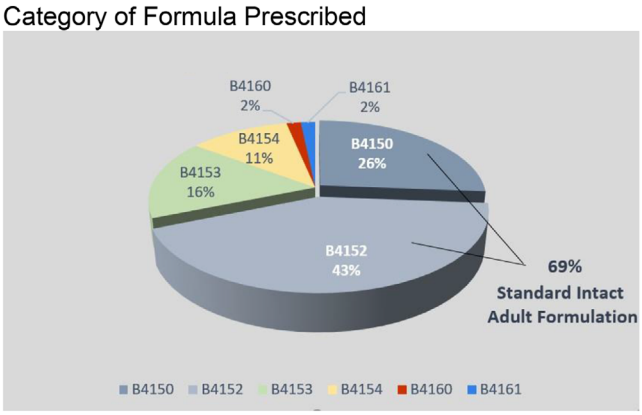
and pressure ulcer incidence rate consistent with ICU incidence rates in the literature. Further research regarding length of therapy at home would provide valuable insights to the long term need for HEN in this population.

Financial Support: n/a

Method of Administration

Category of Formula Prescribed





P46 - Utilizing the Home Care Dietitian to Prevent Hospital Readmit

Elise Kranz, RDN, CNSC, CD, LD/N[1]

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Purpose: The prevalence of Home Enteral Nutrition (HEN) is increasing, as of 2017 approximately 437,882 patients received HEN in the United States1. Though the focus on nutrition has been improving in the hospital, there seems to be less effort to maintain or improve nutritional status after discharge2. In many healthcare systems, enteral nutrition care is fragmented and inefficient3. Interruptions in enteral nutrition related to formula intolerance; technical issues: feeding accesses; clogged or dislodged feeding tubes prevent the delivery of enteral nutrition4. Poorly managed hospital discharge may result in the patient not coping at home and presenting back in the emergency room for an issue that, with a little more time or explanation, could probably have been resolved at home5. Enteral malfunction and breakage may result in significant morbidity and healthcare cost3. The objective of this study was to review dietitian involvement in HEN patients discharging from the hospital initiating and/or resuming enteral nutrition therapy (ENT).

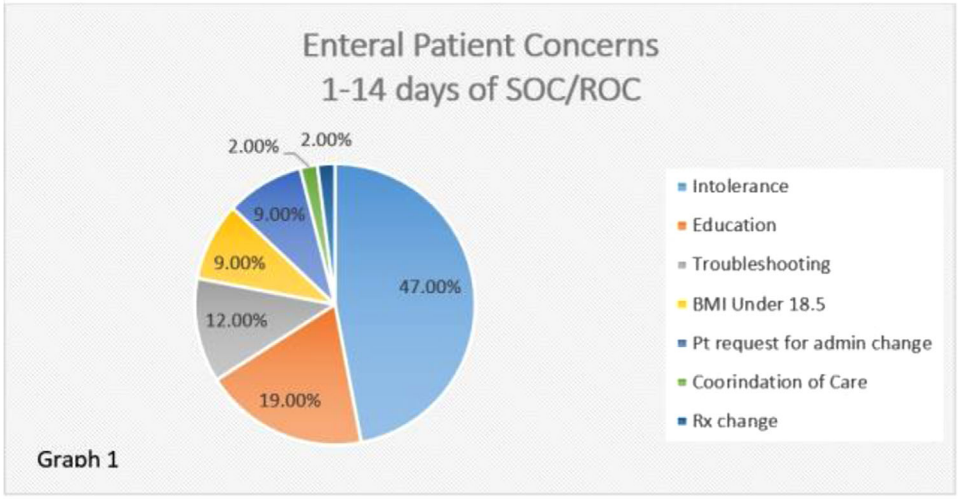
Methods: A retrospective analysis was conducted by the utilization of a home infusion patient database and volunteer reporting from home care clinical dietitians of patient/caregiver contact. Data collection occurred from 07/1/2020-08/31/2020. Data utilized was based on request for dietitian within 1–14 days from start of care (SOC) or resumption of care (ROC) from hospital discharge to home. Patient/caregiver interactions were categorized under: BMI under 18.5 (calls related to low weight), coordination of care, education, intolerance, Rx change and patient request for Rx change. If patients were identified under multiple categories, primary reason was identified following a secondary. Example: Patients calling related to intolerance (primary) who required Rx change (secondary).

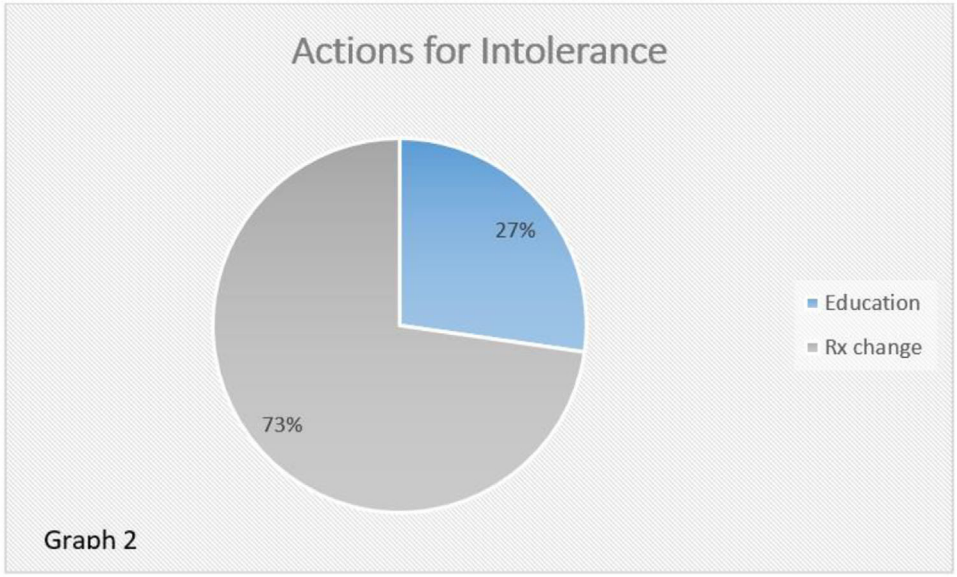
Results: A total of 46 patients were identified, 30 patients had two categories. Patient/caregiver contacted the dietitian on average 6.02 days after hospital discharge, median: 4 days, minimum 1 day and maximum 14 days. The most frequent calls were related to: 47% intolerance, 19%

education and 12% troubleshooting. Graph 2 identifies of the 47% patients reporting intolerance, 73% required an Rx change. Patients identified with two categories had their primary category identified on Graph 1. Secondary categories were as followed: 70% Rx change, 24% education, 3% intolerance and 3% troubleshooting.

Conclusion: It is essential to facilitate an informed and thorough transfer of care from the hospital to the home to minimize potential problems5. By involving a home care dietitian, patient/caregiver questions, concerns or Rx changes can be provided in the home setting, limiting missed nutrition or a trip to the hospital. It is also important that challenges of home enteral feeding are made clear to all parties before the patient is discharged home5. The patient should be encouraged to participate in taking care of their own health, and understand the role they play in the decision-making process5. The key to improved outcomes is increased patient awareness and clinician involvement of a nutrition support specialist early in the patient's care6.

Financial Support: n/a





Poster of Distinction

P47 - Using the Wrong-Route Retract-and-Reorder Measure to Estimate Wrong-Route Medication Errors in Patients with Enteral Tubes.

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Purpose: Wrong-route errors occur when medications are ordered and administered via a route different from the intended route.1 The prevalence of wrong-route administration errors has been estimated to be 6.8% to 26.6%.2 However, little is known about the frequency of wrong-route errors at the ordering stage, particularly among patients requiring an enteral tube. We sought to identify and quantify the frequency of wrong-route medication orders in patients with enteral tubes using the automated Wrong-Route Retract-and-Reorder (RAR) measure.

Methods: Modeled on the National Quality Forum-endorsed Wrong-Patient RAR measure, we developed and validated the Wrong-Route RAR measure to identify near-miss, wrong-route orders. The measure uses an electronic query to identify wrong-route RAR events, defined as medication orders placed by a clinician, retracted (canceled) within 30 minutes, then reordered within 10 minutes by the same clinician for the same patient by a different route. Preliminary validation data indicated that 83.8% (CI 95% 75.4, 90.3) of detected events were true wrong-route orders. We retrospectively applied the measure against all medication orders placed in the electronic health record at a large academic medical center over 1 year (Jan 2019–Dec 2019) and estimated the rate of wrong-route orders by type of route change, specifically oral to per nasogastric (NG) tube, oral to orogastric (OGT) tube, and oral to gastrostomy (GT) tube. Additional sub-analyses were conducted to examine wrong-route orders by provider type, patient age, and race.

Results: Applying the measure to 5,106,695 medication orders placed in 2019, we detected 5,439 wrong-route RAR events. Of these, 1,270 (23.3%) were wrong-route RAR events in which a medication was initially ordered as oral and changed to per NGT (677, 53.3%), OGT (17, 1.3%) or GT (576, 45.4%) (Table 1). Oral to enteral tube wrong-route events were most frequent in adults (1015, 95.5%), White patients (606, 47.7%) and in orders placed by Housestaff (810, 63.8%) (Table 1). The five most frequent drug classes involved in oral to tube order changes were nutritional products, minerals or electrolytes (232, 18.2%), non-opioid analgesics (143, 11.3%), laxatives (120, 9.4%), antihypertensives (113, 8.9%), and anticonvulsants (112, 8.8%) (Table 2).

Conclusion: The Wrong-Route RAR measure can be used to detect wrong-route events and identify subsets of patients vulnerable to these types of errors. Approximately 23.3% of all wrong-route RAR events occurred in patients with enteral feeding tubes. Future research is needed to understand reasons for these events to guide targeted interventions.

Financial Support: Agency for Healthcare Research and Quality grant #R01-HS024538, Develop and Validate Health IT Safety Measures to Capture Violations of the 5 Rights of Medication Safety.

Table 1: Wrong-Route RAR Events by Order Characteristics

	Overall No. RAR Events (% of events) N=5,439	No. Oral to Tube RAR Events (% of events)
Order Change		
Oral to NGT	677 (12.4)	677 (53.3)
Oral to OGT	17 (0.3)	17 (1.3)
Oral to GT	576 (10.6)	576 (45.4)
Patient Gender		
Female	2676 (49.2)	545 (42.0)
Male	2762 (50.8)	725 (51.1)
Unknown	1 (0.0)	0
Patient Age		
<21	951 (17.5)	255 (4.5)
>21	4488 (82.5)	1015 (95.5)
Patient Race		
Asian	376 (6.9)	96 (7.6)
Black	1036 (19.0)	210 (16.5)
Other	77 (1.5)	27 (2.1)
Not Reported	1524 (28.0)	331 (26.1)
White	2425 (44.6)	606 (47.7)
Provider Type		
Attending	524 (9.6)	42 (3.3)
NP	401 (7.4)	118 (9.3)
PA	1473 (21.1)	291 (22.9)
Housestaff	3005 (55.2)	810 (63.8)
Other	36 (0.7)	0

Table 2: Most frequent drug classes involved in oral to tube order errors

Drug Class	No. Oral to Tube RAR Events (% of events) n=1,270
Nutritional products, minerals or electrolytes	231 (18.2)
Non-opioid analgesics	143 (11.3)
Laxatives	120 (9.4)
Antihypertensives	113 (8.9)
Anticonvulsants	112 (8.8)

P48 - Blenderized Tube Feeding and Enterostomy Tube Occlusions Among Adults with Amyotrophic Lateral Sclerosis:Â A Retrospective Study

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Purpose: Adults with amyotrophic lateral sclerosis (ALS) and primary lateral sclerosis (PLS) may develop progressive dysphagia and elect to receive an enterostomy feeding tube for nutrition support. Blenderized tube feeding (BTF) provides a homemade enteral nutrition option, yet there is limited data on the risks associated with this feeding method. One concern related to BTF is the potential for feeding tube occlusion- where the feeding tube lumen becomes blocked by particles of food. Therefore, the purpose of this study was to determine the frequency of, and risk factors for, feeding tube occlusions among a cohort of adults with ALS or PLS who used BTF for an extended period of time.

Methods: We conducted a retrospective review of the electronic medical records of all adult patients diagnosed with ALS or PLS who received outpatient services at the ALS Centre of British Columbia over a two-year period (n = 651). Patients met inclusion criteria if they received partial or complete nutrition through an enterostomy feeding tube and had documented use of BTF during the study period. Relevant data was collected by use of a standardized data collection tool and analyzed by use of means, frequencies and proportions.

Results: Of 97 tube fed patients identified in the review, 20 (21%) had documented use of BTF. Seven subjects (35%) used BTF exclusively, while 13 (65%) used a combination of BTF and commercial formula. Mean duration of BTF use was 11.25 ±7.5 months. None of the subjects were found to have experienced a feeding tube occlusion during the two year study period. All received BTF by gastrostomy tube, sized 14 to 24 French. BTF was administered by syringe bolus, gravity infusion, pump infusion or a combination of methods. Ten subjects (50%) had BTF administered by a relative or friend, eight subjects (40%) self-administered BTF and six (30%) had BTF administered by a home healthcare professional. Counts exceed 20 as there were 5 subjects who had BTF administered by a combination of self, relative/friend or home healthcare professional. Compliance with periprandial gastrostomy water flush recommendations varied as follows: documented compliance n = 14 (70%); documented noncompliance n = 2 (10%); no water flush compliance data n = 4 (20%).

Conclusion: No feeding tube occlusions were found to have occurred, regardless of tube size, BTF administration method, person administering BTF, or water flush practices. Further research on this topic is needed in order to unequivocally rule out feeding tube occlusion as a risk of BTF, however considering the benefits of BTF and the growing interest among patients and caregivers, it is important that clinicians do not restrict this enteral nutrition option based on perceived increased risk of feeding tube occlusion, as there is currently no evidence to suggest such risk.

Financial Support: No financial support was received

P49 - Utilization of Home Enteral Nutrition in Elderly Population: A Tertiary Center Experience

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Purpose: Approximately two out of three individuals over the age of 65 are either at risk of developing malnutrition or have overt malnutrition, with higher rates noted in hospitalized or institutionalized individuals. In patients with dysphagia or those who are not able to tolerate oral intake,

enteral nutrition is used to meet nutrition and hydration needs. Although use of enteral nutrition is quite prevalent in the elderly population, there remains a paucity of data regarding its efficacy as well as associated complications in this cohort.

Methods: Current study is a retrospective review of prospectively maintained database of patients followed in our home enteral nutrition (HEN) program between September 1st, 2017 and September 1st, 2020. Medical records reviewed for nutritional history. We included adults who received enteral nutrition for at least one week with primary aim to evaluate HEN outcomes in patients with age 65 years or older compared to those younger than 65 years.

Results: We included 990 patients (age 59.49±15.93 years; 58.3% male; weight at initiation 72.40±21.26 kg; 73.6% started EN in hospital) of whom 579 (58.5%) were ≤64.9 years and 411 (41.5%) were ≥65 years. In patients at age of ≤64.9 years (age 49.54±12.86 years; 53.2% male; weight at initiation 72.17 ± 22.66 kg), the average calorie requirement was 27.23±9.29 kcal/kg/d while average calorie delivered by HEN was 25.35±10.17 kcal/kg/d. In patients at ≥65 years of age (age 73.47 ± 6.58; 65.5% male; weight at initiation 72.72±19.10 kg), estimated calorie needs was 25.03 ± 7.46 kcal/kg/d whereas calorie delivered via formula was 23.89±8.53 kcal/kg/d. Tube related complications (32.1% in < 65 years vs 31.9% in >65 years; $p = 0.936$) and symptoms of EN intolerance (17.6% in < 65 years vs 16.8% in >65 years; $p = 0.727$) were similar in both groups. Nutren 1.5 Cal was the most commonly used formula (49.3%) whereas PEG was the most preferred tube (31.9%). In the study cohort, leading primary diagnosis was cancer (57.3%) of which head and neck cancer accounted for 59.2% followed by GI malignancies 32.2%. Notably, there was significantly higher cancer prevalence in elderly group (63.5% vs 52.6%; $p = 0.007$). Estimated calorie needs were significantly less for elder patients and they received significantly less protein in their HEN compared to younger patients (1.20±0.39 vs 1.12 ± 0.34 g/kg/d respectively; $p = 0.0265$). Elderly patients remained on HEN for shorter duration compared to younger patients (290.6±426.57 vs 442.4±800.6 days; $p< 0.0001$). Independent of age group, the leading indication for HEN was dysphagia (63.6%) followed by malnutrition (19.3%). However, there was a significant difference in the pathophysiological mechanisms leading to HEN, with younger patients requiring HEN for more conditions related to bariatric surgery, GI dysmotility, hepato-biliary/pancreatic diseases and mucosal diseases compared to elder patients who require HEN more for malignancy related nutritional difficulties and mechanical obstruction.

Conclusion: Elderly patients receiving HEN have unique clinical profile including more malignancy and mechanical obstructions related nutritional challenges. They tend to have a lower estimated calorie needs per body weight and receive less proteins in HEN. Despite overall similar tolerability to HEN as well as tube related issues in both age groups, elder patients receive HEN for shorter duration and with less protein. Improvement in clinical practices involved in nutrition support of elderly to include higher calorie and protein delivery may improve clinical outcomes given concern for anabolic resistance and age associated sarcopenia.

Financial Support: n/a

Table (1): HEN in elder patients

Variable	Age 18-64.9 (n= 579)	Age = 65 (n=411)	*P* value
Age, y	49.54 ± 12.86	73.47 ± 6.58	
Gender, %			
- Male	53.2	65.5	
- Female	46.8	34.6	
BMI at initiation	24.81 ± 8.64	25.29 ± 13.79	0.1667
Patho-physiological mechanisms, %			
- Bariatric Surgery	5.2	2	0.0177
- Congenital/developmental delay	6.2	0.3	< 0.00001
- Gastrointestinal Dysmotility	7.1	3.4	0.025
- Hepatobiliary/Pancreatic diseases	7.6	4	0.031
- Malignancy related	39.6	50	0.002
- Functional disorders	1.1	0	0.0078
- Mechanical obstruction	12.1	15.4	0.031
- Mucosal diseases	7.7	4	0.0244
- Neuro-degenerative diseases	8.3	17.2	0.0001
- Short bowel syndrome	0.5	0.3	0.787
- Trauma/Injury	4	3.4	0.667
Estimated calorie need, kcal/kg/d	27.23 ± 9.29	25.03 ± 7.46	0.0001
Delivered calorie via EN	25.35 ± 10.17	23.89 ± 8.53	0.0580
% of calorie via EN	93.5% ± 20.84	95.1% ± 20.19	0.110
Protein delivered via EN	1.20 ± 0.39	1.12 ± 0.34	0.0265
Commonly used formulas, %			
- Nutren 1.5 Cal®	49.3	50.9	
- Isosource 1.5 Cal®	5.4	11.5	
- Replete®	6.1	5.3	
GI distress/EN intolerance	17.6%	16.8%	0.727
Tube related complication	32.1%	31.9%	0.936
Duration on HEN, d	442.4 ± 800.6	290.6 ± 426.57	< 0.0001

P50 - Characteristics and Clinical Outcomes in Patients with Severe Gastro-Intestinal Dysmotility Receiving Home Enteral Nutrition

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Purpose: Gastrointestinal dysmotility (GID) is an increasingly more prevalent indication for home enteral nutrition (HEN). GID is often difficult to diagnose requiring invasive testing. GID can be sub-classified into chronic intestinal pseudo-obstruction (CIPO) and enteric dysmotility (ED) based on imaging, however the utility of this approach for HEN patients remains an area of further research. The current abstract aims to describe characteristics and clinical outcomes of HEN for patients with GID and its subclasses.

Methods: Current study is a retrospective review of prospectively maintained database of patients followed in our HEN program between September 1st, 2017 and September 1st, 2020. Medical records were reviewed for nutritional history. We included adults who received enteral nutrition with primary aim to evaluate HEN outcomes in patients with gastrointestinal dysmotility.

Results: We included 996 patients (age 59.17 ± 16.39; 58.3% male; BMI at initiation of HEN 25.27 ± 13.76; calorie delivered via EN 1850.70 ± 359.99), of which 49 (5%) were started on HEN due to gastrointestinal dysmotility while 947 (95%) received HEN for other pathophysiological mechanisms. Of the patients with dysmotility, 20/49 had chronic intestinal pseudo-obstruction (CIPO) and 29/49 had enteric dysmotility (ED). Sub-classification was based on clinical diagnoses and imaging findings. Primary symptom of dysmotility was excessive nausea/vomiting (67.3%) followed by weight loss (10.4%) whereas gastroparesis was the leading primary diagnosis (60.4%). Patients with GI dysmotility were notably younger to other patients receiving EN ($p = 0.0157$) and predominantly females. Compared to those with normal gut motility, nutritional support to patient with GI dysmotility appeared to be remarkably challenging with significantly lower BMI at EN initiation (22.44 ± 5.22 vs 24.77 ± 6.08; $p< 0.00001$), higher rate of EN intolerance evident by presence of symptoms of GI distress (nausea/vomiting, diarrhea, constipation, abdominal pain, bloating or acid reflux) (30.6% in dysmotility group vs 16.4% in non-dysmotility group; $p = 0.010$) and more tube related complications (site infection, falling out, breakdown/damage, granulation or leakage) (59.2% dysmotility group vs 30.6% in non-dysmotility group; $p< 0.00001$). In average patients in dysmotility group were on EN for longer duration, however, with no statistical difference to non-dysmotility group. On further analysis and sub-classification, patients with ED had higher tube related complications (62% in ED vs 5% in CIPO; $p< 0.00001$) while around half of patients in both

groups ED and CIPO were intolerant to EN (48.2% in ED vs 55% in CIPO, p = 0.465). There was significantly more females in ED group compared to CIPO group (p = 0.008)

Conclusion: Gastrointestinal dysmotility is an emerging clinical challenge in setting of nutritional support. Patients with dysmotility are typically younger, have lower weight, requiring EN typically for longer duration with poor tolerability to EN and have more tube related complications. Focused guidance on nutrition support for this group may be beneficial.

Financial Support: n/a

Table(1): EN in patients with and without gastrointestinal dysmotility

Variable	Dysmotility Group (n=49)	Non-Dysmotility Group (n=947)	*P* value
Age, y	45.65 ± 21.77	59.87 ± 15.76	0.0157
Gender, % Male Female	 30.6 69.4	 59.8 40.2	 <0.00001 <0.00001
BMI at HEN initiation, kg/m^2	22.44 ± 5.22	24.77 ± 6.08	<0.00001
BMI at end of HEN/Study, kg/m^2	22.03 ± 4.71	24.89 ± 5.50	0.095
Estimated calorie, kcal/d	1748.33 ± 314	1856.06 ± 361.58	0.688
Calorie delivered by EN, kcal/kg/d	1653.50 ± 347.95	1792.76 ± 422.62	0.800
Tube related Complications, %	59.2%	30.6%	<0.00001
EN intolerance/GI distress, %	30.6%	16.4%	0.010
Duration on HEN, d	651.10 ± 761.13	369 ± 672.87	0.141

Table(2): Sub-classification of severe gastrointestinal dysmotility

Variable	CIPO (n=20)	ED (n=29)	*P* value
Age, y	51 ± 27.13	41.96 ± 16.69	0.145
Gender, % Male Female	 55 45	 13.7 86.3	 0.003 0.008
BMI at HEN initiation, kg/m^2	23.31 ± 5.52	21.84 ± 5.01	0.187
BMI at end of HEN/Study, kg/m^2	23.13 ± 4.88	20.66 ± 4.40	0.448
Estimated calorie, kcal/kg/d	1893.10 ± 379.54	1653.48 ± 222.97	0.025
Calorie delivered by EN, kcal/kg/d	1764.77 ± 367.59	1581.96 ± 321.34	0.194
Tube related Complications	5%	62%	<0.0001
EN intolerance/GI distress, %	55%	48.2%	0.465
Duration on HEN, d	614.90 ±828.28	676.06 ± 725.27	0.772

P51 - Prevalence of Hyponatremia in Patients Receiving Home Enteral Nutrition

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Purpose: Most recent dietary guidelines recommend consuming less than 2,300 mg/d of sodium; however, the average American consumes an average of 3,400 mg/d. This high consumption of sodium in diet poses a challenge when patients are placed on enteral feeds, which tend to have sodium concentrations that meet or remain below recommended dietary guidelines. Additional confounding co-morbidities such as renal, liver, or heart failure can predispose patients being placed on enteral nutrition to developing hyponatremia. Despite this risk, there is a paucity of data regarding prevalence of hyponatremia after initiation of home enteral nutrition (HEN) with limited guidance regarding frequency of assessment.

Methods: A retrospective cohort study of patients receiving HEN between January 1st, 2018 and July 30th, 2020 was conducted to evaluate changes in serum sodium levels during HEN. Patients who developed hyponatremia but did not have their serum sodium followed up during EN or received trickled tube feedings were excluded. The aim of this study is to describe clinical characteristics and outcomes in patients receiving EN in setting of hyponatremia.

Results: We identified 891 patients receiving HEN during the study period of which 310 were excluded due to lack of serum sodium follow up, the remaining 581 patients were included (age 60.7 ± 14.6 years; 62.9% male; weight at initiation 74.86 ± 20.52 kg; 77.8% started EN in hospital). Total of 193 (33.2%) developed hyponatremia during HEN while 388 patients remained eunatremic. In hyponatremia group, 48 patients had maximum drop in their serum sodium level from baseline 10 mmol/L or greater while 145 patients had maximum drop in their serum sodium level from baseline less than 10 mmol/L. In hyponatremia group, the median duration from initiation of feeding to the lowest recorded sodium level was 17 days (1—517). The etiology of hyponatremia was not well documented. It was noted that hyponatremia occurred due to volume overload from cardiac or renal diseases in 12% and vomiting or diarrhea in 14.2% whereas less common causes included SIADH 1.7% and medications related 1.7%. HEN was noted to result in 14.9% of hyponatremia whereas in 55.7% of patients, etiology was not clearly defined. In both patients who developed hyponatremia and those who remained eunatremic, leading primary diagnosis was cancer (65%) with head and neck cancer being the most common type. There was no difference in HEN intolerance between both groups with around 1 in 5 patients in each group developing developed at least one symptom of feeding intolerance . Calorie dense formulas were the primary initial formula used in both groups and typically contained 0.8-1.3 mg/ml of sodium. Furthermore, in patients who developed hyponatremia with drop in sodium by ≥10 mmol/L, the duration on HEN was longer compared to those who dropped sodium by < 10 mmol/L. In the group of patients with drop in sodium < 10 mmol/L, the duration from initiation of EN to the lowest level of sodium during the study period was significantly shorter compared to those who developed greater decline in serum sodium. There was no difference in tolerability of feeds between two groups.

Conclusion: Hyponatremia is not uncommon in setting of HEN with a multifactorial etiology. However, initiation of tube feeding with concerns of sodium content in formulas used as well as free water delivered can be major contributors. Given the high prevalence of cancer in our study cohort, metabolic changes related to malignancy is likely involved. Change of clinical practices to include regular monitoring of serum sodium levels in patients receiving HEN may be beneficial.

Financial Support: n/a

Table(1): HEN in setting of change in sodium

Variable	Hyponatremia Group (n=194)	Eunatremia Group (n=389)	*P value*
Age at HEN initiation, y	61.93 ± 14.16	60.11 ± 14.79	
Gender %			
- Male	62.7	63.1	
- Female	37.3	36.9	
Wt. at initiation, kg	73.32 ± 19.06	75.61 ± 21.19	
BMI at initiation, kg/m²	24.73 ± 5.77	26.32 ± 18.40	0.367
Calorie need estimated, kcal/ d	1869.35 ± 326.81	1888.44 ± 365.63	
Calories delivered via EN, kcal/d	1787.91 ± 421.38	1843.48 ± 381.82	
Primary diagnosis, %			
- Bariatric/surgical procedure	3.6	3.7	0.992
- Cancer	65.3	65.1	0.920
- Depression	0	0.2	0.447
- Eating Disorder	0	0.8	0.218
- Gastroparesis	0.5	1.8	0.207
- IBD	0	0.5	0.317
- Neuro-degenerative diseases	5.2	7	0.406
- Pancreatitis	4.1	2.5	0.307
- Trauma	1.6	2.1	0.667
- Other	19.7	16.3	
Type of Cancer, %			
- Brain/CNS	0	0.4	0.477
- Breast	0	0.4	0.477
- Endocrine	0	0.8	0.317
- GI	38.9	36.7	0.617
- Genito-urinary	0.8	0.8	0.999
- Head and Neck	53.2	53	0.976
- Hematological	0.8	2.4	0.280
- Lung	0.8	1.6	0.522
- Neuro-endocrine	3.9	1.6	0.155
- Other	1.6	2.3	
Most used formula, %			
	Nutren® 1.5 Cal (47.1%)	Nutren® 1.5 Cal (58.2%)	
	Isosource® 1.5 Cal (9%)	Isosource® 1.5 Cal (8.9%)	
	Isosource® HN® (6.9%)	Replete® (6.8%)	
	Peptamen® 1.5 (6.3%)	Isosource® HN (6.5%)	
EN intolerance, %	19.2	19	0.976
Duration on HEN, d	255.14 ± 311.50	187.59 ± 238.33	0.0061

e(2): Severity of hyponatremia			
able	Drop in sodium by = 10 mmol/L (n=48)	Drop in sodium by = 9.9 mmol/L (n=145)	P value
t HEN initiation, y	59.20 ± 14.72	62.91 ± 13.82	
er, %			
Male	52.1	66.2	
Female	47.9	33.8	
ht at HEN initiation, kg	70.42 ± 18.28	74.28 ± 19.28	0.622
at HEN initiation, kg/m²	23.89 ± 5.90	25.01 ± 5.72	0.393
tion from initiation to lowest sodium , median (range), d	34 (2—420)	13 (1—517)	<0.0001
tolerance, %	22.9	17.9	0.447
duration, d	273.77 ± 233.24	227.54 ± 235.38	0.0403
ary used formula, %			
	Nutren® 1.5 Cal (42.6%)	Nutren® 1.5 Cal (48.6%)	
	Isosource® 1.5 Cal (14.9%)	Isosource® 1.5 Cal (7%)	
	Peptamen® 1.5 (10.6%)	Isosource® HN® (6.3%)	

P52 - The Impact of COVID-19 on Enteral and Parenteral Feeding Pump Training Practices

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Purpose: Recent challenges have emerged, within the enteral and parenteral nutrition industry, as a direct result of the effects of COVID-19. One of these challenges is to provide enteral and parenteral feeding pump training to clinicians and patients, safely and effectively, while following their facility's COVID-19 guidelines. A brief, six question survey was sent to hospital and home-care facility educators, who provide education and training to their staff, as well as training to their transition of care patients and caregivers, to gather information on how enteral and parenteral pump training is being provided and performed, now vs. pre COVID-19. The responding 14 educators provided feedback of their pump training tools and techniques, including any changes they have made, to facilitate clinical staff training and patient/caregiver training, to adapt to these challenges.

Methods: Survey Questions

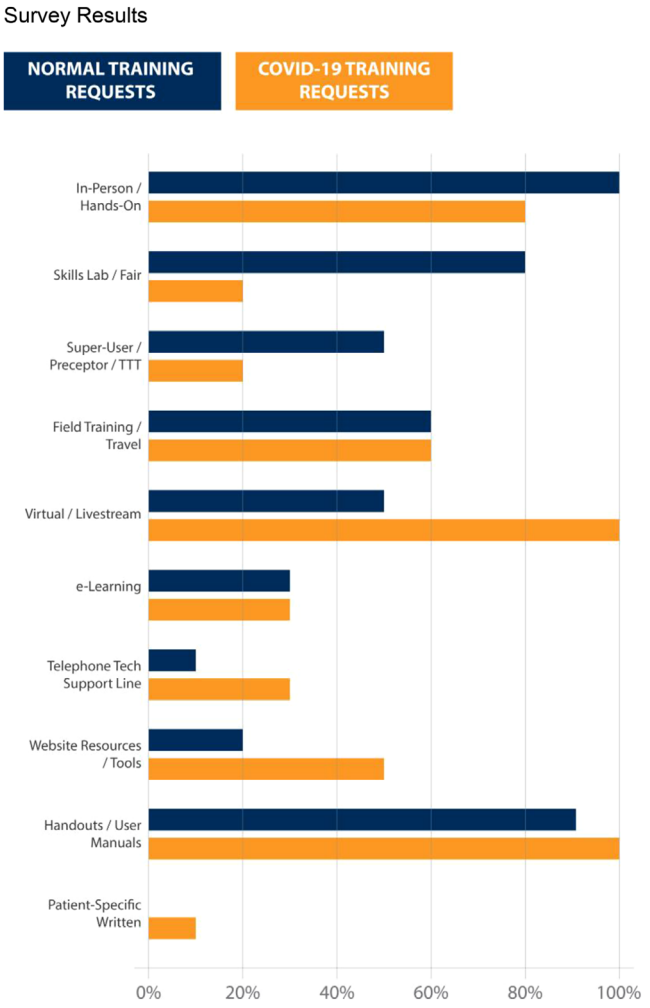
1. What impact has COVID-19 had on your patient and/or clinician education programs?
2. Are there any differences in how you are providing Enteral/Parenteral Pump training now vs. pre COVID-19?
3. Are these changes specific to COVID-19 or in conjunction with the "CARES" act? (I.e., changes to reimbursement)
4. What Enteral/Parenteral Feeding Pump education tools are you using to help train your team and/or your patients? For example; livestream, e-learning, website, etc.
5. How would you say your specific facility's training/education program has changed, due to COVID-19; rated on a scale of 1 to 5: (1) "Not At All Changed" to (5) "Very Changed"?
6. Are there any tools you do not have, which would be helpful to you, for training patients or managing infusions?

Results: The survey results showed an individualized pump training response protocol, which was unique to each facility and customized to meet the needs of their clinicians and patients. The results also showed a generalized shift, from hands-on in-person training to virtual training. However, it is unknown if virtual pump training has proven to be as effective as hands-on pump training, due to an increase in patient and clinician telephone support calls, and reliance on website tools, for pump education and troubleshooting assistance.

Conclusion: From a clinical perspective, the survey results emphasize the need to account for these challenges and provide possible new resources and tools for enteral and parenteral feeding pump competency for fellow clinicians and transition of care patients and their caregivers.

Financial Support: n/a

Survey Results



ENCORE

Publication: Manuscript pending publication in the Journal of Nutrition in Clinical Practice (NCP)

P53 - Reducing outpatient gastrostomy tube complications: A quality improvement project within a community hospital

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Purpose: The placement of a gastrostomy tube (GT) requires additional education and supplies for nutrition support and site care. Utilizing a multidisciplinary team approach to improve patient outcomes with enteral nutrition and gastrostomy tubes has been shown to be beneficial. Discontent among staff and patients due to inconsistencies in patient education provided from staff and complications arising from new outpatient GT placement drove the need for this quality improvement project. Shortfalls in nursing knowledge and processes needed to be addressed to improve patient care and education of proper GT care. The goal was to monitor the effectiveness of a multidisciplinary education protocol for patient GT use and care in order to reduce complications post-placement.

Methods: Baseline assessment included a pre-post-intervention design through quantitative measures to determine reduction in the number of GT complications post-procedure following implementation of a patient education protocol. Patient demographics included only radiation oncology patients with a GT (Table 1). The multidisciplinary team consisted of dietitians, nurses, three scheduling departments, physicians from three specialty areas, and the performance improvement department. Verbal, written, and hands-on demonstration methods for GT care were utilized to provide multiple education pathways to increase patient knowledge. Over the progression of eight months (July 2019-March 2020), patients with new GT were followed post-procedure (one to two weeks prior to starting radiation treatments) and throughout their course of radiation treatments (typically six to seven weeks). The pre-intervention and intervention groups were mutually exclusive and only included patients with GT placement by interventional radiology (IR) or gastroenterology. Four process changes originated from this project: 1) creating nursing role in patient education process with set list of items delineated to the dietitian and those to the nurse to review with the patient prior to tube placement

and weekly at radiation appointments, 2) increasing patient education sessions from one to three sessions utilizing multi-media formats (verbal, written, demonstration) prior to GT use including the dietitian, nurse, and home medical agency via new scheduling processes (Figure 1), 3) creating an eight-page GT booklet encompassing instruction on enteral nutrition and GT care (Figure 2), and 4) developing a standardized enteral nutrition order set.

Results: All patients (100%) that received outpatient GT placement by IR or gastroenterology and radiation treatments were included in their respective study groups. Demographics are found in Table 1. GT complications reduced from 91% in the pre-intervention group (n = 11) to 37% in the intervention group (n = 16) (Table 2). There was a significant difference in whether or not patients experienced complications between groups, $\chi 2$ (1, N = 27) = 7.70, p = 0.006. The odds ratio revealed that complications were 16.67 (95% CI = 1.69 to 164.79) times more likely in the pre-intervention group than the intervention group. The relative risk of complications was 2.4 times higher in the pre-intervention group compared to the intervention group. An independent t-test revealed a significant effect of treatment, t (25) = 3.49, p = .002, d = 1.38, with those in the intervention group averaging less complications (M = .38, SD = .50) than those in the pre-intervention group (M = 1.09, SD = .54).

Conclusion: This study confirms a well-designed protocol for increasing patient knowledge about GT care can be effective at reducing GT complications by utilizing a multidisciplinary team, providing consistency in education, and creating multiple education sessions with multiple media formats.

Financial Support: None

Patient Demographics

Enteral Access Complications

Table 1. Patient Demographics

	No.(%) of Patients	
	Pre-Intervention	**Intervention**
Sex	**(n=11)**	**(n=16)**
Male	11 (100)	15 (94)
Female	0 (0)	1 (6)
Age		
<60 years	5 (45)	5 (31)
>/=60 years	6 (55)	11 (69)
Median age, (age range)	59 (50-73)	63 (47-74)
BMI		
<18.5	0 (0)	1 (6)
18.5-24.9	4 (36)	5 (31)
25-29.9	4 (36)	3 (19)
>30	3 (28)	7 (44)
Diagnosis		
Tonsil	6 (55)	9 (56)
Tongue	1 (9)	1 (6)
Glottis/Supraglottis	1 (9)	4 (25)
Other (Parotid, Pharynx, Vallecula, Unknown)	3 (27)	2 (13)
p16 positive	7 (64)	9 (56)
Concurrent Chemotherapy	11 (100)	12 (75)
G-Tube or PEG Placed By:		
Interventional Radiology	8 (73)	15 (94)
Gastroenterology	3 (27)	1 (6)

BMI, body mass index; G-tube, gastrostomy tube; PEG, percutaneous endoscopic gastrostomy

New Scheduling Process Implemented for Patient Education

Table 2. Enteral Access Complications

	No.(%) of Patients	
	Pre-Intervention	**Intervention**
Location of complication	**(n=11)**	**(n=16)**
Radiation Clinic	8 (73)	5 (31)
Emergency Department	0 (0)	1 (6)
Phone/Email	2 (18)	0 (0)
No issues	1 (9)	10 (63)
Complications		
Reddened site	3 (28)	2 (12)
Technique issues	4 (36)	0 (0)
GI intolerance	1 (9)	3 (19)
Infection	2 (18)	1 (6)
No complications	1 (9)	10 (63)
Result of Complication		
Additional education	6 (55)	4 (25)
Review/reassurance	4 (36)	2 (12)
No issues	1 (9)	10 (63)

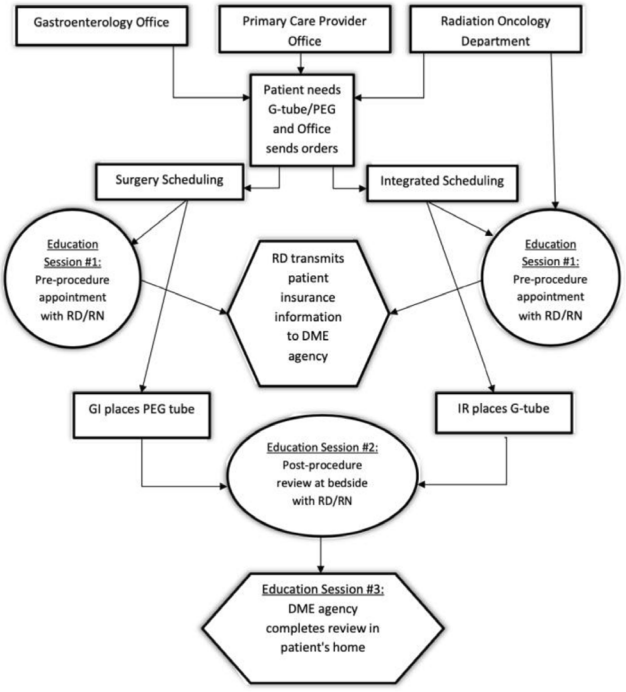
GI, gastrointestinal

Number of patients who experienced complications by treatment group

Treatment Group	**Pre-Intervention**	**Intervention**
Complications	10	6
No Complications	1	10

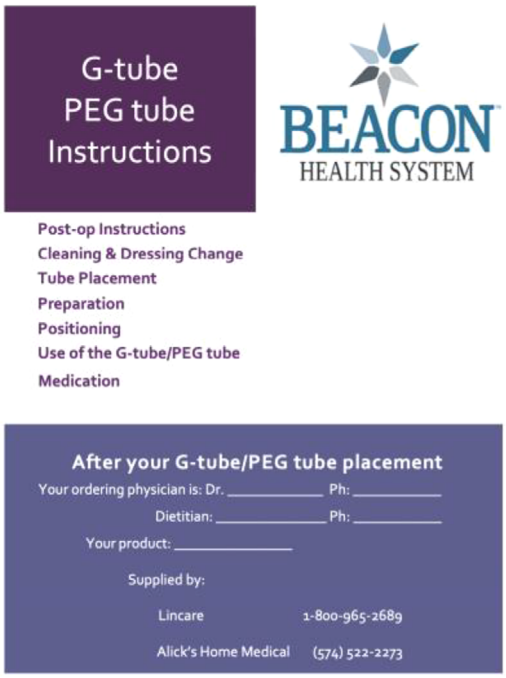
Cover of New Patient Education Booklet

New Scheduling Process Implemented for Patient Education



DME, Durable Medical Equipment; GI, Gastroenterology; IR, Interventional Radiology; RD, Registered Dietitian; RN, Registered Nurse

Cover of New Patient Education Booklet



P54 - Enteral nutrition with COVID-19 patients in the prone position

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Purpose: Enteral nutrition positively impacts outcomes in ICU patients especially when started early. However, there is little known information on starting enteral nutrition in COVID-19 patients, especially in the prone position. Experience at our institution is to start enteral nutrition as soon as possible, often via small bowel feeding tubes in COVID-19 patients in the prone position. The purpose of this study was to assess safety and efficacy of providing enteral nutrition for COVID-19 patients in the prone position.

Methods: This retrospective study evaluated patients with COVID-19 diagnosis who were placed in the prone position and given enteral nutrition via gastric or small bowel route. Charts were reviewed to assess for admission date, date nutrition started, route of nutrition (gastric or small bowel), type of feeding tube and how it was placed. Data was also included on patient condition including use of vasopressors and prone positioning. Outcomes data was collected for any complications (aspiration, infection, bowel ischemia), discharge disposition and length of stay (including ICU and hospital). This data was also compared with those not in the prone position with enteral nutrition.

Results: Close to 60% of Covid patients in the ICU were place in the prone position at some point in their hospital stay. This includes patients on ventilators who were manually proned as well as those not on ventilators. Patients not placed in the prone position, had EN started sooner (1.8 vs 3.7 days) and also had lower LOS (10.7 vs 17.9) and mortality (23% vs 32%). This is most likely due to the fact they were less acutely ill if not requiring prone therapy. TPN was initiated in 10 (4%) of the prone patients, eight of the ten TPN patients were also on high dose vasopressors. When the subgroup of patient on the ventilator and placed in the prone position was reviewed, they had longer delays in EN from admit time (5.7 days, but within 48 hours of placed on the ventilator (1.9 days). There are variations for route of deliver for EN (gastric vs. small bowel) – this data collection is ongoing. It is common for our institution to place small bowel tubes for prone patients, anecdotally, we also have experience in placing the tubes while the patient is prone

Conclusion: Results demonstrate patients who are not placed in the prone position have EN started sooner. Patients on a ventilator and prone have longer lengths of stay and increased mortality, these patients also have longer time between admission and starting enteral nutrition but within 48 hours from when placed on the ventilator. Before the patient is placed on the ventilator, they are typically on po feedings. Based on Initial data and observations, po intake in these patients is very sparse, so there may be an opportunity to start enteral nutrition earlier. Route of delivery for enteral nutrition is variable, this data collection is in progress. Previously, the typical practice at this institution to place small bowel tubes in prone patients, some variations in practice has occurred based on recent guidelines. This lends an opportunity for further evaluation as to which is the best practice for prone patients. The importance of delivering enteral nutrition to ICU patients cannot be overstated. Due to the paucity of evidence related to

nutritional practices with covID-19 patients, recommendations are often based on expert opinion and decisions have been made 'to limit exposure'. This research is an initial step in determining best practices for enteral nutrition with covid-19 patients, especially those in the prone position. There is ongoing data collection and analysis as some patients included in the analysis have yet to be discharged, data will be updated as available by end of 2020.

Financial Support: n/a

EN and Prone Position in COVID patients

COVID Patients in ICU N=392	Mechanical Ventilation	Enteral Nutrition	Days from admit to EN	If Vent, days from Vent to EN	TPN	LOS	Morality
Not Prone N=163	86/163 (53%)	70/163 (43%)	1.8	.76	0	10.7	23%
Prone N=229	140/229 (61%)	129/229 (56%)	3.7	1.1	10	17.9	32%
*Prone and Vent N=140	100%	126/140 (90%)	5.9	1.9	10	21.5	44%

*Subset of Prone patients (not unique patients)

P55 - Comparison of Glycemic Control using Two Enteral Nutrition Formulas in Head and Neck Cancer Patients

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Purpose: Patients with head and neck cancer often require surgery, which has been associated with hyperglycemia. These patients often require enteral nutrition (EN) support. Diabetic specific EN formulas (DSF) were developed to provide glycemic control however, evidence supporting the effectiveness of these products for surgical patients is neither strong nor plentiful. The purpose of this study was to compare glycemic control in patients with head and neck cancer who received either a DSF or an isocaloric standard EN formula (SF) postoperatively.

Methods: Using a cross-sectional study design, patients were retrospectively screened from an enhanced recovery after surgery quality improvement database. Surgical head and neck cancer patients ($\geq$ 18 years of age) who were enterally fed either a 1.5 kcal/ml DSF or an isocaloric SF for $\geq$ three days were included. Patients with a BMI > 40 kg/m2 or a hemoglobin A1C > 9% were excluded. Glycemic control was assessed using the average of all blood glucose (BG) measurements, the average morning BG, incidence of clinical hyperglycemia (BG > 180 mg/dl) and hypoglycemia (BG < 70 mg/dl), and blood glucose variability (BGV- standard deviation of the average blood glucoses) and compared between groups. Length of stay and gastrointestinal intolerance (incidences of diarrhea and emesis) were also compared. Mann Whitney-U, chi-square, and linear regression were used in analyses.

Results: Eighty-one patients were included; DSF (n = 19) and SF (n = 62). There were no differences in age, sex, race, BMI, or average caloric intake between groups ($p > 0.05$). There were significantly more diabetics in the DSF group compared to the SF group (95% vs. 15%, $p = 0.01$). Patients who received the DSF had significantly higher average morning BG (147.5 $\pm$ 30.8 mg/dl vs. 122.5 $\pm$ 20.8 mg/dl) average BG (148.4 $\pm$ 35 mg/dl vs. 126.1 $\pm$ 21.1 mg/dl), more incidences of hyperglycemia (5.8 $\pm$ 8.9 vs. 1.5 $\pm$ 3.1), and more episodes of diarrhea (94.8% vs. 45.2%) compared to the SF group ($p < 0.01$ for all). There was no significant difference in BGV between groups. There was no difference in average BG between groups when adjusting for age, diabetes status, and blood glucose post-operative day zero ($p > 0.05$). The model explained 45.1% of the variance in average BG.

Conclusion: Patients who received a DSF had worse glycemic control measures compared to the SF group, most likely because there were more diabetics in the DSF group. However, average BG did not differ between groups when controlling for diabetes. Diarrhea seemed to be more prevalent in patients receiving a DSF.

Financial Support: n/a

P56 - Prevalence and Geographic Distribution of Chronic Intestinal Failure in the United States

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Purpose: Chronic Intestinal failure (CIF), defined as a loss of gut function resulting in the need for prolonged parenteral support, requires close follow-up and specialized management to optimize outcomes. Given its relatively low prevalence along with fragmentation of healthcare in the United States (US), there remains a paucity of data regarding true prevalence and geographic distribution of CIF patients.

Methods: The Symphony Integrated DataVerse (IDV) claims database was analyzed to evaluate the prevalence and geographic distribution of CIF in the US. The IDV is a national claims database that contains longitudinal coverage of greater than 290 million unique patients between 2012 and 2020. The data base contains inpatient and outpatient medical and pharmacy claims, including dates of service, national provider identifier (NPI), provider specialty, as well as associated diagnoses and procedures performed in a de-identified manner. Patients met inclusion criteria if they received parenteral support prescription at least twice within 6 consecutive months and had relevant diagnostic features that were categorized as surgical (bowel resection or post-surgical malabsorption) or non-surgical (inflammatory bowel disease, malabsorption, etc.). Geographical data was analyzed using the first 3 digits of the zip code for both the patient and the provider allowing for analysis of number of CIF patients per million patients in the database for each state.

Results: The estimated prevalence of CIF was noted to be 24,048 (44 per million) during the study period between October 2012 and June 2020 with 21,819 (91%) patients categorized as adults (≥18 years of age) and 2,229 (9%) as pediatrics (< 18 years of age). 14,375 (60%) were female and 9,673 (40%) were male (Table 1). In terms of geographic distribution, 6,940 (29%) of CIF patients were in the Northeast, 7,365 (31%) in the South, 5,476 (23%) in the Midwest, 4,137 (17%) in the West, and 130 (0.5%) noted to be unidentifiable. Maine, Pennsylvania, and New Jersey were the 3 states with highest prevalence of adult CIF patients at 94, 86, and 79 per million respectively while Nebraska, Washington, and South Dakota had the highest pediatric CIF prevalence at 16, 14, 10 per million respectively. The lowest prevalence for CIF patients was noted in the states of Louisiana (14 per million), Mississippi (16 per million), and Vermont (17 per million) for adults and the states of Hawaii (0 per million), New Hampshire (0.5 per million), and Minnesota (2 per million) for pediatric group.

Conclusion: Based on recent analysis of the prevalence of CIF in the US, the IDV claims database appears to accurately identify nearly all patients with CIF and notes that prevalence is fairly stable compared to recent work. The geographic data allows us to gather regions of the nation with high prevalence of CIF as well as areas where there is a mismatch between number of patients and providers carrying for CIF, resulting in the need to travel great distance for adequate care. Future research will allow further elucidation of the clinical impact of these findings.

Financial Support: Zealand Pharma A/S

Characteristic	All CIF	Pediatric (0-17)	Young Adult (18-44)	Adult (45+)
Total Number	24,048	2,229	3,887	17,932
Total Number per million patients in database	44	4	7	33
Sex				
Male	9,673 (40%)	1,246 (56%)	1,313 (34%)	7,114 (40%)
Female	14,375 (60%)	983 (44%)	2,574 (66%)	10,818 (60%)
Insurance				
Commercial	13,476 (56%)	1,423 (64%)	2,449 (63%)	9,604 (53%)
Medicare	7,869 (33%)	12 (0.5%)	739 (19%)	7,118 (40%)
Medicaid	2,467 (10%)	760 (34%)	658 (17%)	1,049 (6%)
Other	236 (1%)	34 (2%)	41 (1%)	161 (1%)
Region				
Northeast	6,940 (29%)	467 (21%)	978 (25%)	5,495 (31%)
South	7,365 (31%)	774 (35%)	1,174 (30%)	5,417 (30%)
Midwest	5,476 (23%)	459 (20%)	941 (24%)	4,076 (23%)
West	4,137 (17%)	461 (21%)	779 (20%)	2,897 (16%)
Unknown	130 (0.5%)	68 (3%)	15 (0.4%)	47 (0.2%)

Demographic Characteristics of CIF.

Malnutrition, Obesity, Nutrition Practice Concepts and Issues

P57 - Creatinine-to-cystatin C ratio estimates muscle mass correlating the markers of the bioelectrical impedance analysis in the patients with neurological impairment

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Purpose: The presence of neurological impairment (NI) has been considered a critical disorder requiring intensive nutritional support due to the presence of neurological and/or metabolic disorders. Patients with NI presented with varying problems in physical management associated with their nutrition. Although nutritional status should be primarily assessed, it is often challenging to evaluate using physical measurements due to the presence of severe scoliosis and abnormal body compositions.
Creatinine-to-cystatin C ratio (CCR) has been considered a marker of muscle mass. The current study aimed to evaluate the relationship between CCR and nutritional status via a bioelectrical impedance analysis (BIA) in patients with NI

Methods: This retrospective study included 39 patients with NI (17 men, 22 women) aged over 16 years(mean age, 27.8±11.0 [range: 1649] years) . CCR was calculated as serum creatinine level (mg/dL)/cystatin C (mg/L) × 10. BIA parameters such as phase angle (PhA), fat-free mass (FFM), appendicular muscle mass (AMM), and appendicular skeletal muscle mass index (ASMI) were measured via BIA. Correlation analyses were conducted between CCR and BIA parameters.The two groups were compared using the chi-square test and the Mann–Whitney U test. Spearman's correlation coefficients were used to identify relationships between two variables. Data were presented as mean ± standard deviation and range. P-values < 0.05 were considered statistically significant.

Results: The mean SGA, BIA, and serum nutritional parameters of all participants and male and female patients with NI are shown in Table 1. The mean CCR of the patients was 4.47±1.34. The results of the correlation analysis between CCR and SGA and BIA parameters are shown in Table 2. There were significant positive correlations between CCR and FFM, PhA, AMM, and ASMI ($r = 0.3373$, $p = 0.0357$; $r = 0.4273$, $p = 0.0093$; $r = 0.5008$, $p = 0.0012$; $r = 0.4706$, $p = 0.0025$; and $r = 0.4751$, $p = 0.0022$, respectively).

Conclusion: CCR in the patients with NI is a simple and accurate parameter for assessing muscle mass. Hence, it can be used as a simple screening tool for PhA, FFM, and muscle mass.

Financial Support: None

P58 - Antihyperglycemic effects of white mulberry (morus alba) leaf products after an oral sucrose tolerance test: a double-blind triple-crossover randomized trial

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Purpose: White mulberry (morus alba) leaves have been extensively used within traditional Japanese medicine as their phytochemical composition includes 1-deoxynorijimicin (DNJ), an iminosugar that competively inhibits alpha-glucosidase action at the intestinal lumen thus attenuates dietary sugar absorption and, subsequently, prevents postprandial hyperglycemia.

Methods: We conducted a double-blind, triple-crossover, random cluster allocation trial in adults (20-50 yo); both female and male who underwent an oral sucrose (45 g) tolerance test. Glycemia was measured with a continuous monitoring system at 0 (i.e., fasting conditions), 30, 60, and 120 min after carbohydrate ingestion. Interventions consisted in repeating the prior together with the consumption of either a canned beverage containing 17 mg of DNJ, or a powdered ready-to-mix beverage containing 1.8 mg of DNJ.

Results: 60 subjects were recruited: 20 in a range of 20–30 years, 20 more of 31–40 years and, finally, 20 individuals 41–50 years; 50% men in each of these groups. All completed all studies. As shown in the graphic, a statistically significant difference was found in postprandial glycemia at 30 and 60 minutes when comparing the days on which the mulberry leaf products were ingested vs. the control day (without drink). No differences were found between gender, nor among age groups. This is reinforced by the analysis of area under the curve (AUC), which shows a significantly greater total area for the control day (1050 UR) vs. the days of ingestion with can (249 UR) and sachet (113 UR). Additionally, these same analysis did not find peaks in the curves of the white mulberry products, while for the control a peak was found precisely 30 minutes after ingestion.
Finally, the analysis of the magnitude of the effect yielded a Cohen's d of 0.822, ad hoc with a large size, that is, of great clinical relevance. In a complementary way, a post hoc analysis of power was performed, obtaining 99.5% (beta = 0.05), which implies that the sample size is valid and the results can be extrapolated to subjects with similar characteristics.

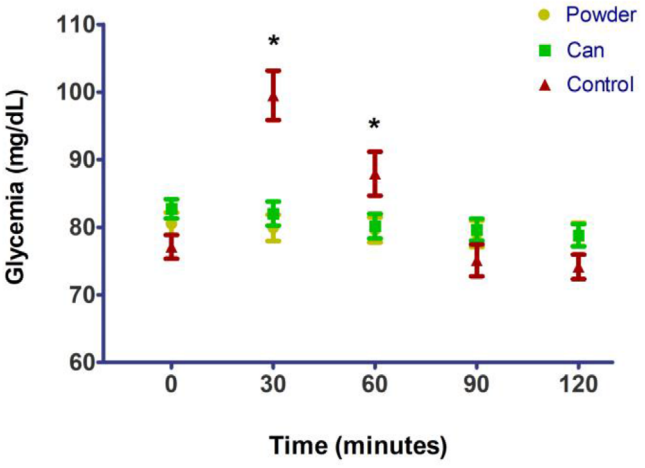
Conclusion: Mulberry leaf products exert a statistically and clinically significant antihyperglycemic effect when compared to control in an oral sucrose tolerance test. For this reason, its potential application as a preventive and modulator of overweight, obesity and alterations in the metabolism of sugars is interesting.

Financial Support: Beliv LCC financed the presented study

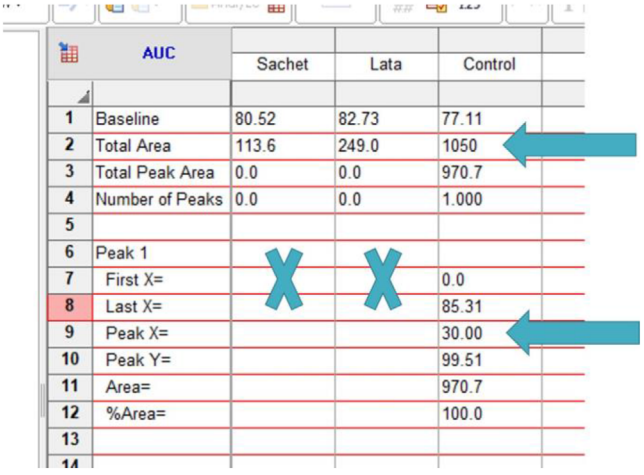
Cluster random allocation

Age	Cluster	Week 0	Week 1	Week 2
	A	Test Food 1	Test Food 2	CONTROL
20-30 yo	B	Test Food 2	CONTROL	Test Food 1
	C	CONTROL	Test Food 1	Test Food 2
	A	Test Food 1	CONTROL	Test Food 2
31-40 yo	B	Test Food 2	Test Food 1	CONTROL
	C	CONTROL	Test Food 2	Test Food 1
	A	Test Food 1	Test Food 2	CONTROL
41-50 yo	B	Test Food 2	CONTROL	Test Food 1
	C	CONTROL	Test Food 1	Test Food 2

Fig 1. Postprandial glycemia analysis



AUC analysis



AUC	Sachet	Lata	Control
1 Baseline	80.52	82.73	77.11
2 Total Area	113.6	249.0	1050
3 Total Peak Area	0.0	0.0	970.7
4 Number of Peaks	0.0	0.0	1.000
5			
6 Peak 1			
7 First X=			0.0
8 Last X=			85.31
9 Peak X=			30.00
10 Peak Y=			99.51
11 Area=			970.7
12 %Area=			100.0
13			

P59 - A randomized cross-over trial on the effectiveness of World Health Organization's Formula-100 as a school-based food supplement for weight gain of first graders and Barangay Lingga Elementary School

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Purpose: Seventh National Nutrition Survey showed an increase in underweight prevalence to 25.6%. School feeding programs have also become popular means of increasing student's concentration and learning capacity because of the reduction of short term hunger. The WHO Formula 100 (F-100) is a homemade high calorie milk formula (100 kcal or 420 kJ/100 mL) that was intended for the rehabilitation phase of treatment of children with severe acute malnutrition. The use of F-100 in a school-setting as part of a feeding program has no supporting research. The present paper intends to close the gaps in the knowledge on the uses of F-100. We aim to evaluate the effectiveness of F-100 as a school-based food supplement for first grade students.

Methods: This study utilized a randomized, cross-over, experimental design of 77-first grade-students from Baranggay Lingga Elementary School at Calamba City. We taught the school cooks and nutritionist on how to make homemade F-100. The process was supervised on the first week and further check randomly until the research ended. Participants were divided into two, where each group of students was treated with either homemade F-100 or regular milk for six weeks. Each student was weight prior to treatment and every two weeks for a six-week period, subsequently both groups were going into wash-out period of two weeks. Treatment and control group were then crossed over for the same treatment of six weeks. The weight was then analyzed with repeated measures ANOVA to look for significance of weight changes from baseline to sixth week. Parents were also tasked with completion of a 24-hour food recall sheet to assess current nutritional intake status of the participants. Participants were also tasked to rate the palatability of F-100 in comparison to commercially available milk. Finally, researchers compared the cost of mixing 100 ml of F-100 with the cost of commercially available formula milk.

Results: Differences between means of overall F-100 treatment group weight gain compared to the control group is significant (0.8174 ± 0.2033, $p < 0.00$). There is no difference in palatability between the F-100 and regular milk ($p = 0.7117$). Most parents did not return the 24-hour food recall sheet, hence the inability to process the nutritional intake status. Lastly, homemade WHO F-100 only cost PHP 4.09 / 100 ml compared to equally calorie-dense commercially available formula that priced at PHP 23.28 and PHP 26.24 every 100 ml.

Conclusion: Homemade WHO F-100 is a cost-effective, easy-to-make, and nutritious alternative for school feeding program.

Financial Support: n/a

Comparison of means of weight on baseline and week six

	Baseline	6th week	Difference	p value
Treatment group 1 (n = 38)	20.16 (3.568)	21.17 (4.456)	1.00 (1.78)	<0.01
Treatment group 2 (n = 39)	18.65 (3.887)	20.03 (3.895)	1.37 (0.66)	< 0.01
Control group 1 (n = 39)	19.75 (4.691)	20.49 (4.729)	0.74 (0.99)	< 0.01
Control group 2 (n = 38)	19.51 (3.790)	19.55 (4.154)	0.04 (1.22)	0.84
Overall treatment (n = 77)	19.39 (3.787)	20.58 (4.189)	1.19 (1.32)	< 0.01
Overall control (n = 77)	19.62 (4.219)	20.00 (4.434)	0.37 (1.16)	<0.01

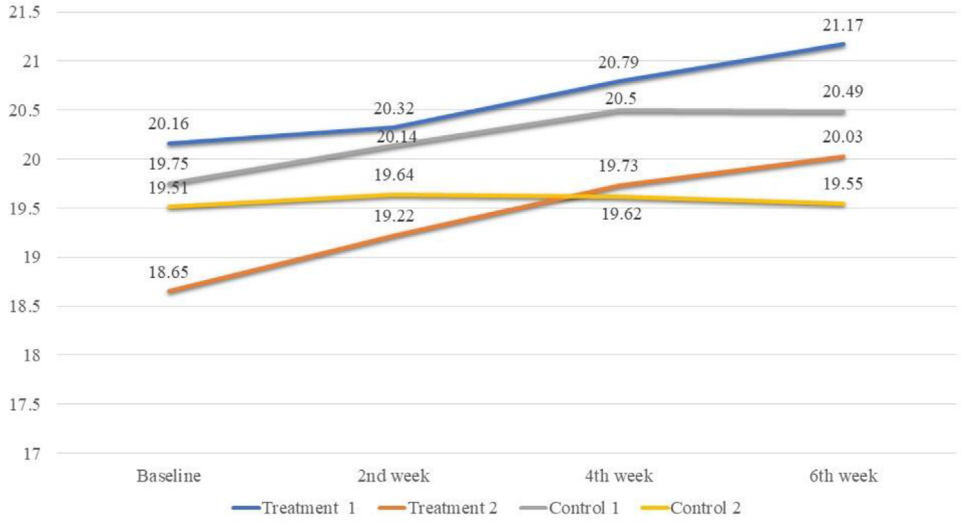
Data shown in average (standard deviation), paired *t*-test

Comparison of means differences of weight gain

	Difference between means	*p* value
Treatment group 1 vs control grp 1	0.11 (0.25)	0.66
Treatment group 2 vs control group 2	1.33 (0.22)	< 0.01
Overall treatment vs overall control	0.82 (0.20)	< 0.01

Data shown in average (standard deviation), paired *t*-test

Bi-weekly trends of means of weight from baseline to week six of treatment



International Poster of Distinction

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Publication: Deniz O, Cruz-Jentoft A, Aycicek GS, Unsal P, Esme M, Ucar Y, Burkuk S. 748640 - Defining Sarcopenic Obesity with Skeletal Muscle Ultrasonography (abstract). Supporting Information. ASPEN Nutrition Science & Practice Conference: March 28–31, 2020, JPEN J Parenter Enteral Nutr. 2020 Feb;44(2):181-183.

P60 - Role of Ultrasonography in Estimating Muscle Mass in Sarcopenic Obesity

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Purpose: Sarcopenic obesity (SO) is the combination of low muscle mass or strength, and high fat mass due to the coexistence of sarcopenia and obesity. Although different definitions have been proposed, there is no definitive diagnosis of SO yet. The present study is designed to define the usefulness of an alternative diagnostic method for SO using skeletal muscle ultrasonography (US).

Methods: Eighty nine patients, aged over 65 years whose body mass index (BMI) was 30 and over were consecutively enrolled in an outpatient clinic of geriatric medicine in this cross-sectional study. All patients underwent comprehensive geriatric assessment, including hand grip strength(HGS) and bioimpedance analysis(BIA). In six different types of muscle [gastrocinemius medialis(GM), rectus femoris(RF), rectus abdominis(RA), external abdominal oblique(EAO), internal abdominal oblique(IAO), transversus abdominis(TA)] ultra-sonographic evaluation of the patients was carried out. The diagnosis of sarcopenic obesity was based on sarcopenic obesity definition consisting of both low HGS (Male< 27 kg, Female< 16 kg) and high BMI (≥30 kg/m2).

Results: The median age of the patients was 72 (65-85) years, 80.3% were female and 34.8% (n = 31) of the patients were sarcopenic obese. Gender rate was similar between sarcopenic obese and non-sarcopenic obese groups. As expected, anthropometric parameters of obesity were similar on both groups. However, anthropometric parameters that estimate muscle mass (calf circumference, middle upper arm circumference) were lower in the sarcopenic group, but estimations of muscle mass with BIA did not differ between groups. All ultrasonographic estimations of muscle mass were lower in sarcopenic than non-sarcopenic obese participants, albeit not all significantly. The largest differences were found in gastrocnemius muscle thickness and in rectus femoris cross-sectional area. GM (14.9 ± 1.82 mm vs. 16.21 ± 2.42 mm), RF (12.7 ± 2.01 mm vs. 13.89 ± 2.87 mm), EAO [4.20 mm (min-max: 2.30-7.50) vs. 4.40 mm (min-max: 3.1-6.1)], IAO (5.21 ± 0.94 mm vs. 6.25 ± 1.32 mm) muscle thickness was found to be lower, and RF cross sectional area (CSA) [3.99 mm2 (min-max: 2.38-6.56) vs. 5.37 mm2 (min-max: 2.14-9.01)] smaller in sarcopenic obese patients compared to non-sarcopenic obese group (p = 0.016, p = 0.026, p = 0.029, p = < 0,01, p = 0,011 respectively). As sarcopenia is defined by muscle strength, we assessed correlations between hand grip strength and ultrasonographic measures. RF CSA and RA subcutaneous fat thickness were most strongly correlated with grip strength (r = 0.477 and r = -508, respectively). Receiver operating characteristic (ROC) analysis suggested that optimum cut-off point of RF CSA for sarcopenic obesity was ≤5.29 cm2 with 95.5% sensitivity, 46.7% specificity, 48.9% positive predictive value and 95.5% negative predictive value (AUC: 0.672).

Conclusion: Our results suggest that ultrasonographic evaluation of muscle mass may be more accurate than BIA-derived skeletal muscle index (SMI) assessment for the diagnosis of sarcopenic obesity. This study represents a first step towards the introduction of ultrasound imaging in the evaluation of SO.

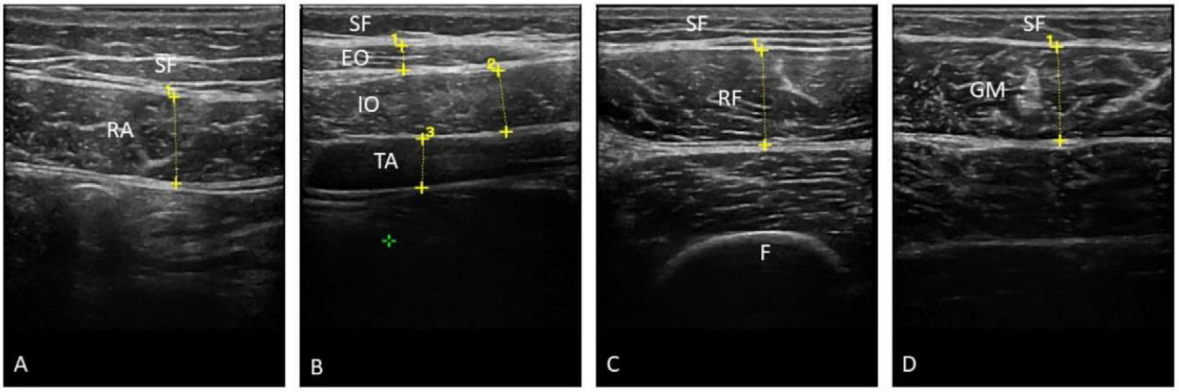
Financial Support: n/a

Table 1. Demographic data of the participants

Parameters	Sarcopenic obese (n = 31)	Non-sarcopenic obese (n = 58)	p
Age, median (min-max)	74 (65-85)	71 (65-84)	0.05
Gender, female, n, (%)	27 (87.1)	45 (77.6)	0.28
Educational status ≤5 years, n, (%) >5 years, n, (%)	 28 (90.3) 3 (9.7)	 47 (81) 11 (19)	 0.36
Co-morbidities			
Diabetes Mellitus, n, (%)	17 (54.8)	39 (67.2)	0.25
Hypertension, n, (%)	30 (96.8)	48 (82.8)	0.09
Coronary artery disease, n, (%)	11 (35.5)	9 (15.5)	**0.03**
Chronic Obstructive Pulmonary Disease, n, (%)	5 (16.1)	5 (8.6)	0.31
Chronic heart failure, n, (%)	4 (12.9)	3 (5.2)	0.23
Geriatric Syndromes			
Dementia, n, (%)	4 (12.9)	2 (3.4)	0.18
Polypharmacy*, n, (%)	26 (83.9)	43 (74.1)	0.30
Urinary incontinence, n, (%)	20 (64.5)	28 (48.3)	0.14
Osteoporosis, n, (%)	10 (35.7)	8 (15.1)	**0.03**
Falls**, n, (%)	9 (29)	9 (15.5)	0.13
4-meter gait speed, m/sn	0.83 (0.33 – 1.16)	1.04 (0.32 - 2.00)	**<0.01**
Katz Index ADL score	6 (1-6)	6 (5-6)	0.10
Lawton-Brody IADL score	8 (0-8)	8 (5-8)	**<0.01**
YDS score	3 (0-15)	1 (0-10)	0.05
MMSE score***	27 (15-30)	28 (15-30)	**0.03**
MNA-SF score	14 (6-14)	14 (9-14)	0.08

*Five or more medications, ** One or more/year, ***Patients with dementia (n=6) excluded, ADL:Activities of Daily Living, IADL:Instrumental Activities of Daily Living, YDS: Yesevage Depression Scale, MMSE: Mini Mental State Examination, MNA-SF: Mini Nutritional Assessment-Short Form, categorical variables were presented as n (%), normally distributed variables were presented as mean±standart deviation while skew distributed ones presented as median (min-max)

Figure 1. Axial ultrasound images



Rectus abdominis (A), external abdominal oblique (B), internal abdominal oblique (B), transversus abdominis (B), rectus femoris (C), gastrocnemius medialis (D) muscle thicknesses. Dotted yellow line represents the thickness. SF, subcutaneous fat; RA, rectus abdominis; EO, external abdominal oblique, IO; internal abdominal oblique, RF; rectus femoris, GM; gastrocnemius medialis.

P61 - Higher Skeletal Muscle Mass Index is Associated with Better Reported Quality of Life and Lower Fatigue in Patients with Heart Failure with Reduced Ejection Fraction and Type 2 Diabetes

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Purpose: Sarcopenia, defined as declining skeletal muscle (SM), is common and associated with poor outcomes in patients with heart failure (HF). Sarcopenia may also be directly linked with quality of life (QoL) and HF symptoms. In this analysis, we hypothesized that greater SM mass index (SMMI) was associated with greater QoL and lower reported fatigue in patients with HF with reduced ejection fraction (HFrEF) and type-2 diabetes mellitus (T2DM).

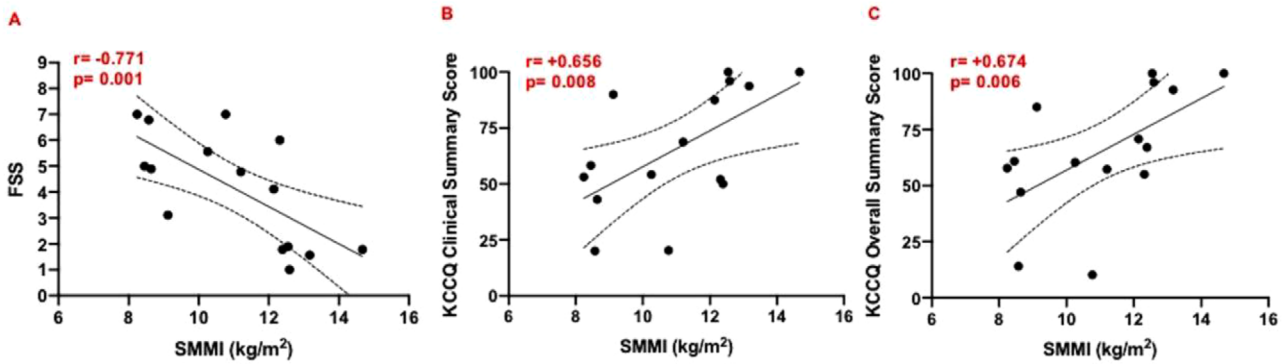
Methods: Fifteen consecutive patients with HFrEF (left ventricular EF< 40%) and T2DM completed the Kansas City Cardiomyopathy Questionnaire (KCCQ) as a measure of QoL and the Fatigue Severity Scale (FSS). The KCCQ has 23 items with 2 summary scores which range from 0–100 with higher scores indicating greater functioning. The FSS is a 9-item questionnaire, which ranges from 9 to 63 with higher scores demonstrating greater fatigue. Body composition was completed with bioelectrical impedance analysis (BIA) to obtain SMMI, defined as SM in kilograms divided by height in meters squared (kg/m2). Correlations were performed with Spearman's Rank Coefficient. Results are presented as median and interquartile range (IQR), significance is defined as $p< 0.05$.

Results: Subjects were 93% male (14/15), 47% black (7/15) with an age of 58 (51.0-61.0) years. SMMI was 11.2 (8.6-12.5) kg/m2, FSS was 4.8 (1.8-6.0), KCCQ clinical summary score was 58.3 (50.0-93.8) and overall summary (OS) score was 60.9 (55-92.7). There was an inverse association between FSS and SMMI ($r = -0.771$, $p = 0.001$) (Figure 1A). Clinical and OS scores from the KCCQ were positively associated with SMMI ($r = 0.656$, $p = 0.008$; $r = 0.674$, $p = 0.006$, respectively) (Figure 1B and 1C).

Conclusion: Greater SMMI is associated with lower patient-reported fatigue and better QoL in patients with HFrEF and T2DM. Future work should focus on interventions to increase SMMI (i.e., resistance training) and identify whether increasing SMMI would result in reduction in fatigue and improved QoL.

Financial Support: Janssen Pharmaceutica

Figure 1



P62 - Assessing Quadricep Muscle Layer Thickness (QMLT), Protein Intake and Physical Activity in Young Healthy Females: A two-phase observational study

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Purpose: Muscle thickness is a major component of the body's ability to respond to acute and chronic illness. Ultrasound imaging [US] has emerged as a convenient, non-invasive, bedside technique to assess lean muscle mass [LMM]. Aging causes LMM loss and may be influenced by total and per-meal protein intake as well as physical activity [PA]. Currently, QMLT norms have not been determined in young healthy females. The primary aim of this study was to measure QMLT, and to determine norms for young healthy females between the ages of 18–30. The secondary aim was to assess the relationship between QMLT, total and per-meal protein intake and PA.

Methods: An observational study measuring QMLT using SonoSite ultrasound machine [US] occurred in two phases. Protein intakes obtained using 24-hour food records were analyzed using ESHA in Phase 2. PA obtained in Phase 1 used self-reported levels. PA obtained in Phase 2 used The International Physical Activity Questionnaire [IPAQ] collecting metabolic equivalents [METS] and level of PA. Frequency distributions, Pearson's Correlation and Chi-Square were used to determine associations between QMLT, protein intake and PA.

Results: A total of 236 females with a mean age 23 ± 2.5 years and QMLT [cm] of 3.9 ± 0.64 cm were enrolled in Phase 1 and 2. Sub-group analysis utilizing the 53 participants in Phase 2 with PA indicated a fair but significant association between QMLT and vigorous PA [$r = 0.44$, $p = 0.001$], as well as total PA in METS-min/week [$r = 0.33$, $p = 0.016$]. No associations were found for total and per meal protein with QMLT.

Conclusion: QMLT can be assessed with US and we report norms for young healthy females. There was a relationship between QMLT and vigorous PA, total PA, along with meeting PA requirements of 600 to 1200 METs-min/week, for moderate to vigorous recommendations. However, there was no relationship between QMLT and protein.

Financial Support: Brescia University College

ENCORE

Presentation: Apollo International Clinical Nutrition Update Conference, Hyderabad, India, September 2019

P63 - Impacts of High Protein Supplementation on Oncology Patients

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Purpose: Introduction: Cancer Cachexia arising from malnutrition and inadequate food intake, affects 50–80% of patients impacting their quality of life (QOL), compromising treatment and predisposing to mortality. Identification of patients with muscle loss has become increasingly difficult as 40–60% of cancer patients are overweight or obese. However, body composition assessment helps understand the true prevalence of cancer cachexia. Nutritional management and Oral Nutrition supplement (ONS) support plays an important role in meeting nutrient adequacy, overcoming sarcopenia, metabolic and therapeutic complications, improving treatment efficacy, nutrition indices and QOL. Purpose: To observe effects of ONS on Nutritional status and QOL in cancer patients.

Methods: Method: This randomized, controlled study had 50 cancer patients on radiation, sorted into control or experimental group who were supplemented with an iso-caloric, high protein ONS (372±186kcals, 45±22gms protein/day) for 4 weeks.The nutritional status was assessed using

Patient-Generated Subjective Global Assessment (PG-SGA), Functional Assessment of Anorexia/Cachexia Therapy (FAACT) scale to assess QOL, anthropometric measurements, body composition, hand grip strength (HGS), Knowledge, attitue and practices (KAP) on ONS, 24 hour diet recall, and food frequency was assessed. All subjects were counselled and advised on high protein foods initially, monitored after 15 days for compliance and reassessed at the end of the study. The results were compared and corelated.

Results: Results: When compared to control the experimental group after a month, showed a statistically proven, marked improvement in the macronutrient intake with 60% of the sample achieving >60% of calorie RDA and 79% achieving >60% of protein RDA supported with ONS. This improved protein intake correlated well with the improved HGS = from 24.6±3.6 to 25.1±4.3kgs (p = 0.012), skeletal muscle % = from 21±4.1% to 22±2.7% (p = 0.023), MUAC = from 16.9±2.7 to 17.2±2.4cms and a maintained calf circumference 17.5±3.4 to 17.7±1.2mm and skin fold thickness = from 18.5±5.1mm to 19.2±4.7mm. The experimental sample (100% compared to the earlier 36% at the start of the study) well understood through diet counselling, the importance of ONS in achieving increased nutrient requirements which was reflected with a good QOL score (FAACT = 118±5.7) and an improved PG-SGA scores (A = from 28 to 48%). With no ONS support, the control group showed a decline in PG-SGA scores (A = from 32 to 16%).

Conclusion: Conclusion: These results suggest that appropriate use of ONS is beneficial in maintaining nutrient adequacy, nutritional status, QOL and promotes treatment efficacy during long term cancer care.

Financial Support: n/a

CO-RELATING PROTEIN INTAKE WITH MUSCLE % AFTER SUPPLEMENTATION:

Correlations

		protein intake	muscle %
protein intake	Pearson Correlation	1	.452*
	Sig. (2-tailed)		.023
	Sum of Squares and Cross-products	246.000	68.400
	Covariance	10.250	2.850
	N	25	25
muscle %	Pearson Correlation	.452*	1
	Sig. (2-tailed)	.023	
	Sum of Squares and Cross-products	68.400	93.040
	Covariance	2.850	3.877
	N	25	25

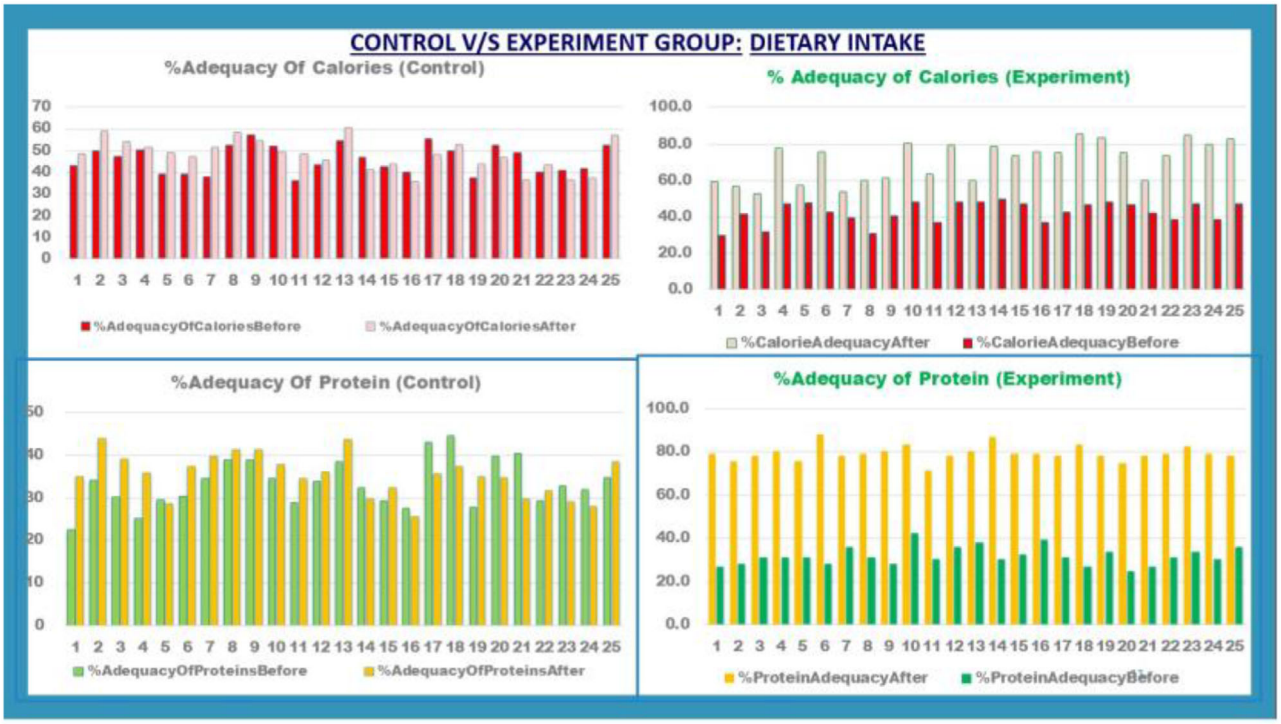
*. Correlation is significant at the 0.05 level (2-tailed).

Correlation between protein intake and hand grip strength
Experimental group

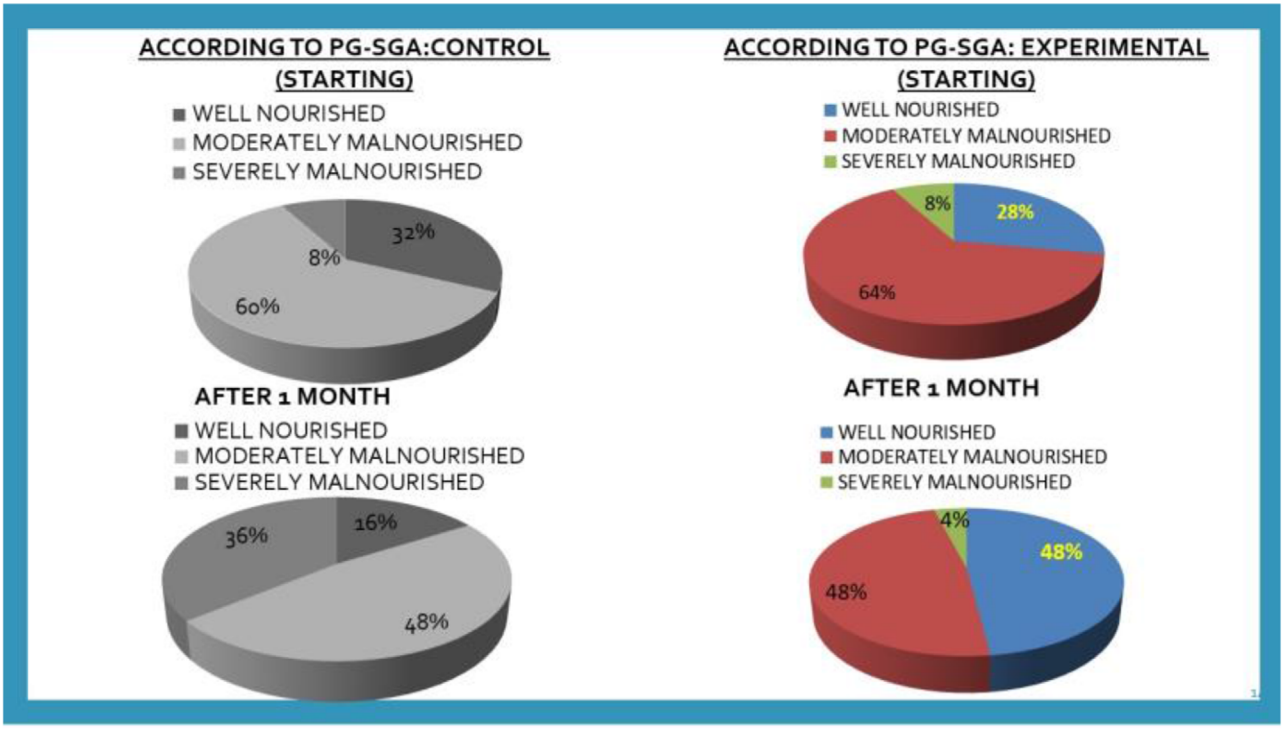
Correlations

		Protein_Adequacy_Case_After_One_Month	Hand_Grip_Strength_Case_After_One_Month
Protein_Adequacy_Case_After_One_Month	Pearson Correlation	1	.495*
	Sig. (2-tailed)		.012
	N	25	25
Hand_Grip_Strength_Case_After_One_Month	Pearson Correlation	.495*	1
	Sig. (2-tailed)	.012	
	N	25	25

*. Correlation is significant at the 0.05 level (2-tailed).



CHANGES IN PG-SGA



P64 - The Frequency and Barriers to Coding for Malnutrition

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Purpose: Malnutrition frequently occurs in hospitalized patients but is often undiagnosed. Malnutrition can impact length of hospital stay, risk for mortality/morbidities, and quality of life. Accurate documentation and coding of malnutrition supports resource allocation and reimbursement for a hospital stay. Electronic queries (e-queries) are used to notify providers that malnutrition was identified by clinical dietitians (RD) at our urban academic medical center. Failure of providers to respond to these queries and/or to accurately document malnutrition can lead to inaccurate reimbursement for allocated resources associated with malnutrition. The objective of this study was to determine the frequency in which the e-queries were activated, providers agreed with the RD's nutritional assessments, and malnutrition was properly documented and coded. Provider's perceived barriers to responding to the e-queries was also investigated.

Methods: Quality Analytics provided a database of all activated e-queries over 11-months (February-December 2019). E-queries prompted providers to respond to RD nutritional assessments as either agree with, disagree with, decline to respond, ask later, or unable to clinically determine. A random sample of medical records from the database were reviewed to assess whether malnutrition was documented and whether an ICD-10 malnutrition code was assigned. A survey was also distributed to providers to identify their perceived barriers to responding to the e-queries.

Results: E-queries were sent out in 19.8% of all cases discharged during the 11-month time frame (5081/25,600). Approximately 41% of the queries were read with no response, 24% of providers agreed with the RD's nutritional assessment of malnutrition, 23% of queries were not read, < 3% disagreed with the RD assessment, and < 10% either declined to respond, delayed responding, or were clinically unable to assess status. Mild protein-calorie malnutrition (E44.1) was the most frequent ICD-10 code assigned (38.9%) while no code was assigned in 13.2% of cases. A random sample from the database (n = 359) showed approximately 90% had documentation of the malnutrition diagnosis, 89% were coded, and only 2.2% were properly documented but not coded. When surveyed, providers responded that lack of time was the major reason for not responding to the query (46%, n = 47).

Conclusion: Results indicated improvement in responses to the e-queries is needed. However, there were few missed opportunities for coding malnutrition when documented correctly. Training opportunities to address educational gaps related to the importance of responding to the query and correctly documenting malnutrition should be implemented using the preferred learning methods identified by providers. Improved documentation of malnutrition can support proper allocation of resources to treat patients and lead to correct hospital reimbursement.

Financial Support: n/a

P65 - Workup of delirium on acute medical units at Vancouver General Hospital: How frequently are we investigating and treating thiamine or vitamin B12 deficiency as a potential cause?

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Purpose: Delirium is an acute disturbance of consciousness with reduced ability to focus, sustain, or shift attention. It is associated with prolonged hospital stays, increased mortality rates, and cognitive dysfunction post-delirium. Thiamine (vitamin B1) and vitamin B12 deficiencies are potential etiologies of delirium. Despite well-established roles in cognitive function, the extent to which these micronutrients are being investigated as part of a delirium workup and treatment plan for patients admitted to acute medical units at Vancouver General Hospital (VGH) is unknown. The purpose of this study was to determine 1) the prevalence of delirium as identified by physicians across three acute medical units at VGH, and of those: 2) the number of patients who received thiamine supplementation; and 3) the number of patients who received vitamin B12 supplementation and/or laboratory investigations of serum vitamin B12 levels.

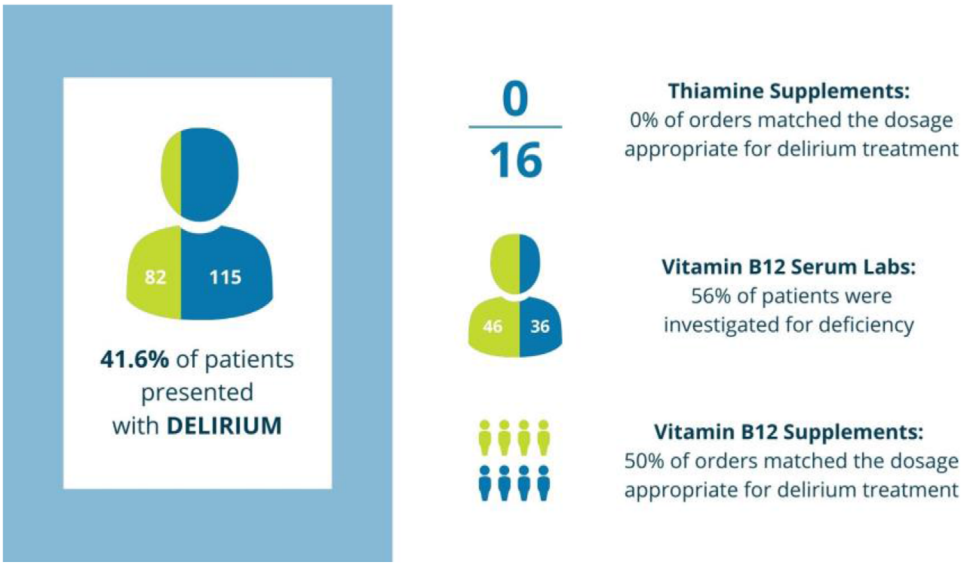
Methods: A retrospective chart review of 197 patients admitted to three acute medical units at VGH from January 1 to 31, 2019 was conducted. Inclusion criteria captured all patients above the age of 19 who were admitted to any of the three acute medical units selected for the study. Descriptive statistics were used to analyze data.

Results: A total of 82 patients (41.6%) presented with delirium. The average patient age was 84 years. Among these patients, 19.5% (n = 16) received thiamine supplementation, of which 25% (n = 4) was for treatment of alcohol withdrawal, and 75% (n = 12) had no documented reason. No patients (n = 0) received the recommended dosage of thiamine as treatment for delirium. Of all patients identified as having delirium, 9.8% (n = 8) received vitamin B12 supplementation, of which 12.5% (n = 1) was for delirium workup. Half of patients with delirium who received vitamin B12 supplementation (n = 4) were prescribed a dosage appropriate for delirium treatment. The proportion of patients presenting with delirium who underwent investigations of serum vitamin B12 levels was 56.1% (n = 46).

Conclusion: This study indicates that despite a high prevalence of delirium within VGH acute medical units, delirium workups do not routinely investigate thiamine or vitamin B12 deficiencies as potential causes. This study suggests the connection between nutritional deficiencies and delirium may be under-recognized during workup and treatment plans for delirium. Dietitians can play a key role in advocating for awareness on this topic, and identifying and treating nutritional deficiencies related to delirium.

Financial Support: n/a

Figure 1. Delirium Study Results



A total of 82 patients (41.6%) presented with delirium. Among these patients, 19.5% (n = 16) received thiamine supplementation, however no patients (n = 0) received the recommended dosage to treat delirium. Of all patients identified as having delirium, 9.8% (n = 8) received vitamin B12 supplementation, half of which (n = 4) received a dosage appropriate for delirium treatment. The proportion of patients presenting with delirium who underwent investigations of serum vitamin B12 levels was 56.1% (n = 46).

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Publication: Manuscript pending publication in the Journal of Pediatric Obesity

P66 - Effect of Obesity on Mortality Among Hospitalized Pediatric Patients with Severe Sepsis.

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Purpose: Pediatric severe sepsis (PSS) is one of the leading causes of mortality among children. Studies in adults have suggested a protective effect of obesity on mortality among patients admitted with sepsis. Pediatric studies analyzing similar relationship are lacking. We sought to analyze the effect of obesity on PSS related mortality.

Methods: We analyzed non overlapping years of National Inpatient Sample (NIS) and Kids Inpatient database (KID) between 2003 and 2014. PSS was defined using specific ICD codes and modified Angus criteria. Based on the nutritional status, patients were divided into three mutually exclusive groups, obese, morbidly obese and control groups and were compared for outcomes measures including in-hospital mortality and health care resource utilizations using length of stay and inflation adjusted hospitalization charges as surrogates. We then analyzed for various comorbid conditions predisposing to sepsis including common childhood malignancies (leukemia/lymphoma, central nervous system malignancies, osteosarcoma, retinoblastoma, neuroblastoma, gastrointestinal tract malignancies), sickle cell disease, primary immunodeficiency disorders, diabetes mellitus, burns, organ transplantation, human immunodeficiency virus infection, chronic complex neurological conditions (cerebral palsy, muscular dystrophies, degenerative diseases, global developmental delay and epilepsy). Multiple morbidity was defined as the presence of ≥ 2 comorbid conditions and analyzed for its association with outcome variables. We also queried the database for various foci of infections including meningitis, pneumonia, empyema, infective endocarditis, intraabdominal abscess & peritonitis, pyelonephritis, cellulitis & skin infections, bacteremia/septicemia, and septic shock. Total hospitalization charges were adjusted for inflation in reference to 2016 based on Bureau of Labor Statistics data.

Results: We analyzed 109,026 hospitalizations due to PSS. The prevalence rate of obesity was 1.5% (n = 1643), and morbid obesity was 1.05% (n = 1147). Severe sepsis patients with obesity had a decreased mortality rate of 4.9% which is significantly lower than morbidly obese group (12.5%) and control group (14.1%), $P < 0.001$. Multivariate regression models showed obesity was associated with 63% (OR: 0.37, CI: 0.29 to 0.47, $P < 0.001$) and 54% reduction in mortality among PSS patients and patients with septic shock respectively. Contrastingly, morbid obesity was not associated with mortality (OR-1.09, CI: 0.90 to 1.31, $P = 0.35$) among PSS patients and but was associated with 1.37 times (CI: 1.06 to 1.78, $P = 0.01$) increased risk of mortality among pediatric patients with septic shock. After adjusting for various comorbid conditions, linear regression models showed that obesity was associated with decreased length of hospitalization by four days (CI: -5.2 to -2.8, $p < 0.001$) and incurred lower hospitalization charges

by almost 43,400 USD (CI: -67,670 to -33364, p< 0.001) compared to control population . Morbid obesity was associated with decreased length of stay by 1.6 days (CI: - 3.1 to - 0.2, p = 0.02) but did not differ in the total hospitalization charges compared to controls.

Conclusion: Pediatric obesity might have a protective effect over mortality among patients with PSS, with the exception of morbid obesity. Further prospective studies are needed to better understand the relationship between body composition and outcomes in PSS.

Financial Support: None

Table 1 Comparison of demographics of pediatric patients with severe sepsis based on obesity status.

Demographics	Obesity N=1643	Morbid Obesity N=1147	Control population N=96317	P value
Median Age (IQR)	15 (12 to 17)	16 (14 to 19)	13 (6 to 17)	<0.001
Age Groups				
1 – 5 years	40 (2.4%)	27 (2.4%)	22221 (23.1%)	
5 – 10 years	152 (9.3%)	47 (4.1%)	13105 (13.6%)	
11 – 15 years	465 (28.3%)	230 (20.1%)	18231 (18.9%)	
16 – 20 years	985 (60%)	843 (73.5%)	42761 (44.4%)	
Gender				0.58
Male	826 (50.2%)	559 (48.7%)	48406 (50.3%)	
Female	817 (49.8%)	588 (51.3%)	47900 (49.7%)	
Race				<0.001
White	590 (35.9%)	375 (32.7%)	40992 (42.6%)	
AA	279 (17%)	298 (26%)	13926 (14.5%)	
Hispanics	461 (28.1%)	186 (16.2%)	17650 (18.3%)	
Others	3113 (19.1%)	288 (25.1%)	23749 (24.7%)	
Insurance				<0.001
Public	850 (51.7%)	574 (50%)	46302 (48.1%)	
Private	598 (36.4%)	425 (37%)	40405 (42%)	
Others/Self Pay/Uninsured	195 (11.9%)	149 (13%)	9610 (10%)	
Bed size				<0.001
Small	155 (9.6%)	178 (15.9%)	9428 (10%)	
Medium	410 (25.4%)	216 (19.3%)	23828 (25.3%)	
Large	1050 (65%)	723 (64.7%)	61066 (64.7%)	
Location				<0.001
Rural	67 (4.1%)	52 (4.7%)	3028 (3.2%)	
Urban Non-Teaching	332 (20.5%)	279 (25%)	14038 (14.9%)	
Urban Teaching	1217 (75.3%)	786 (70.4%)	77255 (81.9%)	
Type of Hospitalizations				<0.001
Non- Elective	1523 (93.6%)	1042 (91.7%)	86032 (89.9%)	
Elective	105 (6.4%)	94 (8.3%)	9699 (10.1%)	
Mortality	80 (4.9%)	142 (12.5%)	13596 (14.1%)	<0.001
Length of stay Median (IQR)	9 (5 to 14)	12 (6 to 22)	10 (5 to 22)	<0.001
Median Total Charges (IQR)	87188 (43439 to 160239)	132581 (57401 to 245229)	107273 (46504 to 264529)	<0.001

Table 2. Comparison of associated comorbid conditions among pediatric patients with severe sepsis.

Clinical Characteristics	Obesity N=1643	Morbid Obesity N=1147	Control population N=96317	P Value
Malignancy	215 (13.1%)	76 (6.6%)	15288 (15.9%)	<0.001
sickle cell disease	18 (1.1%)	13 (1.1%)	1300 (1.3%)	0.55
PID	21 (1.3%)	11 (1%)	2774 (2.9%)	<0.001
DM	110 (6.7%)	179 (15.6%)	2413 (2.5%)	<0.001
Burns	<10	0	607 (0.6%)	0.011
Organ Transplant	40 (2.4%)	13 (1.1%)	6324 (6.6%)	<0.001
UT anomalies	161 (9.8%)	157 (13.7%)	10213 (10.6%)	0.002
HIV	<10	<10	378 (0.4%)	0.07
Chronic complex neurological condition	116 (7.1%)	68 (5.9%)	16826 (17.5%)	<0.001
Multimorbidity	83 (5.1%)	81 (7.1%)	9019 (9.4%)	<0.001
Central venous catheterization	618 (37.6%)	472 (41.2%)	38481 (40%)	0.11
Mechanical ventilation	516 (31.4%)	435 (37.9%)	42656 (44.3%)	<0.001

Table 3. Comparison of associated focus of Infection among pediatric patients with severe sepsis.

Type of infection	Obesity N=1643	Morbid Obesity N=1147	Control population N=96317	P Value
Meningitis	42 (2.6%)	15 (1.3%)	2493 (2.6%)	0.025
Pneumonia	508 (30.9%)	388 (33.8%)	31795 (33%)	0.16
Empyema	30 (1.8%)	36 (3.1%)	3015 (3.1%)	0.011
Infective Endocarditis	22 (1.3%)	<10	1881 (2%)	0.002
Intraabdominal abscess & Peritonitis	46 (2.8%)	50 (4.4%)	4226 (4.4%)	0.008
Pyelonephritis	100 (6.1%)	47 (4.1%)	6843 (7.1%)	<0.001
Cellulitis and abscess of skin	182 (11.1%)	158 (13.8%)	5283 (5.5%)	<0.001
Septic Arthritis	18 (1.1%)	<10	1137 (1.2%)	0.19
Bacteremia or Septicemia	1568 (95.4%)	1124 (98%)	90869 (94.3%)	<0.001
Polymicrobial infection	480 (29.2%)	362 (31.6%)	32421 (33.7%)	<0.001
Septic Shock	799 (48.6%)	453 (39.5%)	53861 (55.9%)	<0.001

Table 4. Multivariate Analysis evaluating the impact of nutritional status on the outcomes of length of stay and total hospitalization costs among pediatric patients with severe sepsis.

	Length of stay (days)*		Total Hospitalization Charges (in USD)$	
Nutritional Status	Average difference (Confidence Interval)	P Value	Average difference (Confidence Interval)	P Value
Control Population	Reference		Reference	
Obesity	-4.03 (-5.2 to -2.8)	<0.001	-43,401 (- 59,557 to -27,244)	<0.001
Morbidly Obesity	-1.6 (- 3.1 to -0.2)	0.02	-1524 (- 20870 to 17827)	0.87

P67 - Observations of Patient Reactions to Weight Gain in a Severely Underweight Patient Population

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Purpose: Weight gain in a severely underweight population can be a delicate topic. Many patients who start parenteral nutrition (PN) have a severely compromised nutritional status and a poor weight status as compared to Dr. GJ Hamwi's ideal weight range formula (HAMWI) weight recommendations. Malnutrition is usually why the patient is referred for nutrition support. Consequences of severe malnutrition include increased risk of osteoporosis, impaired immune system, fertility issues, anemia, vitamin and mineral deficiencies, developmental issues, depression, and in

worse case scenarios possible cardiac arrest and death. Patients who are severely underweight for a short time or for a prolonged period may have low body confidence and react fearfully to gaining weight despite known health benefits of weight gain.

Methods: Over the course of three months, a nationwide home infusion provider observed thirteen severely underweight patients receiving nutrition support and subjective reactions to weight status as they began gaining weight. Patients were 16–41 pounds below their ideal weight range (as determined by HAMWI) and all were severely underweight. Length of PN varied from 3 months to 3 years. Observations regarding body image were noted and documented by the nutrition support dietitian.

Results: Negative comments about weight gain occurred: *53.4% when 5–10# was gained *15.4% when 10–15# was gained *30.7% when ideal weight range was achieved During weekly conversations with the dietitian, all 13 patients verbalized perceived negative body image comments such as: “love handles”, “thunder thighs”, belly looking “too large”, having “fluffy fat”, clothes not fitting, wearing “fat girl” pants, pants fitting “too snug”, and feeling “chunky”. Additional observations noted: 13/13 patients verbalized low body confidence 3/13 patients noticed improved energy levels with weight gain 0/13 had a previously diagnosed eating disorder or history indicating an underlying psychosocial disorder Diagnoses included: 5/13 gastroparesis, 3/13 malabsorption, 2/13 history of gastric bypass surgery, 2/13 pancreatic cancer, and 1/13 short bowel syndrome In 3/13 patients, providers questioned compliance of PN therapy due to low body weight 5/13 patients requested a PN decrease once weight gain >5# occurred.

Conclusion: When severely underweight patients started to gain desirable weight, 13/13 sampled patients receiving PN expressed negative body image comments. This led to patients requesting a decrease in calories or PN days (5/13 patients); possible decreased adherence to therapy (3/13), and low body confidence as verbalized by 13/13 patients. The health impact of malnutrition in a severely underweight individual is significant. Healthcare providers and the nutrition support team should educate patients regarding the benefits of healthy weight status, healthy energy levels, and discuss the potential impact of body image with positive health changes. These can be challenging topics for providers but improving education and the conversation surrounding negative body image may help improve patient outcomes, social health, and wellbeing.

Financial Support: n/a

P68 - Influence of multiprofessional follow-up on weight recovery after bariatric surgery

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Purpose: Introduction: Several treatments are proposed for obesity, with bariatric surgery generally being the last resort. The results have been shown to be effective, but research also indicates that weight recovery is a common feature of these patients. Bariatric surgery induces an average loss of 60 to 75% of excess body weight, with maximum loss between 18 and 24 months after the operation. However, several studies 1,2 show that some weight regain occurs from two years after the operation.
Objective: To relate the weight recovery of patients undergoing bariatric surgery for more than two years with pre- and postoperative multiprofessional follow-up.

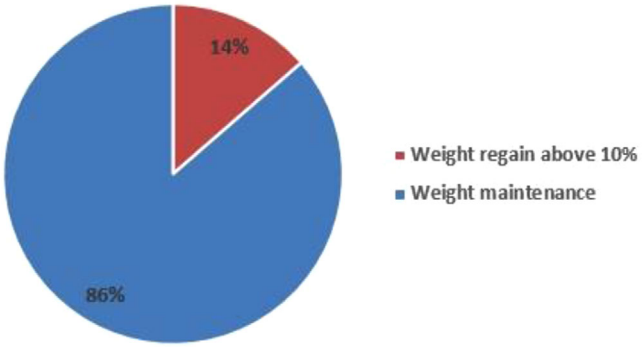
Methods: Patients who underwent the Roux-en-Y gastric bypass surgery technique and who participated in the pre and postoperative follow-up of a health operator were selected. Of this group, weight evolution and adherence to professional monitoring were assessed using medical records and telephone interviews, 24 months after surgery. We classified as weight regain those patients who had an increase above 10% of the minimum weight reported after surgery.

Results: Of the 88 patients studied, the majority (62.5%) were interviewed between 24 and 36 months after surgery and the rest (37.5%) between 36 and 60 months. Of these, 97% had a significant loss of excess weight, with 19 patients losing between 50% and 74% and 66 reducing more than 75% in the first two years. Only 12 patients (14%) showed a significant weight regain two years after the surgery, as shown in Graph 1. When comparing the results with a similar studyş, it was found that out of the patients evaluated, 23% had weight regain. A differential found between the models was related to the time of multiprofessional follow-up before surgery, since in the aforementioned research, it registered the average time of three months while in the present study all patients had been prepared for surgery for at least twelve months. It is suggested that the follow-up time prior to surgery can influence the quality of the patients’ psychological and physiological preparation for better weight maintenance after surgery. In the present study, 97% stated that preoperative follow-up contributed to increase knowledge about self-care. In another study 4, when questioning psychological aspects of patients seen in a private clinic after surgery, it was found that the majority (67.4%) admitted that they should have prepared themselves better psychologically. Regarding adherence to the post-surgical follow-up, it was found that patients who gave up treatment in the first year had a greater weight regain than those who continued treatment until the second year, as shown in Table 1.

Conclusion: The technical knowledge and motivational support offered by the multiprofessional team are important aspects for the successful treatment of obesity.

Financial Support: n/a

Follow-up period	n	Average Weight regain (%)	DP
Patients followed up during the 1st year after surgery	41	7.30	7.6
Patients followed up during the 1st and 2nd post-operative year	47	4.30	3.7



Graph 1 – weight evolution of patients interviewed after two years of bariatric surgery

P69 - Colorectal cancer stage is associated with increased risk of malnutrition.

Gary Wong, BS[1]; Joseph Tang, BA[1]; Alyssa Standlick, BS[1]; Nicholas Russo, BS[1]; Alexander Rennie, BS[1]; Erin Gurd, RD/ LDN/ CNSC[2]; Benjamin Powers, MD/ MPH[2]; Pamela Hodul, MD[2]

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Purpose: Colorectal cancer (CRC) is one of the most common GI malignancies worldwide and is one of the leading causes of cancer-related deaths in Western countries.2 Patients with GI malignancies are at greatest risk for malnutrition. Malnutrition has been linked with poor quality of life, decreased response to therapy, increased postoperative complications, greater risk for hospitalization leading to increased costs in care, and mortality.1 Routine use of validated malnutrition screening tools may improve identification of patients at highest risk for malnutrition. Earlier intervention in patients with CRC may lead to improvement in quality of care and reduced morbidity.

Methods: A validated outpatient oncology malnutrition screening instrument, the Malnutrition Screening Tool (MST)4,5 was administered by a clinical nurse to CRC patients in a multi-disciplinary oncology clinic over a 15 month period during 2019–2020. Patient demographics and clinical variables were collected using an IRB approved protocol and entered into a RedCap Database. Curable disease was defined as cancer that can be treated with surgery or neoadjuvant chemotherapy. Non-curable disease was defined as those with locally advanced or metastatic disease. Comparison of descriptive variables were reported. Additional statistical analysis using independent variable t-tests were performed to identify significance of patient-centered variables.

Results: Approximately 1,187 gastrointestinal cancer patients presenting for initial consultation were screened for malnutrition risk using the MST. Of these, 333 patients had biopsy confirmed CRC and were included in this study. Approximately, 29% (n = 95/333) of patients were found to be "at risk" for malnutrition. Age and sex were not associated with increased risk. However, stage of disease was found to be statistically significant, $p = 0.010$ (Table 1). Patients with incurable disease were 1.5 times more likely to be at risk for malnutrition than those with curable disease (34% vs 21%). Median percentage weight loss in patients with incurable vs curable disease was 4.7% and 2.7%, respectively. Of the patients that screened positive for risk of malnutrition, median percentage weight loss was also noted to be greater in patients with incurable disease (12.7% vs 8.3%). Interestingly, only 21.3% of patients correctly diagnosed themselves as high risk for malnutrition while 78.7% of patient found to be at risk for malnutrition by the MST did not. This difference between the two groups was found to be statistically significant, $p < 0.001$ (Table 1).

Conclusion: We have demonstrated the feasibility of using the MST as a screening tool to identify CRC patients at risk for malnutrition. As demonstrated here, stage of CRC is a significant variable associated with malnutrition risk. The majority of patients with increased risk for malnutrition were unable to correctly perceive their nutritional risk. Lack of recognition of malnutrition may be a contributing factor in delay of diagnosis. Screening combined with early referral for dietary consultation may improve patient outcomes.

Financial Support: n/a

Table 1. Characteristics of patients at risk or not at risk for malnutrition

		Not At Risk (n=238)	At Risk (n=95)	T-test
Age	<65 years old	146	61	0.63
	65 years old or greater	92	34	
Stage	Potentially curable	112	30	0.010
	Not curable	126	65	
Sex	Female	115	42	0.50
	Male	123	53	
Self-Perception	Not malnourished	233	74	<0.001
	Malnourished	5	20	

P70 - Disease stage is associated with malnutrition risk as identified using the Malnutrition Screening Tool (MST) in patients with primary intrahepatic cancers.

Pamela Hodul, MD[1]; Alexander Rennie, BS[2]; Alyssa Standlick, BS[2]; Nicholas Russo, BS[2]; Joseph Tang, BA[2]; Gary Wong, BS[2]; Erin Gurd, RD/ LDN/ CNSC[1]; Benjamin Powers, MD/ MPH[1]

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Purpose: Malnutrition portends a poor prognosis amongst patients with primary intrahepatic cancers defined as Hepatocellular Carcinoma (HCC) or Intrahepatic Cholangiocarcinoma (IHC). 1 Intrahepatic neoplasms are the 9th most common cancer in the United States. However, these cancer types are projected to be the 3rd most common by 2030.2 The Malnutrition Screening Tool (MST) is a validated survey that allows prediction of a patient's risk of malnutrition.4 Factors associated with increased risk of malnutrition in patients with intrahepatic primary cancers is not well characterized. Here we use the MST to identify patient and / or disease variables which best associate with malnutrition risk in patients with primary hepatic malignancies.

Methods: A cohort of 137 patients with intrahepatic cancers (HCC or IHC) were evaluated in the GI Oncology Clinic at Moffitt Cancer Center over a 15 month period during 2019–2020. Patients who presented to the clinic were given the MST, a validated malnutrition screening tool4, by the nurse during the initial visit. Data from the patients' charts were extrapolated via the electronic health record, then entered into a redcap database. Curable disease was defined as cancer that can be treated with surgery or neoadjuvant chemotherapy. Non-curable disease was defined as those with locally advanced or metastatic disease. Comparison of descriptive variables were reported. Additional statistical analysis using independent variable t-tests were performed to identify significance of patient-centered variables.

Results: There were 137 patients with primary intrahepatic carcinomas that were included in the study (HCC n = 76, IHC n = 61). Of the 137 patients, 45% (n = 61) were found to be "at risk" for malnutrition as defined by the MST (HCC 32/ 76, 42%; IHC 29/61, 48%). Patients with incurable disease (n = 104) were 2 times as likely to be screened as "at risk" per the MST, 52% compared to patients with curable disease (n = 33) 21%. Age and Charlson Co-Morbidity index were not variables that were found statistically significant. Of those deemed "at-risk", patients with incurable disease presented with significantly more GI symptoms (2.98 vs. 1.88 average symptoms reported, $p < .01$). Specifically, patients with non-curable disease experienced significantly more bloating of the stomach (37% vs. 14%, $p < .01$) and jaundice (24% vs. 0%, $p < .01$) than those with curable disease. Patients with incurable disease presented with increased median weight loss (10.18% vs. 7.75%, $p = 0.11$) and greater prevalence of severe liver disease (50% vs. 35%), although these results were not statistically significant.

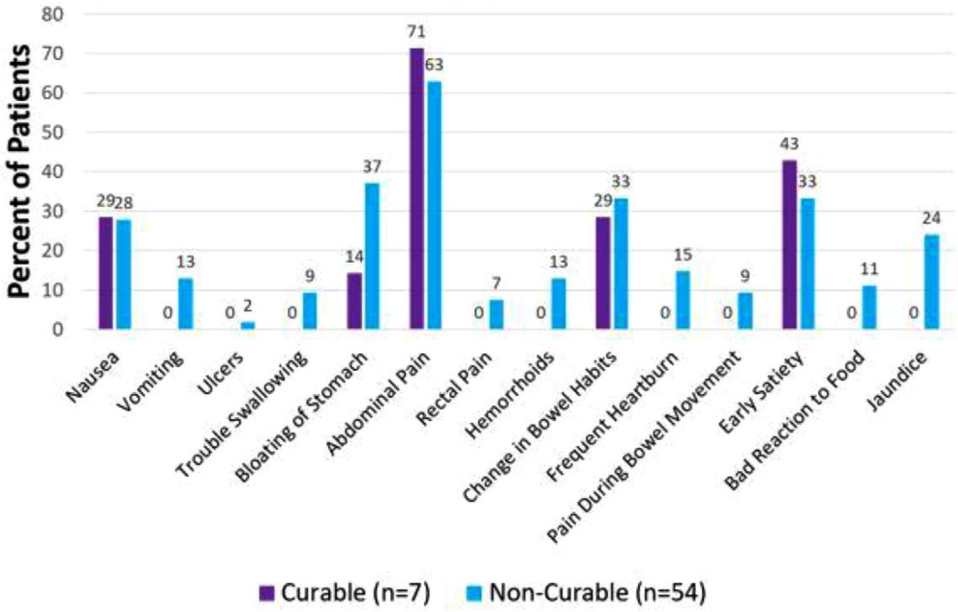
Conclusion: We have demonstrated the feasibility of using the MST as a screening tool to identify intrahepatic carcinoma patients at risk for malnutrition. As demonstrated here, patients who presented with non-curable disease were twice as likely to be "at-risk" for malnutrition per the MST than those with curable disease. Increased awareness that disease stage and associated symptoms can impact nutritional risk in patients with primary intrahepatic cancers will lead to earlier identification of at risk patients. Timely identification and intervention will likely lead to improved outcomes and tolerance to therapy.

Financial Support: n/a

Table 1. T-test Values for Predictors of Malnutrition

	Average Value (Range)		T-Test
	MST at risk (n=61)	MST not at risk (n=76)	MST at risk vs. not at risk
Charleston Comorbidity index (CCI)	5.09 (0-11)	4.34 (0-15)	p = 0.18
Age-Adjusted CCI	8.08 (2-19)	7.38 (0-16)	p = 0.26
Number of Gantrointestinal Symptoms	2.93 (0-10)	1.88 (0-7)	p < .01

Figure 1. Most Common GI Symptoms in MST At-Risk Patients



P71 - Mental Health in Primary Colorectal Cancer Patients is Associated with Malnutrition Risk

Pamela Hodul, MD[1]; Joseph Tang, BA[2]; Gary Wong, BS[2]; Alexander Rennie, BS[2]; Alyssa Standlick, BS[2]; Nicholas Russo, BS[2]; Erin Gurd, RD/ LDN/ CNSC[1]; Benjamin Powers, MD/ MPH[1]

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Purpose: Colorectal cancer (CRC) is the third most common malignancy in the United States.1 Malnutrition is a common problem in cancer patients,2 with upwards of 20% of cancer patient mortality attributed to the effects of malnutrition alone.3 Malnutrition is linked to poor treatment outcomes including increased intolerance to chemotherapy, risk of infection, hospitalization, and progressive disease.1 Previous studies have shown that CRC patients are also at increased risk for mental health problems, contributing to worsening quality of life and treatment outcomes.4

Methods: We performed a prospective cohort study to assess the prevalence and factors most closely associated with malnutrition risk in newly diagnosed patients presenting with CRC to an outpatient oncology clinic over an 18 month period between 2019 and 2020. A validated outpatient oncology malnutrition screening instrument, the Malnutrition Screening Tool (MST)5 was administered by the clinical nurse. Patient symptoms, demographics, and clinical variables were collected using an IRB approved protocol and entered into a RedCap Database. The associations between MST risk and binary variables were analyzed using the Chi Square test. The associations between MST risk and continuous variables were analyzed using the Kruskal Wallis test.

Results: Of 1,187 gastrointestinal cancer patients screened for malnutrition risk using the MST, 333 biopsy-confirmed CRC patients were identified and used as the study cohort. Of those, 28.5% (n = 95) screened positive for "at risk" for malnutrition. Patients at risk for malnutrition were 1.5 times more likely to report the presence of mental health issues compared to the low risk group (41.1% vs 28.6%, $p < 0.05$). (Figure 1). Anxiety and depression were commonly reported mental health issues in CRC patients (23.4% and 15.6%, respectively). Amongst patients at risk for malnutrition, 30/95 (31.6%) suffered from anxiety and 16/95 (16.8%) reported depression. Risk of malnutrition in CRC patients was independent of age,

socioeconomic status (Area of Deprivation Index, ADI National Index Score), Charlson Comorbidity Index (CCI), marital status (single vs married or cohabitation), and social support status (living alone vs living with another). (Figure 1)

Conclusion: In this cohort study, we have demonstrated that the MST can be used as a screening tool to identify CRC patients at highest risk for malnutrition. We have also identified an association between mental health issues and risk of malnutrition in the CRC patient population. We know from prior studies that inadequate screening and or recognition of malnutrition risk by providers leads to inferior treatment outcomes. Concurrent mental health issues may further compound this risk. Early identification of malnutrition risk through validated screening tools such as the MST and appropriate treatment of comorbid mental health issues in CRC patients may lead to improved patient outcomes and quality of life.

Financial Support: n/a

Figure 1. Characteristics of CRC patients at risk or not at risk for malnutrition

		Not At Risk (n = 238)	At Risk (n = 95)	Chi Square Analysis P Value
Marital Status*	Married	166	67	0.93
	Not Married	71	28	
Social Support*	Lives With Others	187	78	0.54
	Lives Alone	44	15	
Mental Health Issue	No Mental Health Issues	170	56	0.028
	Mental Health Issues	68	39	
		Median(25th and 75th Percentiles)	**Median(25th and 75th Percentiles)**	**Kruskal Wallis P Value**
Age		59.5 (52 – 59)	59 (50 – 69)	0.50
ADI		50 (30 – 73)	46(34 – 66)	0.35
CCI		1 (0 – 2)	0 (0 – 2)	0.68

Marital status and social support were not reported by all patients*

P72 - "You can't manage what you can't measure": Perspectives of transplant recipients on two weight management interventions

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Purpose: Weight gain occurs frequently in solid organ transplant recipients (SOTRs) leading to increased morbidity and/or mortality. There is thus a need for evidence-based weight management interventions (WMIs) for these patients. Previous research suggests that effective interventions for SOTRs must be tailored to address the unique physical and psychosocial circumstances of this patient population. However, few studies have examined how to best meet patients' needs in delivering post-transplant nutrition and weight management guidance. This study aimed to explore qualitatively the perspectives of SOTRs regarding their experiences participating in a group-based weight management program utilizing a) standard population-based nutrition guidance (TxGLB), compared to those receiving b) novel, nutrigenomics-based nutrition guidance (TxGLB+Ngx).

Methods: All active participants in the Nutrigenomics, Overweight/Obesity, and Weight Management - Transplant (NOW-Tx) clinical intervention pilot study were invited at its conclusion to participate in the qualitative study. The guiding methodology was interpretive description. Data collection occurred using semi-structured focus groups and individual interviews which were audio recorded and transcribed verbatim. Consistent with interpretive description methodology, data analysis was conducted concurrently with data collection. Paper copies of transcripts were hand coded line-by-line using the process of inductive thematic analysis. The resulting codes were then organized into a coding scheme (themes and sub-themes) which was systematically applied to all transcripts with the aid of qualitative data analysis software (NVivo 12 Pro for Windows).

Results: Eighteen out of 19 invited NOW-Tx study participants (95%) agreed to be interviewed either in focus groups (n = 15) or individually (n = 3). Four overarching themes were identified, each with one or more sub-themes. Three themes were common to both intervention groups: The post-transplant experience; Beneficial program components; Suggestions for improvement. One theme was unique to the nutrigenomics-based intervention and comprised the sub-themes of intervention-specific advantages, challenges and problem-solving. Table 1 lists all themes and sub-themes, and provides examples of supporting quotes for sub-themes.

Conclusion: Study participants expressed a strong interest in and need for credible post-transplant nutrition and weight management guidance. The group-based WMI developed for this study offers multiple components that participants identified as beneficial: evidence-based nutrition knowledge development, clear weight management goals and reinforcement, and self-monitoring guidance. This intervention also provides social support from SOTR peers, a feature that is highly valued by this patient population with self-described unique physical and psychological health circumstances. The addition of nutrigenomics-based dietary guidance to the WMI demonstrated high acceptability among participants in the cur-

rent study. This novel intervention offers a potentially valuable means of enhancing motivation for behavior change in this specialized population desiring clear, actionable and highly personalized dietary guidance for weight management.

Financial Support: 1) grant from Brescia University College 2) complimentary genetic test kits and laboratory analysis from Nutrigenomix.

Table 1 Themes, sub-themes and examples of supporting quotes

Both intervention groups (population-based and nutrigenomics-based nutrition guidance)		
Themes	Sub-themes	Examples of supporting quotes
1. The post-transplant experience	Limited access to professional nutrition guidance	"I wish I had been followed more closely [post-transplant] so that someone could give me help on what to eat so that I could gain weight - but healthy." (*Participant 1, TxGLB)*
	Existing health self-management skills	"Well, before your transplant you're pretty much down to nothing, as far as your health and your strength. And then, you know, you're building yourself back after your transplant." (*Participant 9, TxGLB+Ngx*)
	Physical and psychological health factors	"I think we're kind of unique individuals and diet is a very important part of our lives, especially being post-transplant patients….I have to watch it more than maybe the average person, just so that, you know, my organ will last longer, and I will be healthier." (*Participant 12, TxGLB*)
	Connection to other transplant recipients	"I just think that if we could have a bunch of us - we empower each other." (*Participant 17, TxGLB*)
2. Beneficial program components	Nutrition knowledge development	"You know, this is science, it does work. And if you listen to the news every day, you get a different diet tip every day and most of it's garbage and doesn't apply to you. This is my plan, it applies only to me. And if I follow it, it'll work." (*Participant 2, TxGLB*)
	Clear goals and reinforcement; Self-monitoring guidance	"I find you can't manage what you can't measure, and you know, this sheet that you've given us is a road map, it tells us what to do. And if you follow it, and you measure your food, and stick to it, it will work, and that's what I found out over the last year (*Participant 2, TxGLB*)
	Peer support	"It was nice because we could chat with each other and say, 'Hey, I found this recipe and it keys in to what we just learned.'" (*Participant 1, TxGLB)*
3. Suggestions for improvement	Varied suggestions	"I think there should have been more information on what to do when you're dealing with the psychological piece [transplant-related mental health]." (*Participant 17, TxGLB*)
		Nutrigenomics-based group only
Theme	Sub-themes	Supporting quotes
1. Unique aspects of nutrigenomics-based guidance	Advantages	"It's personalized, which is a big advantage. So it tells you - as opposed to the standard recommendations for the general population - the idea with this is that it's got an advantage specifically for me." (*Participant 16, TxGLB+Ngx*)
	Challenges: Implementing recommendations	"You do have to take time, cutting vegetables and having all that fresh, whole food, it does take time. But that's the commitment." (*Participant 9, Tx-GLB+Ngx*)
	Problem-solving: Learning trajectory	"I started trusting myself and I would - I could eyeball my cup of cereal, and I was pretty good at eyeballing it. So that was the first step. And then over the course of the six months, you kind of figure out what foods have - you know, something that's going to be high in protein." (*Participant 17, TxGLB+Ngx*)

Themes, sub-themes and examples of supporting quotes

Themes, sub-themes and examples of supporting quotes

P73 - Characteristics of Patients Post Bariatric Surgery on Home Parenteral Nutrition and Common Indications

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Purpose: Obesity is an ongoing issue in the United States, thus more patients are having bariatric surgery (BS) for weight loss. BS does have associated risks which can be short and long term (1,2). These complications can directly impact nutrition status which can result in malnutrition. Parenteral nutrition is an appropriate nutrition intervention in patients who have a dysfunction of the GI tract where enteral nutrition is not appropriate or not tolerated. The purpose of this study was to describe the characteristics of patients post BS who received home parenteral nutrition (HPN) from a national home infusion provider and to evaluate the type of BS and common indications most likely to result in HPN use.

Methods: Patients 18 years of age and older and started on HPN between April 1, 2019 and April 1, 2020 due to complications related to bariatric surgery were evaluated. Data were collected on patient demographics (age, gender, BMI), need for HPN, type of BS, date of BS, length of need for HPN and reason HPN was discontinued were evaluated.

Results: A total of 159 patients were identified as having complications for BS. Seventy-five patients were removed as no follow up note was completed indicating need for HPN was less than one week. Five patients were removed as they did not fit criteria upon chart review, leaving 77 patients for analysis. The majority of patients received gastric sleeve (n = 31, 40.3%) followed by roux-en-Y gastric bypass (n = 27, 35.1%). The most common reason for HPN was anastomotic leak (n = 15, 19.5%) closely followed by intractable nausea/vomiting (n = 14, 18.2%) and ulcer (n = 12, 15.6%). The majority of patients required HPN greater than 1 year after BS (N = 26, 36.4%). Most patients required HPN for 30–90 days (n = 26, 33.8%) and 12 patients remain on HPN as of this writing (n = 12, 15.6%). HPN was discontinued for various reasons, but improved oral intake was the most common reason for completion of therapy (n = 25, 32.5%), followed by unspecified reasons (n = 14, 18.2%) and resolution of leak and/or surgical repair (n = 10, 13.0%).

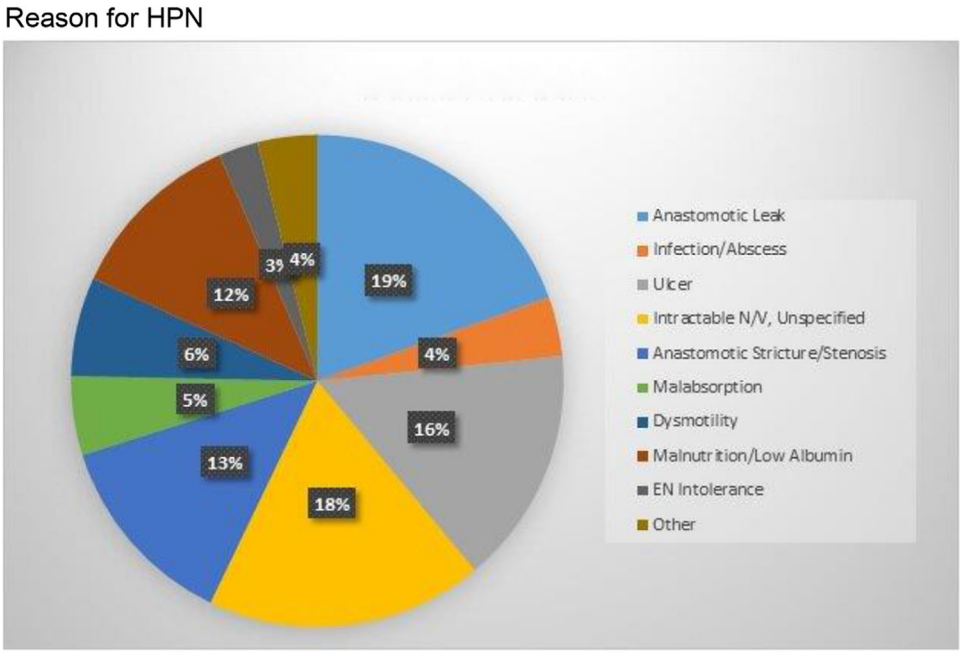
Conclusion: Our study demonstrated that among patients requiring HPN for complications with BS, those who received gastric sleeve were most at risk for requiring HPN, however this may be related to the growing popularity of this type of BS (3). There were a variety of reasons for requiring HPN; anastomotic leak and intractable nausea/vomiting being the most common. The majority of patients required HPN > 1 year after their BS. High risk patients should be closely monitored for signs of food intolerance for at least one year post-operatively so appropriate interventions can be implemented to avoid requiring HPN. Improved oral intake was the most common reason for discontinuing HPN. This may be attributable in part to home infusion dietitians who are skilled at promoting oral intake and proactively weaning patients from HPN. This research helps to further identify the common barriers to weaning HPN which can help to better serve this population and meet their nutrition goals. Future research should focus on specific nutrition interventions implemented by HPN dietitians in the short and long term HPN patient.

Financial Support: n/a

Table 1: Characteristics and PN Use in Patients Post Bariatric Surgery

	Number (Percentage)
Number of Patients	77
Age (Years)	49.6
BMI	34.5
Gender	
Male	5 (6.5)
Female	72 (93.5)
Type of Bariatric Surgery	
Gastric Sleeve	31 (40.3)
RYGB	27 (35.1)
BPD w/ Duodenal Switch	8 (10.4)
Other/Not Specified	11 (14.3)
Time from Surgery to HPN (days)	
<30 days	16 (20.8)
30-179 days	18 (23.4)
180-360 days	6 (7.8)
>1 year	28 (36.4)
Unknown	9 (11.7)
Duration of TPN (days)	
<30 days	19 (24.7)
30-90 days	26 (33.8)
>90 days	20 (26.0)
Still on HPN	12 (15.6)

Table 2: Reason for Discontinuing HPN	
	Number (Percentage)
Improved Oral Intake	25 (32.5)
Unspecified	14 (18.2)
Still on HPN	12 (15.6)
Leak Resolved/Surgical Repair	10 (13.0)
Line Infection/Line Removed	8 (10.4)
Transition to EN	5 (6.5)
Non-Compliance	3 (3.9)



P74 - Treatment of Iron Deficiency after Bariatric Surgery with Oral Iron: Does It Work?

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Purpose: Iron deficiency (ID) is one of the most common and consequential deficiencies which mitigate the health benefits of metabolic surgery. ID slowly progresses to ID anemia and associated symptoms but ID without anemia also impacts DNA replication, cell cycle, immune response, neurotransmission, and energy metabolism, leading to fatigue, poor weight loss and poor quality of life. Yet, there is limited evidence on the effectiveness of current guidelines for prevention and treatment of ID after bariatric surgery. The cause of ID is multifactorial related to changes in foregut anatomy reducing absorption, decreased dietary iron, lack of tolerance to inorganic iron supplements and poor patient compliance. Hypothesis: The treatment of ID with an additional daily 325 mg ferrous sulfate tablet (101 mg elemental iron daily) can improve hematinic parameters as well as fatigue.

Methods: This single arm pilot study included patients that had ferritin < 30 ng/ml with or without anemia within 3 years after bariatric surgery. All were taking multivitamins containing 36 mg elemental iron (per standard of care), and were started on ferrous sulfate 325 mg daily. Patients were followed monthly for evaluation of side effects, intolerance and symptoms of fatigue. A dietitian followed patients monthly to evaluate their compliance and appropriate iron and standard supplement intake and to educate them to include iron rich foods into their post bariatric diet. The patients' compliance with iron intake was monitored using a monthly calendar check. FACIT-fatigue questionnaire was used for evaluation of fatigue monthly. Data collection took place at the month 0, 2, and 4 of treatment, including data from the comprehensive medical evaluation visit before

surgery. Changes in hematinic parameters and fatigue from pre to post treatment were evaluated using repeated measure linear regression. Self-reported data from questionnaires was used to measure patient compliance.

Results: Twenty-six female patients were included in the project. Nineteen patients (73%) completed 2-month and/or 4-month follow-up. Seven patients (26%) dropped out: COVID-19 related reasons (n = 5), symptomatic with IDA and intolerance to oral intake requiring iron infusion (n = 1), and non-compliance (n = 1). During the 4-months of follow-up, serum ferritin increased by 26 ng/mL (p = 0.0006). FACIT-fatigue score at baseline (mean 35) improved by 9 points during follow-up (p = 0.015). Hemoglobin increased by 0.8 g/dl during follow-up, but this improvement was not significant (p = 0.090). Three out of 19 patients had side effects during follow-up (15%). One patient had severe constipation and missed frequent doses at month 4. Two patients had mild gastrointestinal disturbances which were resolved and/or tolerated, and they continued iron intake. Overall patient compliance was good with 89% very compliant.

Conclusion: Our data indicates: oral ferrous sulfate containing ~100 mg elemental iron daily improved hematinic parameters, iron treatment improved symptoms of fatigue, the incidence of GI side effects was low, and patient compliance with an intensive multidisciplinary care plan for treatment of ID was good.

Financial Support: n/a

Table 1: Characteristics at baseline treatment

Number of patients and sex	26 females
Menstrual status, number of patients (Premenopausal/ postmenopausal)	18/8
Type of surgery, number of patients (Roux-en-Y / Sleeve)	23/3
Average age, years	40.2 ± 9.1
Average BMI, Kg/m^2 - pre-op	44.3 ± 6.8
Average BMI, Kg/m^2 - baseline	32.8 ± 6.5
Average months since surgery	12.7 ± 6.5
Average Hgb, g/L, pre-op	12.5 ± 1.1
Average Hgb, g/L, baseline	12.4 ± 1.2
Average ferritin, ng/ml, pre-op	28.3 ± 17.5
Average ferritin, ng/ml, baseline	13.1 ± 6.2

P75 - Cardiovascular disease risk factors among Geriatric Population in Saudi Arabia

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Purpose: The study aimed to determine selected CVD risk factors among Saudi geriatric population in Al Madinah Al Munawarah, Saudi Arabia. It was hypothesized that participants would have a higher risk of developing CVD.

Methods: An epidemiological, cross-sectional, community-based study included freely living persons aged ≥65years (n = 600). An equal number of participants was recruited between January 2018 to January 2020. The sample size was determined based on the following equation: n = (Z1-α/2)2x P (1-P) ÷d2 considering a confidence level of 95%, Z1-α/2 = 1.96, d = 0.05 and using a 3.5% malnutrition prevalence in this population. Researchers collected socio-demographic characteristics. Body weight and height were measured twice for the calculation of body mass index (BMI). Fasting blood samples (5 ml) were collected for the determination of selected biochemical markers, including glycemic status, lipid profile, C-reactive protein, serum albumin, and haemoglobin level. The Atherogenic Index of Plasma (AIP) was calculated (log (TG/HDL-C). Blood tests were carried out by an electrochemiluminescence immunoassay using the Cobas-e 411 immunoassay analyzer and Siemens Dimension XP. Ethical permission was obtained from the Ethics Committee at the Faculty of Applied Medical Sciences at Taibah University. Statistical analysis was performed using Graphpad Prism 7 (GraphPad Software, CA, USA). Quantitative data were expressed as mean ± SD, frequencies and percentages. Differences between older men and women were analyzed using Independent Student's t-test. An AIP value of < 0.11 depicts the low risk of CVD, 0.11-0.21 is indicative of intermediate-risk, and >0.21 for high-risk CVD. Pearson's correlation was used to determine the association between selected CVD risk factors. Multivariate analysis based on Multiple Linear Regression model was run to predict the risk of CVD for older adults based on 95% confidence interval. Significance level was set at < 5%.

Results: Smoking was more prevalent among men (30%) than women (3.7%). Older adults had higher glycated haemoglobin percent and C-reactive protein levels. Many men (57%) and women (33%) had elevated C-reactive protein levels (Table 1). More women suffered from hypoalbuminemia (54%) than men (40.7%), whereas low haemoglobin levels were more common among men (54% versus 40.7%, respectively). Many women (25%) and men (44%) were malnourished, either overweight or obese (Table 2). Multiple Linear Regression models showed that HDL-C and albumin decreased significantly with age, whereas BMI (women only), C-reactive protein and AIP increased (Table 3).

Conclusion: The older Saudi population is at increased risk for CVD as determined by smoking status, selected biochemical markers, and BMI; the risk increases with age. These risk factors are all nutrition-related and are affected by their dietary intake. There is a need for developing community-based intervention programs targeting these risk factors.

Financial Support: n/a

Table 1: Selected Biochemical markers for older Saudi men and women*.

Blood Test	Women (n=300)	Men (n=300)	P-value	Normal values
Fasting Blood Glucose (mmol/L)	5·77±5·76	6·23±4·32	0·40	4·6 - 6·4
Glycated Hemoglobin A1C (%)	7·90±2·95	8·4±1·64	<0·001**	4·3 - 6·0
Hemoglobin level (g/dl)	12·6±3·46	12·6±3·46	0·27	12 - 16
Iron (µmol/L)	7·8±9·83	9·8±3·73	0·80	9·0 - 30·4
Ferritin ug/mL	68·12±14·705	39·12±12·991	<0·001**	12 to 150
LDL-cholesterol (mmol/L)	3·23±0·86	2·92±1·02	0·87	5·2 - 6·1
HDL-cholesterol (mmol/L)	1·22±0·31	1·02±0·19	<0·001**	1·0
Total cholesterol (mmol/L)	6·78±1·14	6·63±1·13	0·04*	5·3 – 6·2
Triglycerides (mmol/L)	1·27±0·67	1·49±1·1	<0·001**	0·40 - 1·52
ALT (U/L)	16±2·01	18±4·01	0·01*	7 - 55
AST (U/L)	20·0±9·18	19·0±6·18	0·06	15·1 - 46·2
Creatinine (mmol/L)	57·1±9·83	89·1±10·33	<0·001**	45 - 90
C-reactive protein (mg/L)	17·14±5·92	36·14±7·82	0·003**	0·00 - 5·00
AIP	0·21±0·18	0·22±0·21	0·04*	0·11-0·21
Albumin (g/L)	33·0±5·21	37·0±7·31	0·02*	35 – 55
Vitamin B_{12} (pmol/L)	220·0±22·80	215±22·78	<0·05*	118 - 701

**Mean ± SD and P-values are shown. Haemoglobin levels were within the lower limits among both men and women; Albumin levels were low, especially among women. Older adults had elevated HBA1C, total cholesterol levels, C-reactive protein, and AIP.*

Table 2: Categories of Body composition and selected biochemical markers amongst Saudi old men and women[#]		
	Women n (%)	**Men n (%)**
BMI (Kg/m^2)		
Underweight (<18·5)	74 (24·7)	23 (7·7)
Normal weight (18·5 to 25)	149 (49·7)	125 (41·7)
Overweight (25 to 29·9)	68 (22·7)	110 (36·7)*
Obese (≥ 30)	11 (2·7)	22 (7·3)
Albumin (g/L)		
< 35	163 (54·3)	122 (40·7)
35–50	126 (42·0)	177 (59·0)
> 50	9 (3·0)	1 (0·3)*
Hemoglobin (g/dl)		
F< 12 g/dl; M < 14	122 (40·7)	162 (54)
F 12 to 16; M 14 to 18	176 (58·7)	135 (45)
F > 16; M < 18	2 (0·7)	3 (1)
Iron (µmol/L)		
F < 11; M < 14	201 (67·0)	253 (84·3)
F 11-29; M 14-32	90 (30·0)	49 (16·3)
F > 29; M > 32	9 (3·0)	0 (0)**
Glycated haemoglobin A1C (%)		
Normal < 5·7	60 (20·0)	17 (5·7)
Pre-diabetic 5·7% to 6·4	24 (8·0)	35 (11·7)
Diabetic > 6·4	216 (72·0)	248 (82·7)*
Vitamin B_{12} (pmol/l)		
< 118	73 (24·3)	25 (8·3)*
118 - 701	211 (70·3)	251 (83·7)
> 701	16 (5·3)	24 (8)
Atherogenic Index of Plasma (CVD risk)		
Low	135 (45)	18 (6·0)
Intermediate	77 (25·7)	5 (1·7)*
High	88 (29·3)	277 (92·3)**
C-reactive protein (mg/L)		
<1·00 mg/L	50 (16·6)	20 (6·7)
1·00 - 5·00 mg/L	150 (50·0)	110 (36·7)
>5 mg/L	100 (33·4)	170 (56·6)*

[#]*Number and percentages are shown. A large number of older adults were malnourished (being overweight/obese). Nearly half of the participants had hypoalbuminaemia, intermediate to high AIP values, and elevated C-reactive protein.*

Table 3: Multivariate analysis based on Multiple Regression models showing B values, 95% CI, and *P* values for women and men:

Male, n=300					
Variables	95% CI	B	SE	ß	P value
Albumin	0.9643 to 4.004	-2.36	0.024	-0.54	0.03
Triglycerides	0.2318 to 3.2596	2.792	0.004	0.77	<0.001
Cholesterol	0.7761 to 3.265	2.654	0.006	0.69	0.002
HDL-C	0.7935 to 1.62	-1.412	0.001	-0.55	<0.001
LDL-C	0.9265 to 3.604	2.981	0.003	0.57	0.0028
Fasting glucose level	0.8823 to 4.004	2.854	0.014	0.54	0.04
Ferritin	0.9990 to 4.000	2.982	0.073	0.65	<0.001
BMI	0.9987 to 2.001	1.932	0.012	0.54	<0.001
C-reactuve protein	0.3536 to 20.29	2.874	0.024	0.68	0.003
AIP	0.9973 to 3.005	1.984	0.001	0.54	0.002
Women (n = 300)					
Albumin	0.9710 to 1.015	0.356	0.005	0.043	0.001
Vit B_{12}	1.001 to 2.003	-1.332	0.075	-0.543	0.05
Calcium	0.1588 to 1.726	-1.62	0.047	-0.651	0.03
Triglycerides	0.1569 to 3.170	2.392	0.002	0.654	<0.001
Cholesterol	0.9426 to 1.604	2.832	0.004	0.667	0.04
HDL-C	0.9037 to 19.19	-1.332	0.001	-0.761	<0.001
LDL-C	0.6604 to 1.175	2.932	0.003	0.687	0.003
HbA1c (%)	0.8386 to 1.009	2.412	0.010	0.557	<0.001
Fasting blood glucose	0.9993 to 1.125	2.354	0.019	0.687	<0.001
Ferritin	1.000 to 4.009	2.762	0.016	0.554	<0.001
C-reactive protein	0.9936 to 6.003	2.339	0.005	0.654	<0.001
AIP	0.5641 to 16.177	2.389	0.001	0.765	<0.002

Age is the dependent variable. Their HDL-C and albumin decreased significantly with age, whereas BMI (women only), C-reactive protein and AIP increased.

P76 - Malnutrition is Associated with Increased Mortality and Length of Stay in Patients with Heart Failure, and is More Common In Smokers

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Purpose: Malnutrition is generally associated with poorer hospital outcomes, and it is not uncommon in patients with heart failure. Previously published studies on incidence rates of malnutrition in heart failure patients and outcomes are limited by their small sample size and lack of control for confounding factors. This is a follow up of a previous analysis, with an updated dataset that includes additional variables, in our retrospective cohort study that aims to elucidate the associations between malnutrition and hospital length-of-stay (LOS), mortality and discharge destination in inpatients with heart failure.

Methods: Data was obtained from the electronic medical records (EMR) at Columbia University Irving Medical Center for inpatients admitted with primary diagnosis of heart failure between January 1st 2018 to December 31st 2018. A two-sided t-test was conducted between heart failure patients with and without malnutrition on outcomes of mortality, LOS and discharge destination.

Results: For N = 7386 inpatients with heart failure, the median age was 75 years old, with 3444 females (46.63%) and 3942 males (53.37%). Overall mortality rate was 5.75% (n = 425). There were significant increases in mortality (10.71% vs. 4.57%, relative risk (RR): 2.35, P< 0.001), and length of stay associated with malnutrition, compared to those without malnutrition (16 days vs. 7 days, P< 0.001). Disposition of those surviving to discharge was 2369 (32.07%) patients directly home, and 4592 (62.17%) patients to a healthcare facility (e.g. skilled nursing, rehabilitation). Significantly fewer patients with malnutrition were discharged to home compared to those without malnutrition (16.78% vs. 37.90%, OR 0.33, P< 0.001). Underweight, by BMI, was much more prevalent in the malnutrition group than in those without malnutrition (18.53% vs 7.33% p = 0.017), and a significantly (p < 0.001) higher proportion of patients in the non-malnutrition were normal weight group, compared to the malnutrition group. There was a significant association in prevalence of hyperkalemia in those with malnutrition compared to those without malnutrition (18.74% vs. 13.44%, relative risk (RR): 1.39, P< 0.001). There was also a significant association between prevalence of chronic kidney disease-related anemia (CKDA) in patients with malnutrition compared to those without (18.88% vs. 12.40%, relative risk (RR): 1.52, P< 0.001). Nicotine dependence was also more prevalent with malnutrition compared to those without malnutrition (24.98% vs. 21.27%, relative risk (RR): 1.17, P = 0.0021).

Conclusion: Patients with heart failure and malnutrition are at higher risk for in-hospital mortality, prolonged hospital length of stay, and a decreased probability of discharge to home. Other findings included a higher incidence of CKDA, hyperkalemia, and nicotine dependence in those with malnutrition. Continued study of this population will include the impact of confounders such as socioeconomic status and comorbid conditions, as well as additional outcome measures such as repeated hospitalizations, with the goal of creating predictive models for which patients with malnutrition might benefit from nutritional interventions.

Financial Support: n/a

P77 - Early and late post-operative complications are related to preoperative body mass index and surgical technique of obese bariatric patients?

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Purpose: Obesity has complex and multifactorial etiology, resulting from the interaction of genes, environmental and emotional factors. Bariatric surgery is a treatment modality for obesity and benefits in the clinical management of comorbidities, and its effectiveness confirmed by several studies. However, early or late post-operative complications this surgery influence on clinical outcomes. This study purpose to evaluate the relationship between early and late post-operative complications of bariatric surgery with surgical techniques, comorbidities and body mass index (BMI) in obese patients.

Methods: Retrospective cohort study with 412 patients from a tertiary hospital in Porto Alegre/Brazil, with approval by the local Ethics Committee. Patients of both genders, over the age of 15 years who underwent bariatric surgery between 2013 to 2016 were included. Pregnant patients, duplicate or incomplete data were excluded. Data on gender, age, surgical technique, preoperative body mass index, length of stay, admission to the intensive care unit (ICU), preoperative comorbidities and post-operative complications early (< 30 days) and late (> 30 days and < 1 year) were collected. Data presented as mean and standard deviation or percentage and frequency according to variable. To evaluate the association of early or late post-operative complications with other collected variables we used the Chi-Square test. The level of significance was 5%.

Results: Of the 412 patients, 2 were excluded to duplicity, 7 to pregnancy and 57 to incomplete data, totaling 346 patients. The sample consisted of 76.3% (n = 264) women with mean age 36.71 ± 9.48 years, mean preoperative BMI 44.13 ± 8.62 kg / m2 and 63.6% (n = 220) were obese grade III / morbid. Roux-en-Y gastric bypass bariatric surgical technique was performed in 77.7% (n = 269 / n = 341) and 93.1% (n = 322 / n = 335) of these surgeries by video. The average time of hospitalization was 4.98 ± 1.39 days and 6.9% (n = 24) admitted to ICU. The preoperative comorbidities, 15.3% (n = 53) were diabetic, 40.5% (n = 140) were hypertensive and 35% (n = 121) were dyslipidemic. Early and late post-operative complications occurred in 14.7% of bariatric surgeries, with 6.9% (n = 24 / n = 338) of patients presenting early complications in the early post-operative, of these 2.0% (n = 7) stenosis, 1.4% (n = 5) atelectasis, 0.6% (n = 2) deep venous thrombosis and 0.6% (n = 2) hemorrhage. Late complications in post-operative occurred in 7.8% (n = 27 / n = 333) of patients, is emphasized 3.8% (n = 13) delayed gastric stenosis and 0.9% (n = 3) ulcer peptic. Early post-operative complications were significantly associated with bypass technique (p = 0.046) and the ICU (p < 0.001). There was no significant association between the late post-operative complications and classification of preoperative BMI (p = 0.638), diabetes (p = 0.570), hypertension (p = 0.486), dyslipidemia (p = 0.189), surgical technique (p = 0.061) and ICU (p = 0.973).

Conclusion: Early post-operative complications were associated with gastric bypass technique and the need for ICU admission. However, there was no relationship between late post-operative complications and preoperative BMI or with the surgical technique.

Financial Support: n/a

P78 - Preliminary results of the study policies and laws of public health in clinical nutrition (POLENC)

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Purpose: Background: Disease-related malnutrition is a highly prevalent disease in Latin American countries, affecting between 30–50% of hospitalized patients. Political will is crucial to roll out and implement optimal nutritional care process in the clinical setting (1). The aims of this study were to assess the current status of public health policies in clinical nutrition, and define a conceptual guideline for their development in Latin America.

Methods: Methods: We conducted a three-phased study as follows: Phase 1: Review of documents on policies and legislations addressing clinical nutrition issues in 16 Latin American countries; Phase 2: Semi-structured in-depth interviews with strategic stakeholders (namely, clinical nutrition experts, patients, policy makers, and legislators); Phase 3: Focus group discussions and consensus of experts. Data were analyzed using qualitative content analysis procedures.

Results: Results: Here we present Phase 1 results from the Public Health Policies and Legislations in Clinical Nutrition (POLENC) study. We identified 9 clinical nutrition practice categories that should be included in the policies and legislations (Table 1). We observed a high heterogeneity in the legislation of clinical nutrition practice regarding categories' content between countries. Each country has specific regulations on oral nutritional supplements. However, none have a specific legislation on nutritional care processes. For example, no country makes nutritional risk screening mandatory at hospital admission. Importantly, our results also showed that Brazil is the only country with a specific public health policy addressing clinical nutrition issues, whereas the other countries have a "community nutrition" policy.

Conclusion: Conclusion: These preliminary results from the POLENC study underscore the challenges Latin American nations face when building a public policy on clinical nutrition. Among them, the high heterogeneity of clinical nutrition regulations and the lack of public policies on disease-related malnutrition and nutrition care processes. In view of these results, initiatives incorporating the identified clinical nutrition practice categories are required to support the development of effective legislations, policies and programs.

Financial Support: n/a

Table 1. Legislations and regulations in clinical nutrition in Latin American countries

Country	Clinical nutrition policy content categories								
	PN	EN	ONS	DFSMP	NST	CAPS	MDevs	HAN	NCP
Argentina	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Bolivia	No	No	Yes	No	Yes	No	Yes	No	No
Brazil	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Chile	Yes	No	Yes	No	No	No	Yes	Yes	No
Colombia	No	No	Yes	Yes	No	Yes	No	No	No
Costa Rica	No	No	Yes	No	No	No	Yes	No	No
Ecuador	No	No	Yes	No	No	No	Yes	No	No
El Salvador	No	No	Yes	No	No	No	Yes	No	No
Guatemala	No	No	Yes	Yes	No	No	No	No	No
México	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No
Panamá	No	No	Yes	No	Yes	No	Yes	No	No
Paraguay	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Perú	Yes	Yes	Yes	No	Yes	No	Yes	No	No
Dominican Republic	Yes	No	Yes	No	No	No	No	No	No
Uruguay	No	No	Yes	No	No	No	Yes	No	No
Venezuela	No	No	Yes	No	Yes	Yes	No	Yes	No

PN: Parenteral Nutrition; EN: Enteral Nutrition; DFSMP: Dietary foods for special medical purposes; ONS: Oral Nutritional Supplements; NST: Nutrition Support Teams; CAPS: Central Admixtures Pharmacy Services; MDevs: Medical Devices; HAN: Home Artificial Nutrition; NCP: Nutritional Care Process (Screening, Diagnosis Nutritional Therapy and Monitoring)

P79 - Evaluation of a Didactic Nutrition Support Elective Course Taught at Two Doctor of Pharmacy Programs

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Purpose: Nutrition support is an important component of healthcare education. Healthcare graduates are expected to practice competently in nutrition support-related areas following graduation and licensure. However, decreasing emphasis has been placed on nutrition support education in didactic healthcare curricula. This has resulted in increased need for nutrition support training prior to licensed practice. The purpose of this quality improvement study is to evaluate outcomes of a didactic nutrition support elective course offered to Doctor of Pharmacy (PharmD) students at two educational institutions.

Methods: A didactic 1.5 to 2.0 credit hour elective course entitled "Nutrition Support" was offered to PharmD students at California Health Sciences University (CHSU) and at Keck Graduate Institute (KGI). The faculty member offering the course is a Doctor of Pharmacy (PharmD) graduate board-certified in pharmacotherapy, critical care pharmacy, and nutrition support pharmacy. The course was taught utilizing a flipped classroom model, in which students watched video lectures prior to class and completed in-class activities, including prescribing enteral and parenteral nutrition regimens for simulated patients. Course assessments included a pre-course and post-course multiple choice nutrition support knowledge assessment, midterm and final examinations, a parenteral nutrition basic calculations competency, and a team Objective Structured Clinical Examination

(OSCE), which required teams of four to six students to prescribe a parenteral nutrition regimen and write a progress note for a complex patient. Pre-course and post-course multiple choice nutrition support knowledge assessments were compared for each cohort utilizing a t-test.

Results: Sixteen students from CHSU in the spring 2018 semester, 24 students from KGI in the spring 2019 semester, and 32 students from KGI in the spring 2020 semester were enrolled in the didactic nutrition support elective course. For the CHSU students, pre-course and post-course multiple choice nutrition support knowledge assessment averages were 48.3% and 58.3% respectively ($p = 0.007$). For KGI students taking the course in spring 2019, pre-course and post-course multiple choice nutrition support knowledge assessment averages were 54.1% and 90.3% respectively ($p < 0.001$). For KGI students taking the course in spring 2020, pre-course and post-course multiple choice nutrition support knowledge assessment averages were 54.9% and 93.1% respectively ($p < 0.001$). On the midterm and final examinations, the CHSU students scored averages of 89.0% and 81.2% respectively. For the KGI students taking the course in spring 2019, averages on the midterm and final examinations were 80.3% and 75.7% respectively. For the KGI students taking the course in spring 2020, averages on the midterm and final examinations were 74.2% and 78.2% respectively. For the parenteral nutrition basic calculations competency, averages were 95.0% for the CHSU students, 87.3% for the KGI students taking the course in spring 2019, and 82.0% for the KGI students taking the course in spring 2020. The averages for the team OSCE were 91.7%, 85.3%, and 82.1%, for the CHSU students, KGI spring 2019 students, and KGI spring 2020 students respectively.

Conclusion: The three offerings of the didactic nutrition support elective course significantly improved nutrition support knowledge of three different student cohorts at two PharmD programs. Future offerings of the course will be provided to third year pharmacy students to develop nutrition support knowledge and skills prior to practice in the field.

Financial Support: n/a

P80 - Prevalence and Characteristics of Starvation-Related Malnutrition in a Mid-Atlantic Healthcare System: a Pilot Study

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Purpose: Malnutrition in the hospital negatively impacts outcomes including readmission rates, mortality, and cost. Starvation-related malnutrition (SRM) is state of chronic undernutrition with little to no inflammation. Research on SRM within the hospital setting is lacking. Our objective was to determine the prevalence and characteristics of malnutrition within the hospital system, with particular focus on the characteristics and factors associated with readmissions in those with SRM.

Methods: We conducted a retrospective cohort study of analyzing the characteristics of adult in-patients with acute and chronic disease-related malnutrition compared to patients with SRM. Prevalence of malnutrition was calculated by dividing the total number of admissions of patients identified as malnourished by the total number of hospital discharges during the study period. Descriptive statistics were used to describe the cohort. Analysis of variance (ANOVA) was performed to determine differences between patient characteristics with SRM and other forms of malnutrition. Tukey post-hoc analysis was used to determine which groups were significantly different.

Results: Prevalence of malnutrition was 2.8%. Patients with SRM had lower body mass index (BMI; $p< 0.001$), and higher rates of readmission ($p = 0.046$), infectious disease ($p< 0.001$), psychiatric disease ($p< 0.001$), and substance abuse ($p< 0.001$) than patients with acute or chronic disease-related malnutrition. Readmitted patients with SRM had lower BMI, and higher rates of infection and illicit drug abuse than those without readmission.

Conclusion: The high incidence of comorbid substance abuse and mental illness in patients with SRM provide important targets for treatment that might reduce readmission and improve outcomes.

Financial Support: n/a

Table 1. Demographic Characteristics of Total Sample by Malnutrition Type at First Admission

Population Characteristics	Total Sample n=2304	Acute Disease Related Malnutrition n=406 (17.6%)	Chronic Disease Related Malnutrition n=1841 (79.9%)	Starvation Related Malnutrition n=57 (2.5%)	F statistic	p- value
Age, mean (SD)	65.8 (16.1)	62.5 (18.3)[ab]	66.8 (15.3)[a]	59.0 (18.4)[b]	18.171	<0.001
Female, n (%)	1201 (52.1)	215 (53)	954 (51.8%)	32 (56.1)	0.279	0.757
Race, n (%)					3.547	0.029
White	1583 (68.7)	275 (67.7)	1260 (68.5)	48 (84.2)[a]		
Black	644 (28)	119 (29.3)	516 (28)	9 (15.8)[a]		
Other	77 (3.3)	12 (3)	65 (3.5)	0 (0)		
Ethnicity						
Hispanic/Latino, n (%)	57 (2.5)	10 (2.5)	46 (2.5)	1 (1.8)	0.064	0.938
Body Mass index (BMI) (kg/m^2), mean (SD)	21.5 (5.9)	24.4 (6.6)[a]	20.9 (5.7)[b]	18.9 (3.8)[c]	63.522	<0.001
Patients readmitted, n (%)	148/2304 (6.4)	22/406 (5.4)	118/1841 (6.4)	8/57 (14)[a]	3.092	0.046
Comorbidities, n (%)						
Anemia	123 (5.3)	14 (3.4)	108 (5.9)	1 (1.8)	2.67	0.069
Diabetes	460 (20)	76 (18.7)	375 (20.4)	9 (15.8)	0.602	0.548
GI Dysfunction	654 (28.4)	132 (32.5)[a]	513 (27.9)[ab]	9 (15.8)[b]	4.057	0.017
Infectious Disease	82 (3.6)	12 (3)	53 (2.9)	17 (29.8)[a]	61.814	<0.001
Mental Health /Psychiatric disease	297 (12.9)	46 (11.3)	217 (11.8)	34 (59.6)[a]	59.812	<0.001
Seizures	42 (1.8)	1 (0.2)	33 (1.8)	8 (14)[a]	27.166	<0.001
Diagnostic Criteria, n (%)						
BMI ≤ 18.5	517 (22.4)	31 (7.6)	455 (24.7)	31 (54.4)	N/A	N/A
Inadequate Energy Intake	1551 (67.3)	342 (84.2)	1171 (63.6)	38 (66.7)	N/A	N/A
Fluid Accumulation	74 (3.2)	25 (6.2)	49 (2.7)	0 (0.0)	N/A	N/A
Loss of Muscle Mass	1244 (54)	137 (33.7)	1067 (58.0)	40 (70.2)	N/A	N/A
Loss of Subcutaneous Fat	1222 (53)	121 (29.8)	1059 (57.5)	42 (73.7)	N/A	N/A
Unintended Weight Loss	1546 (67.1)	332 (81.8)	1187 (64.5)	27 (67.1)	N/A	N/A
Substance Abuse, General, n (%)	298 (12.9)	40 (9.9)	223 (12.1)	35 (61.4)[a]	65.129	<0.001
Alcohol Use Disorder	231 (10)	33 (8.1)	174 (9.5)	24 (42.1)[a]	34.628	<0.001
Illicit Drug Abuse	108 (4.7)	12 (3)	75 (4.1)	22 (38.6)[a]	72.276	<0.001

* Indicates significant difference between groups (p≤ 0.05) (One-Way ANOVA)

[a, b, c] Results are the mean (Standard Deviation (SD)) or frequency (%). For a particular variable, means and frequencies with different superscripts are significantly (p ≤ 0.05) different (Tukey post-hoc), while the same and/or no superscript indicates no difference between those groups (p ≤ 0.05).

Table 2. Demographic Characteristics of Starvation Related Malnutrition by Admission Number

Population Characteristics	SRM-Not readmitted (1 Admission) n=49	SRM-Readmitted (> 1 Admission) n=8	χ^2	p- value
Age, mean (SD)	59.8 (18.6)	54.3 (17.2)	0.826 †	0.438
Female, n (%)	28 (57.1)	4 (50)	0.143	0.72
Smokes, n (%)	25 (51.0)	5 (62.5)	0.364	0.709
Race, n(%)			8.191	0.016
White	44 (89.8)	4 (50)		
Black	5 (10.2)	4 (50)		
BMI (kg/m^2), mean (SD)	19.3 (3.9)	16.6 (1.7)	3.247 †	0.004
Length of stay (days), mean (SD)	12.63 (17.8)	4.9 (6.2)	2.312 †	0.028
Medicaid Primary, n (%)	18 (36.7)	6 (75)	4.131	0.059
Comorbidities, n(%)				
Infectious Disease	12 (24.5)	5 (62.5)	4.747	0.043
MRSA	1 (2.0)	2 (25)	7.27	0.049
Mental Health/Psychiatric Disease	27 (55.1)	7 (87.5)	2.999	0.125
Anxiety	16 (32.7)	4 (50)	0.909	0.432
Depression	17 (34.7)	6 (75)	4.642	0.051
Seizures	5 (10.2)	3 (37.5)	4.247	0.074
Substance Abuse, General, n (%)	28 (57.1)	7 (87.5)	2.674	0.134
Alcohol Use Disorder	20 (40.8)	4 (50)	0.238	0.709
Illicit Drug Abuse	15 (30.6)	7 (87.5)	9.391	0.004
Benzodiazepine	0 (0)	2 (25)	12.695	0.018
Cocaine	10 (20.4)	3 (37.5)	1.141	0.365
Opioid	10 (20.4)	3 (37.5)	1.141	0.365

BMI, Body Mass Index; MRSA, Methicillin-resistant Staphylococcus aureus; SRM, Starvation Related Malnutrition; SRM-N, patients with SRM that were not readmitted; SRM-RA, patients with SRM that were readmitted; SD, Standard Deviation

p-values reported are based on Fisher's Exact test for categorical variables and independent t-test for continuous variables. These tests were performed using data from first admission for all cases. Groups were based on number of admissions, 1 admission (SRM-N) or >1 admission (SRM-RA), the latter of which is also referred to as readmission.

Column totals for subcategories may be greater than the overall parent category due to dual/multiple diagnoses (e.g. Anxiety and depression)

† Indicates t-statistic is reported in place of χ^2

P81 - Implementing a volume-based feeding protocol in a neurosciences critical care unit

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Purpose: Intensive care unit patients are at increased risk for hospital-acquired malnutrition due to the stress of critical illness, inability to eat, and enteral feeding interruptions. At a large, urban, academic tertiary care center in the neuroscience critical care unit (NCCU), a chart review revealed

that patients on traditional, rate-based feedings (RBF) only meet their nutritional needs about half of the time ($\bar{x} = 56\%$, $\sigma\bar{x} = 31\%$). Studies have shown that volume-based feeding (VBF) protocols are safe and offer more effective nutritional delivery than RBF protocols, which are the current standard of care at this facility. To address this gap in health care delivery and minimize the risk of malnutrition in this patient population, a VBF protocol was implemented involving nurse-driven tube feeding rate adjustments to compensate for feeding interruptions and to meet daily volume goals.

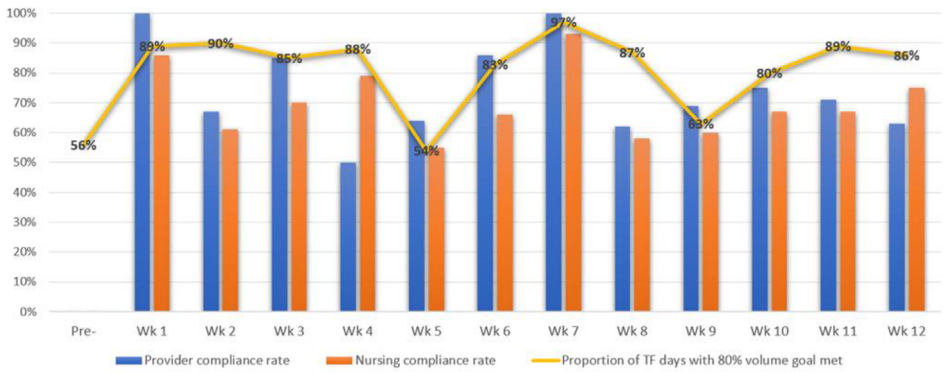
Methods: The Mobilize, Assess, Plan, Implement, Track (MAP-IT) framework was used to implement this quality improvement project. A pre- and post-study design was selected. Formal institutional review board approvals were obtained. An interdisciplinary approach was adopted and included a team of providers, nurses, and dietitians. To facilitate compliance with the VBF protocol, the implementation team provided virtual in-services to the multidisciplinary team, nurses demonstrated competency through an online quiz, and champions provided just-in-time education. The primary outcome measure was the amount of enteral nutrition delivered daily over a seven-day period and was assessed via chart audit. Secondary outcomes included protocol compliance rates and proportion of tube feeding (TF) days with feeding intolerance and hypoglycemia. Sustainability measures included official policy adoption and regular data dissemination through email and bulletin board.

Results: From a total of 104 patients (RBF = 57, VBF = 47), there were 194 episodes of tube feeding (RBF = 97, VBF = 97). Each episode was defined as the number of TF days per patient in a defined seven-day period. After 12 weeks of implementation, an independent t-test revealed more patients received TF days meeting the 80% volume goal (VBF 82% vs. RBF 56%, $p < 0.005$, $d = 0.88$), fewer hypoglycemic episodes (VBF 1% vs. RBF 4%, $p = 0.03$, $d = 0.32$), and no significant difference in feeding intolerance episodes (VBF 34% vs. 37%, $p = 0.51$). Provider and nursing staff compliance to the protocol were 72% and 68% respectively. Compliance rates were threatened by unprecedented staff turnover in the setting of the COVID pandemic, but they remained relatively the same.

Conclusion: A VBF protocol delivers significantly more enteral nutrition compared to a RBF protocol. Implementation of VBF in the NCCU was challenging due to the complexity of the intervention and competing unit priorities during the ongoing COVID-19 pandemic. Implementing a clinical policy with multidisciplinary involvement, utilizing champions, and employing multi-pronged implementation strategies may improve adherence. With early initiation of VBF, appropriate nurse-driven rate adjustments, and a multidisciplinary approach that shifts the unit culture to value nutrition, patients appear to meet their daily tube feeding goals consistently.

Financial Support: none

Figure 1. Compliance rate versus proportion of tube-feeding days meeting the 80% volume goal



P82 - The Effect of Nutrition Support on Nutrition and Clinical Outcomes in Critically Ill Patients

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Purpose: The study examined the impacts of nutrition support on ICU patients with different nutrition risk, routine clinical laboratory measurements, and malnutrition and inflammation biomarkers. The study's secondary purpose was to evaluate whether malnutrition is associated with blood biomarkers of nutrition and inflammation in the ICU

Methods: A retrospective medical chart review was conducted at a Medical Intensive Care Unit from January 2019 to December 2019. A total of 60 patients met the inclusionary criteria and were screened for nutritional risk using the mNUTRTIC and NRI score. Malnutrition was diagnosed using the GLIM criteria. Anthropometric measurements, routinely collected laboratory data, and the type of nutrition support were recorded from the day of ICU admission. ICU LOS, days on ventilation, duration on nutrition support, infection rate, mortality rate, nutritional and inflammatory

biomarkers, TLC, NRI, and NLCR, were evaluated and compared between normal nutrition vs. malnourished and different BMI groups. Chi-square, one-way ANOVA, Pearson correlation, and a binomial logistics regression analysis were conducted.

Results: The result showed that 30% of ICU patients were malnourished. Although the inflammatory markers WBC, NLCR, absolute neutrophils, absolute lymphocytes were trending down, this was not significant. Hemoglobin, hematocrit, the total protein used as nutritional markers had decreased by day 14, with a significant difference ($p < 0.001$). TLC and NLCR were significantly lower in the group with malnutrition ($p < 0.01$). Logistic regression analysis showed that elevated NLCR, Neutrophils, and lower TLC, NRI, and Lymphocytes were significantly associated with malnutrition in ICU patients ($p < 0.01$). Malnutrition was found to correlate with TLC and BMI ($p < 0.05$) negatively.

Conclusion: Malnutrition was found to be associated with TLC, NLCR, NRI, Neutrophils, and Lymphocyte, and maybe useful biomarkers in diagnosing malnutrition. Malnutrition affects the outcomes of ICU patients negatively. Nutrition support did not considerably improve nutritional status and immune function in malnourished patients in this study.

Financial Support: n/a

P83 - Current Practices In Diagnosis and Treatment of Malnutrition In an Acute Care Hospital In Massachusetts

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Purpose: Through the past decade, there has been an increasing awareness and concern about morbidity, mortality, and cost associated with malnutrition. The goal of this quality improvement (QI) project was to describe current practices and existing or perceived barriers in identifying and documenting malnutrition among healthcare providers in a 300-bed Massachusetts hospital.

Methods: A malnutrition questionnaire was created to document knowledge of the Academy of Nutrition and Dietetics (AND)/American Society for Parenteral and Enteral Nutrition (ASPEN) criteria for malnutrition (6 questions), hurdles or impediments as perceived by healthcare providers that hinder diagnosis and treatment of malnutrition (14 questions), and healthcare provider's demographics. The questionnaire was anonymously completed by healthcare providers between June and July 2020. Responses to each question were tabulated using count and percent. Associations between malnutrition knowledge score and practice characteristics (profession, years of experience, and amount of nutrition education received) were tested using chi-square test.

Results: A total of 38 healthcare providers completed the surveys. Staff Physicians were significantly more likely to correctly identify AND/ASPEN malnutrition characteristics of edema, fat wasting in triceps area, and reduced grip strength when compared to residents, nurse practitioners, and physical assistants (60% vs 20%, $p = .048$). Taking a nutrition-related course (32%) and training with dietitian during residency (16%) were significantly more likely to be associated with better knowledge of AND-ASPEN criteria for moderate malnutrition compared to the remaining sources ($p = .026$). Of respondents, 31.5% indicated that they had limited exposure to nutrition education; 34% had few classes in nutrition during their postgraduate course. About 3% of respondents were able to correctly answer all the questions that assessed knowledge of AND/ASPEN criteria. Approximately, 40% of healthcare providers ranked their ability to diagnose malnutrition as average. One-quarter (24%) felt not being familiar with the AND/ASPEN guidelines was an impediment to diagnosing malnutrition. Only 61% were documenting severe malnutrition. With regards to documenting malnutrition in the discharge summary, 63% responded "only sometimes" or "rarely". Criteria used by healthcare providers also deferred from the six characteristics cited by AND/ASPEN. For instance, 16% still used albumin and prealbumin which is not recommended by AND/ASPEN. All of the respondents were supportive of an interdisciplinary malnutrition communication tool between the registered dietitian and the healthcare provider.

Conclusion: In this QI study, health care providers are aware of the knowledge gap in diagnosis and treatment of malnutrition and are equally enthusiastic about addressing these hurdles in malnutrition documentation. These healthcare providers also expressed the need for relevant interdisciplinary tools to help promote best practice nutrition care in hospitalized patients. Thus, registered dietitians can play an important role in education and collaboration with healthcare providers to improve diagnosis and treatment of malnutrition.

Financial Support: n/a

P84 - Retrospective Analysis of Variables Associated with Obtaining Accurate Heights and Weights in a Pediatric Hospital: The Dietitian's Perspective

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Purpose: The issue of inaccurate and infrequent patient weights and heights is a common occurrence throughout many hospitals. Inaccurate or lacking anthropometric data can impact growth assessment, ability to provide proper nutrition intervention, and patient safety. The aim of this three-

phase study was to describe weight and height measurement compliance and the prevalence of inaccuracies in weight and height documentation at a pediatric free-standing hospital before and after implementing interventions to improve these processes. This article describes the frequency of lacking and discrepant weight and height measurements in a pediatric hospital, and the impact on nutrition assessments and ongoing dietary management.

Methods: A retrospective review of 300 inpatient charts was conducted in 2015 for initial data collection, and another 300 charts in 2018 for post-intervention evaluation. Inpatient charts were randomly selected from a list of total hospital admissions during two 3 month time periods (11/7/14-2/7/15 and 11/1/17-1/30/18) and a data collection tool designed to complete chart reviews was utilized to obtain patient information. The number of weights and heights obtained during the admission with comparison to the number of required weights and heights that should have been obtained during the admission, and potential inaccuracies amongst multiple measurements was among information collected. Dietitian notes were reviewed to determine if lacking or discrepant weight or height data impacted the nutrition assessment and therefore the dietitians' ability to make recommendations.

Results: Data from 2015 compared to 2018 indicated a significant increase in the number of weight and height measurements that were taken, by 50% and 12%, respectively. The percentage of discrepancies in weight and height increased from 2015 to 2018, providing another area of potential study. The number of patients assessed by a dietitian stayed consistent from 2015 to 2018 (33% vs 30% respectively), however the number of instances where a dietitian was unable to assess growth or provide intervention strategies decreased by 14% from 2015 to 2018.

Conclusion: Overall, this 3 phase study investigating the frequency and discrepancies of weight and height measurements in a pediatric hospital adds to the body of literature which supports the importance of further attention and emphasis on anthropometric measurement, in order to promote patient safety and to enable dietitians to conduct nutrition assessments with appropriate interventions.

Financial Support: n/a

P85 - Nutritional Status of End-Stage Renal Disease Patients on Hemodialysis Using the Malnutrition Inflammation Score Tool: A Single-Center Descriptive Study

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Purpose: Malnutrition Inflammation Score (MIS) was used to assess the nutritional state of the HD patients. Anthropometric measurements and biochemical tests were done and results were compared with the MIS scores. Out of the 74 patients, 53 had MIS scores of more than >5, the prevalence of malnutrition at 72% (95% CI; 60–81%). The most common cause of CKD is diabetes (42%) followed by hypertension (32%). Median duration of HD is significantly higher among patients with PEW. The median calf circumference (CC), hand grip strength (HGS) and creatinine levels are significantly lower with PEW. HGS, CC and mid-upper arm circumference (MUAC) had negative correlation with MIS. There is high prevalence of malnutrition among HD patients at The Medical City using MIS. There is a need to develop a protocol for patients with MIS >5 points to be referred to the nutrition team of the hospital for full nutrition care. Anthropometric measurements should be included in monitoring PEW progression.

Methods: The investigators used MIS, a 4-point scale quantitative nutrition screening tool with four parts: patient's related medical history, physical examination, BMI and laboratory parameters. The cut-off score of 5 was used based on the studies which showed increased mortality risk in patients with MIS greater than 4–5. Anthropometric measurements specifically triceps skin fold (TSF), MUAC, mid-arm muscle circumference (MAMC) and CC were measured. HGS was measured using the Camry hand dynamometer. Recent data for serum albumin, TIBC, creatinine, BUN, URR and KT/V were also taken.

Results: As illustrated on Table 2, the median MIS is 7, ranging from 0 to 21. Of the 74 patients, 53 had a MIS score of >5; prevalence of PEW is 72% (95% CI: 60–81%). The median age of patients is 66 years old. The BMI ranged from 18 to 43.7 kg/m2. Of the 30 obese patients, 22 (73%) were Obese Class I (BMI range of 25–29.9 m/kg2), while 8 (27%) were Obese Class II (BMI range of >30m/kg2).
In Table 1, the most common cause of CKD is diabetic nephropathy (42%). No significant difference between the two groups in terms of HD type, dialyzer used, HDfrequency, hours spent for HD as well as age at time of HD initiation. However, all patients who underwent dialysis every other day were found to be malnourished. Median duration of HD was significantly higher among patients with PEW. Most common co-morbidity was hypertension (92%). The median calf circumference, handgrip strength and creatinine are significantly lower in patients with PEW compared to those without (all p's < 0.05) as shown on Table 3. Table 4 showed as age and MIS increase, HGS decreases. It revealed a significant but positive correlation of HGS with biochemical markers creatinine and albumin. It was also noted that those with decreased MAMC had increased MIS.

Conclusion: In this study on malnutrition among CKD patients on MHD, majority of subjects were malnourished based on MIS. Only 74 out the 121 registered MHD patients were included. The investigators acknowledge that this limitation may reduce the validity of the study. Although MIS includes PEW criteria of the International Society of Renal Nutrition and Metabolism (ISRNM), it did not specify any quantifiable levels for muscle mass and muscle wasting. The investigators performed accepted methods namely HGS, CC, MUAC and MAMC to measure these parameters, separate from MIS. The methods are easy and inexpensive, and known surrogate markers for diagnosing sarcopenia. Decreased measurements of CC,

MAMC and HGS were associated with higher MIS indicating that subjects with reduction in muscle mass and strength had worse nutritional status. A validated renal disease-specific tool such as MIS with simple anthropometric measurements can help identify sarcopenia.

Financial Support: n/a

Table 1. MIS score and prevalence of PEW among ESRD patients of HD (n=74)

	n(%)
MIS score, median	7 (IQR [4-10])
Protein-energy wasting, %	
Yes	53 (72)
No	21 (28)

IQR is the 25th and 75th percentile: 25% of the data for MIS is ≤4 and 75% is ≤ 10

Table 2. Demographic and clinical profile of patients by nutrition status (n=74)

CHARACTERISTICS	TOTAL (n=74) n(%)	PEW		
		YES (n=53) n(%)	NO (n=21) n(%)	P VALUE
Age (in years), median	66 [IQR: 52-74]	67 [IQR: 51-75]	64 [IQR: 60-70]	0.5249[a]
Sex				
Male	36 (49)	25 (47)	11 (52)	0.686[b]
Female	38 (51)	28 (53)	10 (48)	
BMI, median	23.55 [IQR: 20.4-26.5]	23.70 [IQR: 19.9-25.8]	23.3 [IQR: 21.7-28.3]	0.4012[a]
Primary cause of CKD				
Diabetic nephropathy	31 (42)	21 (40)	10 (48)	0.389[c]
Hypertensive Nephrosclerosis	24 (32)	20 (38)	4 (19)	
Type of HD				
HD	57 (77)	38 (72)	19 (90)	0.126[c]
HDF	17 (23)	15 (28)	2 (10)	
Dialyzer				
Low flux	43 (58)	28 (53)	15 (71)	0.144[b]
High flux	31 (42)	25 (47)	6 (29)	
Frequency of HD				
Three times per week	69 (93)	48 (91)	21 (100)	0.313[b]
Every other day	5 (7)	5 (9)	0	
Duration on HD (in months), median	27 [IQR: 16-48]	36 [IQR: 19-57]	18 [IQR: 12-26]	0.0077*[a]
Hours on HD				
4 hours	73 (99)	52 (98)	21 (100)	1.000[c]
5 hours	1 (1)	1 (1)	0	
Age at start of HD, median	63 [IQR: 50-70]	64 [IQR: 48-72]	62 [IQR: 59-69]	0.7872[a]
Comorbidities, % yes				
DM	38 (51)	29 (55)	9 (43)	0.357[b]
Hypertension	68 (92)	49 (92)	19 (90)	1.000[b]

[a]Mann Whitney U test was used; [b]Chi square test was used; [c]Fisher's exact test was used

Critical Care and Critical Health Issues

P86 - Enteral Feeding Volumes: Can You Trust Your Numbers? A Pilot Study Optimizing Accuracy of Documentation in the Hospital Setting

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Purpose: Critically ill patients are at increased risk for longer hospital stays, morbidity and mortality when they experience underfeeding. Clinicians rely on accurate reporting when monitoring results of enteral feeding intakes to make appropriate adjustments. In response to concerns that enteral feeding volumes were being overestimated due to lack of a standardized method for charting volumes, the 24-hr feeding volumes charted by nursing in the electronic chart were compared to those from the actual feeding pump data over the course of several months.

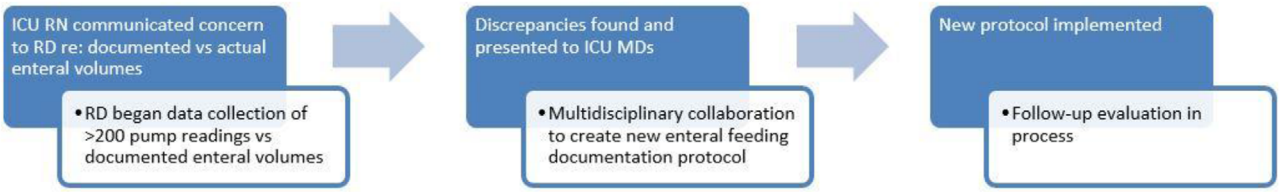
Methods: The 24-hr feeding volumes were collected from pumps at shift change across two collection periods spanning approximately three months. Patients on continuous enteral feeds at the time were included. The first collection period occurred in the surgical ICU, and then collection expanded to cover multiple ICUs in our hospital (cardiac, medical, burn, neuro) per request of staff from these units interested in evaluation of their units. After the collection, the actual feeding volumes were compared to charted volumes.

Results: Most concerning, of the 207 documented 24-hr feeding volumes, including patients on trophic feeds, ramping feeds, or at target goal, 73% over-documented actual volume provided by the pump. Of the subgroup of 56 patients documented as given 100% of goal volume, the average volume achieved was 10% less.

Conclusion: Awareness of undocumented feeding pauses (medication administration, rotating the patient, etc) and their impact on volume deficit will help the clinician appropriately adjust feeding goals to optimize nutritional intake and improve outcomes of critically ill patients. These findings led clinical staff to collaborate on creating a guideline to standardize the documentation of enteral feeding volumes. The next phase of this study will be a retrospective analysis to review standardized documentation impact on patient feeding volumes and how to address any deficits.

Financial Support: n/a

Figure 1 Process of Optimizing Accuracy of Documentation in the Hospital Setting



P87 - Cost-effectiveness Comparison of High Protein Enteral Feedings Used in the ICU: Retrospective Adjusted Analysis

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Purpose: Critical care nutrition guidelines suggest increased levels of protein for critically ill patients, as well as enteral formulas containing immunonutrients for surgical and trauma patients. This retrospective observational analysis seeks to compare hospital costs associated with use of peptide-based immunonutrition (IM) enteral formulas with standard high protein formulas (StdHP) in the ICU.

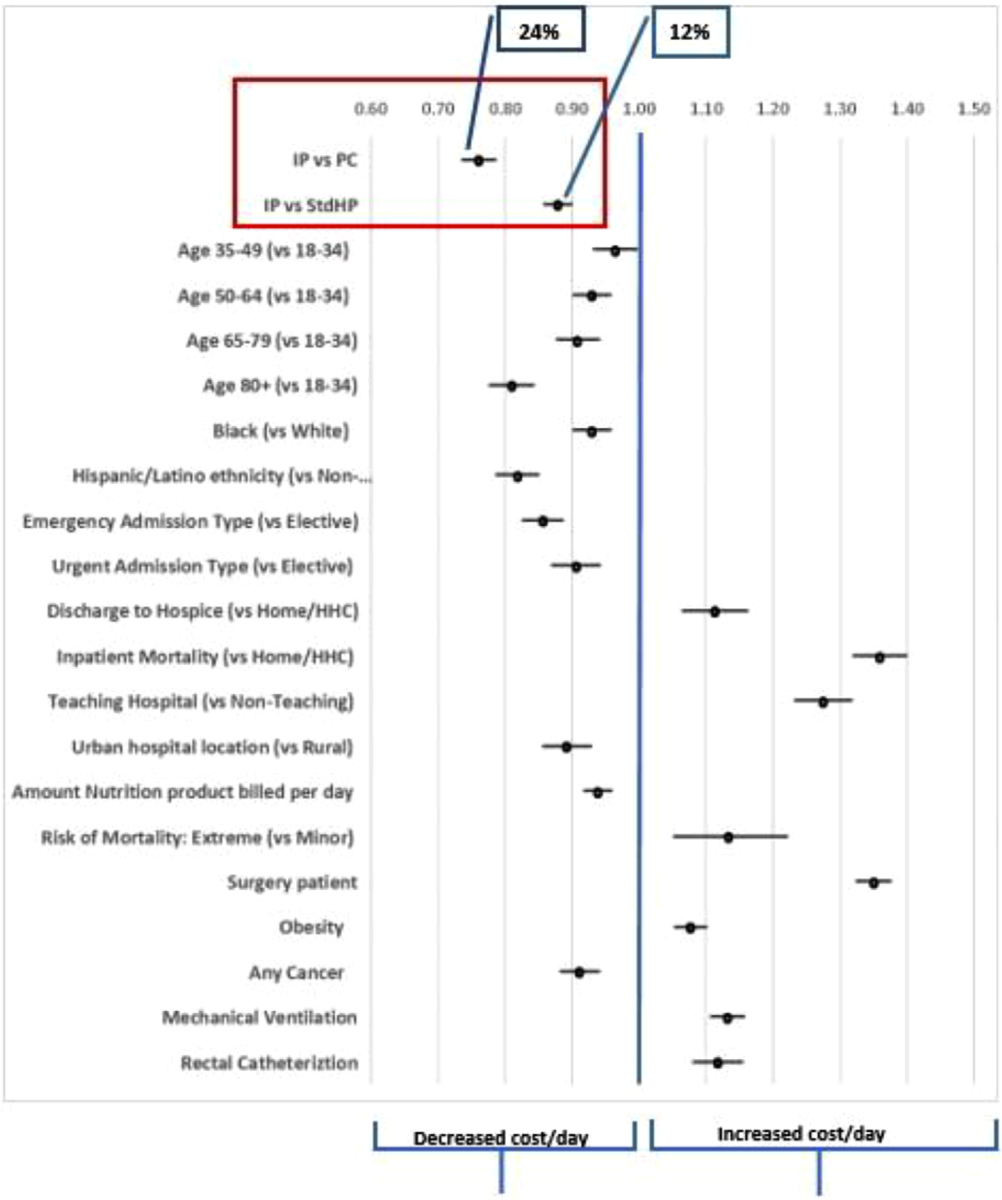
Methods: The Premier Healthcare Database was utilized to group adult patients (age ≥ 18) admitted to 27 hospitals between 10/1/15-2/28/19 with an ICU stay and ≥ 3 days exclusive use of a 25% protein IM formula [Impact® Peptide 1.5 (IP) or Pivot® 1.5 Cal (PC) or a 25% protein StdHP formula (Replete®, Replete® Fiber, Promote®, Promote® Fiber)]. A descriptive analysis characterized patients meeting selection criteria and a multivariable regression model followed to determine the effect of different formulas on the outcome of total cost per day.

Results: Overall, patients (n = 5,752) were billed for a median of 7 one-liter units of formula per hospital stay. On average, 78% of patients required mechanical ventilation; approximately 75% of IP (n = 2,525) and 71% of PC (n = 759) patients had surgery vs. 52% of StdHP (n = 2,468) patients. The PC group also sustained more trauma (42%) vs. IP (31%) and StdHP groups (14%). IP, PC and StdHP groups registered mean unadjusted hospital cost/day of $4,654, $4,821 and $4,028, respectively. Hospital cost per day was adjusted by demographic, hospital and clinical characteristics to address confounding. The estimated coefficients were exponentiated and noteworthy associations are reported below (Figure 1). After adjustment, the total hospital cost/day for patients receiving IP was 24% lower compared to patients receiving PC (0.76, CI: 0.73-0.79, $p < 0.001$), and 12% lower compared to patients receiving StdHP (0.88, CI: 0.86-0.90, $p < 0.001$). Factors that were associated with increased cost per day included: APR-DRG risk of mortality, surgery, obesity, mechanical ventilation, rectal catheterization, and death or discharge to hospice vs home. Factors associated with decreased cost per day included: age 80+, Black race, Hispanic/Latino ethnicity, emergency vs. elective admission, cancer, and amount of nutrition billed per day.

Conclusion: Despite increased cost of IM formulas versus StdHP options, after controlling for clinical and healthcare variables, total hospital cost per day was significantly less for IP than both PC and StdHP. Differences in formulations such as protein hydrolysis, types and amounts of immunonutrients, content of MCT and carbohydrate may explain some of the health economic differences. Additional studies are required to corroborate.

Financial Support: Nestle Health Science

Figure 1. Exponentiated Coefficient and 95% Confidence Limits for Multivariable GLM Regression



Also included in the model (not shown): gender, healthcare payor, geographic region of hospital, APR-DRG severity of illness, trauma diagnosis, admission source/place of origin, septicemia, pneumonia, diabetes complicated, malnutrition, antibiotic and anti-diarrheal medication days billed; HHC = Home Healthcare

ENCORE

Publication: Dickerson R, Van Matre E, Filiberto D, Fischer P, Minard G. S34 - Predictability of nitrogen balance for critically ill patients with severe traumatic injuries (abstract). Supporting Information. ASPEN Nutrition Science & Practice Conference: March 28–31, 2020, JPEN J Parenter Enteral Nutr. 2020 Feb;44(2):110-112.

P88 - Predictability of nitrogen balance for critically ill patients with severe traumatic injuries

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Purpose: The intent of this study was to determine if nitrogen balance (NBAL), a marker of net protein catabolism, can be accurately predicted from conventional demographic and nutritional markers in critically ill patients with severe multiple traumatic injuries who received nutrition therapy.

Methods: Data from 4 previous studies conducted at our institution involving adult patients (>17 years of age) who were admitted to the trauma intensive care unit (TICU) and required enteral or parenteral nutrition therapy were extracted for this retrospective study. Patients had a 24-hour urine collection within the first 2 weeks following admission to the TICU for urinary urea nitrogen (UUN) and creatinine for determination of nitrogen balance (NBAL) and creatinine clearance (CrCl). Patients with a serum creatinine > 1.5 mg/dL, history of chronic kidney disease, required dialysis or had a measured CrCl < 90% of predicted by the Cockroft-Gault equation, cirrhosis, hepatitis, pregnancy, thermal injury, or ad-libitum oral intake were excluded. NBAL (g/d) was calculated: nitrogen intake (g/d) - UUN (g/d)/0.85 - 2 with an adjustment for a serum urea nitrogen change > 2 mg/dL during the NBAL determination. Approximately 50 variables (serum laboratories, nutritional, demographic and clinical data) were recorded for each patient. Patients were randomized so that 85% of the population was assigned to model development and 15% for testing the validity of the model. The randomization was done within each study to ensure an equivalent proportion of patients allocated to both groups. Development of a multivariate regression equation via a forward stepwise multivariate linear regression procedure was conducted (SPSS ver. 25). Goodness of the fit of the model was determined via Pearson product correlation coefficient. Predictive performance of the model was evaluated for bias and precision. Interval data are reported as mean + SD. Differences between model and test groups were evaluated by t-test/Mann-Whitney U test or Chi Square analysis. Statistical significance was defined as a P value of < 0.05.

Results: Five hundred and fifty-one patients served for model development and 100 were allocated to the test population. No significant differences in patient demographics, nutritional data, or clinical outcomes were noted between the groups (Table 1; p = N.S.). The following regression model was developed (r = 0.688, P < 0.001): NBAL (g/d) = Protein intake (g/kg)*4.55 + Caloric intake (kcal/kg)*0.291 + Age (yrs)*0.112 - Serum urea nitrogen (mg/dL)*0.476 - Height (cm)*0.176 - Urine output (mL)*0.001 – Infection (1 = yes; 0 = no)*2.52 + 19.233. Although the regression was unbiased (95% confidence interval of -13.5 to 20.2 g/d), it consistently under-predicted measured NBAL for those with a NBAL worse than -15 g/d (Figure 1). The mean error was 3.4 + 8.4 g/d and root mean squared error was 6.8 + 5.9 g/d. NBAL was accurately predicted within + 3 g/d for 26% of patients.

Conclusion: NBAL cannot be accurately predicted via conventional mathematical methods due to the marked variability among the patients. NBAL should be measured for highly catabolic critically ill patients with severe multiple traumatic injuries.

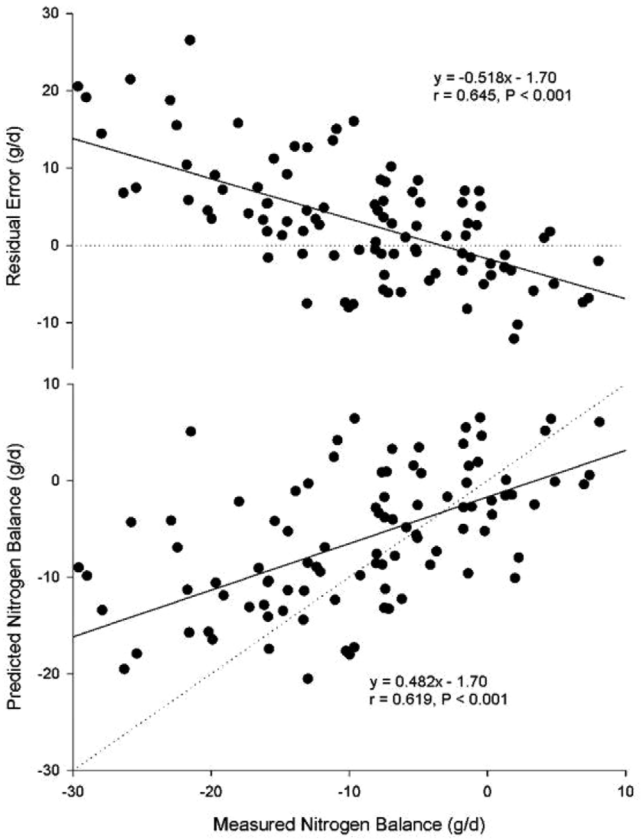
Financial Support: n/a

Table 1. Patient characteristics, serum laboratories, nutrition, and clinical data

Variable	Model Development Population	Test Population	P
N	551	100	
Sex, Male/Female, n/n	423/128	75/25	0.147
Age, years	45 ± 18	44 ± 18	0.701
Mechanism of injury			
Motor vehicle collision, n	386	69	
Gunshot wound/knife stab wound, n	82	12	0.560
Fall/assault, n	60	12	
Other, n	23	7	
Injury severity score	29 ± 12	29 ± 12	0.703
Traumatic brain injury, n	161 (29%)	32 (32%)	0.314
Ventilator-dependent, n	501 (91%)	88 (88%)	0.052
Survived/died, n*	400/45	76/5	0.255
ICU length of stay, d*	24 ± 19	23 ± 15	0.536
Ventilator days, d*	20 ± 23	18 ± 13	0.230
Hospital length of stay, d*	38 ± 31	33 ± 20	0.159
Heart rate, bpm	111 ± 23	110 ± 24	0.692
Respiratory rate, bpm	25 ± 8	26 ± 10	0.474
Infection at time of NBAL, n	291 (53%)	57 (57%)	0.669
Height, cm	176 ± 11	175 ± 10	0.733
Weight, kg	90 ± 23	88 ± 25	0.638
Body mass index, kg/m^2	29.2 ± 7.0	28.4 ± 7.5	0.850
Nutrition start, d	3 ± 2	3 ± 3	0.961
PN/EN/Both, n/n/n	43/454/54	11/77/12	0.417
Protein intake during NBAL, g/kg	1.3 ± 0.8	1.3 ± 0.8	0.765
Protein intake during NBAL, g	101 ± 59	99 ± 58	0.744
Caloric intake during NBAL, kcals/kg	16 ± 10	16 ± 10	0.983
Caloric intake during NBAL, kcals	1211 ± 729	1217 ± 762	0.942
NBAL, g/d	-10.0 ± 10.8	-9.8 ± 10.5	0.866
Measured Cr Cl, ml/min/1.73 m^2	143 ± 62	144 ± 61	0.801
Hospital day of NBAL, d	7 ± 3	7 ± 4	0.723
Urine volume during NBAL, mL	2837 ± 1447	2831 ± 1333	0.771
Serum urea nitrogen pre-NBAL, mg/dL	16 ± 11	18 ± 13	0.187
Serum urea nitrogen post-NBAL, mg/dL	18 ± 11	19 ± 12	0.525
Serum creatinine, mg/dL	0.8 ± 0.3	0.9 ± 0.4	0.292
Glucose mg/dL	126 ++ 29	129 ± 37	0.780
Albumin, g/L	2.2 ± 0.7	2.3 ± 0.7	0.396
Prealbumin, g/L	9.3 ± 5.1	9.6 ± 6.0	0.594
Maximum temperature, ° C	38.5 ± 0.7	38.5 ± 0.6	0.544
WBC, cells/mm^3	13.6 ± 7.3	12.7 ± 6.4	0.284
Lactate at admission, mg/dL	3.3 ± 3.0	4.1 ± 4.5	0.084
Arterial pH	7.42 ± 0.05	7.42 ± 0.05	0.449

*data not available in one study (125 patients)

Figure 1. Predicted Nitrogen Balance and Residual Error Compared to Measured Nitrogen Balance



P89 - Vitamin D Deficiency Among Adult Lung and Liver Transplant Patients: A Retrospective Review

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Purpose: It has been previously suggested that adult lung and liver transplant recipients often have vitamin D deficiency post transplantation, which may be associated with an increased risk of organ rejection and infection. The increased risk of vitamin D deficiency in lung and liver transplant candidates is thought to be multifactorial due to limited sunlight exposure, reduced functional status with disease progression, medication use inhibiting absorption, and poor diet quality. This study aimed to identify if vitamin D deficiency was prevalent in pre- and post-lung and liver transplant recipients at a large, academic center. This review determined the need for a structured vitamin D protocol to minimize clinical risks associated with vitamin D deficiency.

Methods: A retrospective chart review was conducted in adult lung and liver transplant recipients who received an organ transplant in 2019 at a large academic center. Demographic and clinical data were collected and those who had either a vitamin D level within 1 year pre- or -post organ transplantation were included in this study. Patients who did not have an available pre- or -post Vitamin D level available in the electronic medical record were excluded.

Results: A total of 23 adult lung transplant (10 female, 13 male) and 112 liver transplant (54 female, 58 male) recipients were included in this retrospective review. Vitamin D levels were available in 64 patients pre-transplant (lung n = 23; liver n = 41) and 114 patients post-transplant (lung n = 8; liver n = 106). The mean 25-hydroxy vitamin D level was 33.1 ± 16.1 ng/mL (14-67 ng/mL) pre- and 40.4 ± 21.1 ng/mL (20-79 ng/mL) post-lung transplant, while the mean 25-hydroxy vitamin D level was 25.0 ± 13.7 ng/mL (5-67 ng/mL) pre- and 25.2 ± 13.7 ng/mL (6-70 ng/mL) post-liver transplant. Vitamin D deficiency (< 30 ng/mL) was found in 52.2% (12/23) pre- and 37.5% (3/8) post-lung transplant recipients and in 70.7% (29/41) pre- and 70.0% (71/106) post-liver transplant recipients.

Conclusion: Our review highlights the need for a formal vitamin D protocol to be established for both pre-and post-lung and liver transplant recipients to minimize associated clinical risks with vitamin D deficiency.

Financial Support: n/a

P90 - Calorie Deficit Calculator to Facilitate Adequate Nutrition in the Trauma ICU

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Purpose: Over- and underfeeding in the intensive care unit (ICU) are both associated with poorer outcomes, but the amount of energy received from all sources (parenteral nutrition, enteral nutrition, propofol, and dextrose-containing fluids) can be difficult and time-consuming totally. We sought to evaluate the feasibility of a custom-designed ICU Nutrition Calculator program to assess an ICU patient's nutritional demands and actual nutritional intake.

Methods: The ICU Nutrition Calculator is a quick and accurate tool designed to assess an ICU patient's nutritional demands and actual nutritional intake. Practitioners can input relevant patient metrics (sex, height, weight) to individualize the determined goal BEE, protein, or lipid percentiles. The tool then calculates the energy and protein deficit or excess over a 24-hour period based on the energy received the day prior and goal calories. (Figure 1) Using the data from the tool, the ICU practitioner will be able to make changes to the patient's current nutritional regimen. In this before/after study, nutritional intake and calorie deficit were calculated daily in Trauma ICU patients during four consecutive weeks with and without the availability of the ICU Nutrition Calculator. The control arm of the study occurred in the month of January 2020 and the calculator was available in the month of March 2020. During the intervention period, the Trauma ICU team adjusted the nutritional formulas without any guidance from the researchers. For this analysis, we elected to set the caloric goal with 1.3 kcal per calculated BEE, and 1.5 grams of protein per kilogram of body weight. If the patient was above a BMI of 30, ideal body weight was used. We then used the tool to calculate the energy deficit/excess during both study periods. Pre-calculator and post-calculator energy and protein deficits were then analyzed.

Results: There were 150 patients (71% male) recruited during the study period: 129 (86%) Trauma and 21 (14%) Acute Care Surgery patients. The control group included 96 patients, representing 497 patient days, versus 63 patients representing 500 patient days in the intervention group. Percent energy deficit in the control patients was 61% (95% CI: 57%-66%), significantly greater compared to 49% (95% CI: 44%-53%) in the intervention patients (OR 1.63, 95% CI 1.27-2.10). Percent protein deficit in the control group was 55% (95% CI 50%-59%), compared to 29% (95% CI: 25%-33%) in the intervention group (OR 2.9, 95% CI 2.2-3.8) (Figure 2). The intervention group received significantly higher percentage of prescribed energy and protein compared to the control group.

Conclusion: Availability of the ICU Nutrition Calculator was associated with improved macronutrient delivery in Trauma ICU patients. Further investigation is required to explore how the ICU Nutrition Calculator affects outcomes of critically ill patients.

Financial Support: n/a

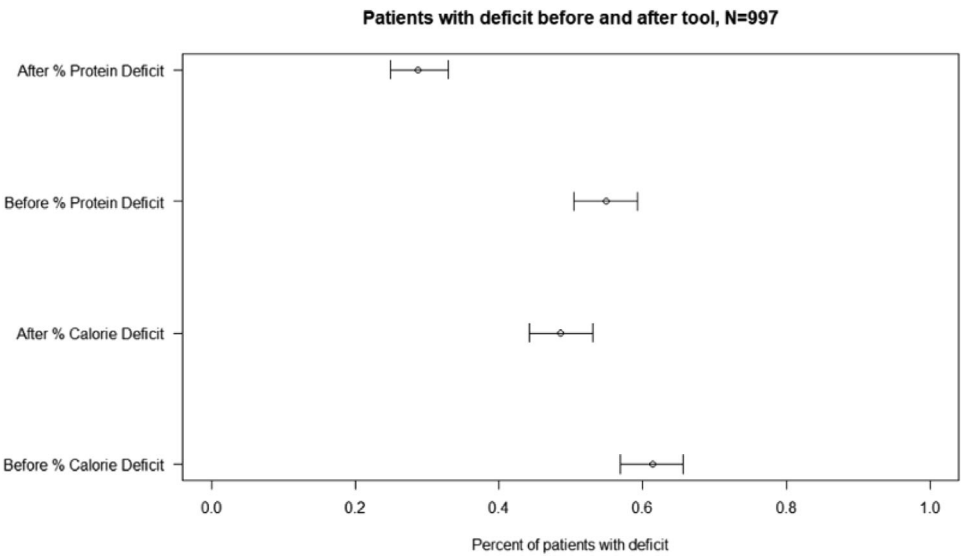
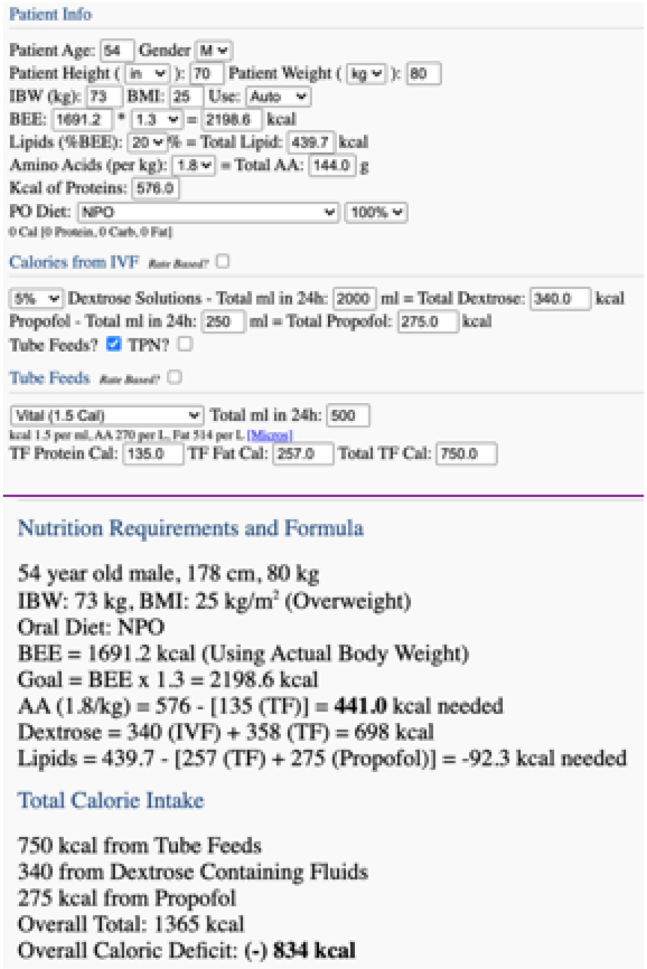


Figure 1



P91 - The effect of oxandrolone on weight loss and muscle mass in acute spinal cord injury patients

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Purpose: Lean body mass (LBM) loss refractory to nutrition intervention plagues patients following acute spinal cord injury (aSCI). Oxandrolone has been shown to blunt LBM loss in burn patients, but its effect on LBM after aSCI remains unknown and is the purpose of the current study.

Methods: In 2018, our institution adopted a guideline for oxandrolone after aSCI. According to this guideline, patients < 60 years of age admitted with an aSCI at or above the 6th thoracic level and an initial American Spinal Injury Association (ASIA) impairment scale score of A, B, or C are evaluated to receive 5 mg twice a day (BID) of oxandrolone starting on post-injury day 5. Hepatic function panels are monitored weekly, and oxandrolone is reduced if values trend up. Oxandrolone is discontinued for an increase in values 3–5 times baseline levels. Patients with transaminitis which does not improve on follow-up laboratory testing, or who are pregnant or lactating are excluded from receiving oxandrolone. Patients ≤18 years-of-age sustaining an acute cervical spinal cord injury who received oxandrolone were included. Historical aSCI controls with similar injuries, age, and body mass index (BMI) were obtained for comparison. Data collected included age, sex, level of injury, initial ASIA score, height, admission weight, BMI, discharge weight, and hospital length of stay. Percent weight change from admission to discharge was calculated. To evaluate change in muscle mass, the sternocleidomastoid muscle (SCM) length and width was measured at the C5 level on initial computed tomography (CT) images and follow-up imaging within 4-months post-injury. SCM area was calculated and indexed to height. The Mann-Whitney U and Fischer's exact tests were used for between group comparisons.

Results: Twenty aSCI patients met inclusion criteria and were matched with historical controls. Both cohorts were 80% male. No significant differences in baseline data were noted between groups. Patients in the treatment group were started on oxandrolone a median of 6 (IQR 5, 7) days post-injury, and received the medication for an average of 24 ± 9.6 days. Transaminitis requiring a reduction in oxandrolone dosing occurred in 9 patients. Oxandrolone was discontinued for transaminitis despite dose reduction in 2 patients. Median length of stay was 36 days (IQR: 25.3, 53) for

patients who received oxandrolone and 31 days (IQR: 22.5, 40.8) for historical controls (P = 0.27). Patients who received oxandrolone had significantly lower percent weight loss than patients who did not [0% (IQR -2.4, 0%) vs -4.4% (IQR -8.2, 0) P = 0.048]. CTs were available for 14 oxandrolone and 13 controls with follow-up studies completed 76 (IQR 45, 95) and 50 (IQR 36, 86) days post-injury, respectively (P = 0.27). Median change in indexed SCM was -18.5 mm (IQR-33.6, 4.9) in oxandrolone patients and -3.1 mm (IQR -38.1, 27.2) in controls (P = 0.59).

Conclusion: Oxandrolone reduced weight loss following aSCI, but did not significantly improve loss of SCM muscle area in this cohort. Larger studies are needed to further investigate the impact of oxandrolone on LBM after aSCI.

Financial Support: n/a

P92 - Application of preoperative fasting abbreviation protocol in patients subject to femur fracture surgery

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Purpose: Introduction: Enhanced recovery after surgery (ERAS) protocols are multimodal perioperative care pathway widely studied in the last years to achieve early recovery and reduction of complications after surgical proceduresź,š. The enhanced recovery after surgery started mainly with colorectal surgeries, but it soon proved its efficacy in all major surgical specialties. The nutritional state influences the emergence of higher risk of postoperative complications and mortality in orthopedic surgery patientsş, due to that, nutritional interventions have been associated to the reduction in these risk factors and reduction in costs. Associate hospital stay and rate of readmission of patients subject to femur surgery to the use of preoperative fasting abbreviation protocols.

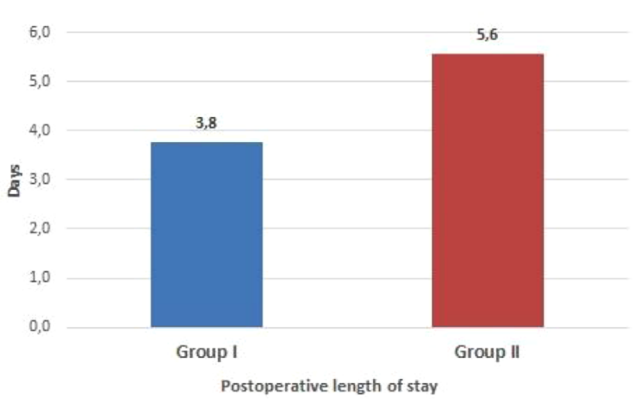
Methods: The patients selected were those that have undergone emergency orthopedic surgeries for femur fracture correction in a healthcare provider own hospital, from 2018 to 2020. The patients were divided in two groups: Group I, patients subject to the use of carbohydrate-enriched solution (12.5% of maltodextrin) six hours before surgery and a second dose two to three hours before anesthetic induction; while for Group II the traditional fasting protocol was applied.

Results: Sixty (60) patients participated in the study, most of them women (82.7%) and around 93.3% elderly. Eighteen (18) of these patients were subject to fasting abbreviation (Group I) and 42 patients were classified as Group II and the average fasting time in hours was 3.55 ± 0.07 and 16.42 ± 0.21, respectively. While comparing the groups, it was observed that patients from Group I had shorter hospital stay between the surgery and release from the hospital, as shown in graph 1. It was observed that the fasting abbreviation practice before surgery reduced, on average, 1.8 days of hospitalization among patients from Group I, which reflected on the reduction of approximately R$ 38,641.21 in hospital daily cost. It was also observed that patients from Group I presented lower rates of readmission in less than 30 days (5.6%) when compared to Group II (7.0%). There was also absence of deaths during hospitalization among Group I patients, while Group II recorded two deaths. The nutritional state of patients with hip and femur fracture seems to affect their recovery, because those that are well nourished present better clinical recovery4.

Conclusion: The outcomes obtained with the application of postoperative fasting abbreviation protocol indicate improvement in the recovery of patients subject to femur fracture correction surgery and acceleration of hospital stay.

Financial Support: n/a

Graph 1 - Comparison of the mean time, in days, of postoperative hospitalization in groups I and II



Graph 1 - Comparison of the mean time, in days, of postoperative hospitalization in groups I and II

P93 - Reduction of hypercalcemia following readjustment of target serum 25-hydroxy vitamin D concentration during cholecalciferol therapy in vitamin D deficient, critically ill patients

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Purpose: Studies indicate worsened clinical outcomes for critically ill patients with vitamin D deficiency as defined by a serum 25-hydroxy vitamin D concentration (25-OH vit D) < 20 ng/mL. Our previous investigation indicated that cholecalciferol therapy for vitamin D deficient critically ill patients with a target 25-hydroxy vitamin D concentration of >30 ng/mL resulted in a significant proportion of patients with hypercalcemia (ionized serum calcium concentration (iCa) > 1.32 mmol/L) without the presence of hypervitaminosis D (25-OH vit D > 80 ng/mL). The purpose of this study was to evaluate the safety of cholecalciferol therapy with a lower target 25-OH vit D of > 20 ng/mL as compared to therapy with the higher target.

Methods: Adult patients (>17 years of age) admitted to the trauma intensive care unit (TICU) and referred to the Nutrition Support Service for enteral nutrition (EN) with vitamin D deficiency were given 10,000 IU of cholecalciferol daily via the feeding tube until the target 25-OH vit D was achieved, EN was discontinued, or the patient was discharged from the TICU. Patients were retrospectively included if at least at least two weekly serial 25-OH vit D levels during were measured. Safety was evaluated by the presence of hypercalcemia. Cholecalciferol was initiated if 25-OH vit D levels were less than 20 ng/mL and continued until the target 25-OH vit D was achieved, enteral nutrition was discontinued, or if hypercalcemia occurred. Interval data were analyzed using the Student t-test or Mann-Whitney U-test. Nominal data were analyzed using Chi-Square analysis or Fisher Exact test. Continuous variables were given as mean ± SD.

Results: One-hundred and three critically ill trauma patients were evaluated for study: 50 were given cholecalciferol therapy with the new target 25-OH vit D and 53 were from a previous study with the higher target. Patient characteristics are given in Table 1. Data regarding cholecalciferol therapy and serial serum chemistries are given in Table 2. Patients treated with the lower 25-OH vit D target received cholecalciferol therapy for a shorter duration (Table 2). Improved safety was demonstrated with a reduction in hypercalcemia from 40% (21 out of 53 patients) with the higher target 25-OH vit D to 4% (2 out of 50 patients) with the lower target 25-OH vit D. Serum phosphorus concentrations were greater on weeks 1 and 2 for those who received the higher target therapy compared to the lower target group ($p = 0.001$ and $p = 0.007$, respectively; Table 2). However, less patients achieved a 25-OH vit D > 20 ng/mL with the lower target therapy: 70% versus 93% of patients, respectively ($p = 0.005$).

Conclusion: Compared to a goal 25-OH vit D target of ≥30 ng/mL, a goal target of ≥20 ng/mL led to a tenfold decrease in the incidence of hypercalcemia. This modification in treatment strategy improved the safety of cholecalciferol therapy for vitamin D deficient, critically ill patients with traumatic injuries. Whether this strategy will also improve clinical outcomes requires further study.

Financial Support: n/a

Variable	Serum 25-OH vit D target		P value
	≥ 20 ng/mL	≥ 30 ng/mL	
N	50	53	
Age, years	46 ± 19	43 ± 15	0.302
Sex, Male, n (%)	37 (74%)	36 (68%)	0.498
Race, n (%)			
Caucasian	26 (52%)	27 (51%)	
African American	22 (44%)	23 (43%)	0.228
Hispanic/Other	2 (4%)	3 (6%)	
Weight, kg	86 ± 21	88 ± 22	0.808
Height, in	69 ± 3	68 ± 10	0.227
BMI, kg/m^2	27.9 ± 6.3	28.8 ± 7.8	0.508
Admission Diagnosis			
MVC, n (%)	38 (76%)	39 (75%)	
GSW/KSW, n (%)	6 (12%)	6 (11%)	0.228
Assault/Fall, n (%)	6 (12%)	4 (8%)	
Other, n (%)	0 (0%)	4 (8%)	
TBI, n (%)	32 (64%)	31 (58%)	0.566
Alcohol Use, n (%)	15 (30%)	11 (21%)	0.164
Hospital day EN started	3 ± 2	3 ± 2	0.231
Initial WBC, cells/mm^3	19.0 ± 6.9	17.6 ± 7.8	0.345
Initial Tmax, ºC	38.3 ± 5.3	37.9 ± 1.1	0.567
Initial CRP, mg/dL	20.8 ± 7.3	23.7 ± 9.7	0.107
Initial Prealbumin, mg/dL	9.1 ± 4.1	7.8 ± 4.0	0.166
Sepsis, n (%)	23 (46%)	31 (58%)	0.205
Survived, n (%)	45 (90%)	49 (92%)	0.660
Furosemide exposure, n (%)	22 (44%)	20 (38%)	0.518
HCTZ exposure, n (%)	5 (10%)	2 (4%)	0.210

BMI, body mass index; CRP, C-reactive protein; GSW, gunshot wound; HCTZ, Hydrochlorthiazide; KSW, knife stab wound; MVC, motor vehicle collision; N, number of patients; TBI, traumatic brain injury; Tmax, maximum temperature; WBC, white blood cells

Table 2. Cholecalciferol therapy and serial serum chemistries

Variable	Serum 25-OH vit D target		P value
	≥ 20 ng/mL	≥ 30 ng/mL	
N	50	53	
Hospital day of baseline 25-OH vit D, d	5 ± 5	5 ± 4	0.630
Hospital day cholecalciferol initiated, d	6 ± 5	7 ± 4	0.694
Duration of cholecalciferol therapy, d	11 ± 6	14 ± 5	0.015
25-OH vit D -baseline, ng/mL	11.6 ± 4.0	14.8 ± 2.8	0.001
25-OH vit D - week 1, ng/mL	21.1 ± 10.4	24.4 ± 10.0	0.098
25-OH vit D - week 2, ng/mL*	16.1 ± 7.6	32.7 ± 9.7	0.001
Ionized Ca-baseline, mmol/L	1.09 ± 0.06	1.21 ± 0.17	0.001
Ionized Ca-week 1, mmol/L	1.11 ± 0.07	1.22 ± 0.07	0.001
Ionized Ca-week 2, mmol/L	1.14 ± 0.08	1.22 ± 0.77	0.007
Phosphorus-baseline, mg/dL	3.4 ± 1.1	3.6 ± 0.9	0.276
Phosphorus-week 1, mg/dL	3.7 ± 1.0	4.3 ± 0.6	0.001
Phosphorus-week 2, mg/dL	3.9 ± 1.1	4.8 ± 1.2	0.007
Magnesium-baseline, mg/dL	2.0 ± 0.3	2.1 ± 0.3	0.313
Magnesium-week 1, mg/dL	2.0 ± 0.3	2.2 ± 0.3	0.001
Magnesium-week 2, mg/dL	2.2 ± 0.3	2.2 ± 0.3	0.677

*n = 21 and n = 29 for each group, respectively 25-OH vit D, serum 25-hydroxy vitamin D; d, days; N, number

P94 - Gastric Feeding Intolerance in Critically Ill Patients During Sustained Pharmacologic Neuromuscular Blockade

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Purpose: Current practice among many clinicians is to withhold enteral nutrition (EN) for patients requiring pharmacologic neuromuscular blockade (NMB) pharmacotherapy due to a common belief of anticipated feeding intolerance. However, the predominant effect of these agents is upon skeletal muscle. It is unclear to what extent smooth muscle contractions are altered. Data to support or refute this empirical practice are limited. The purpose of this study was to assess gastric feeding intolerance for critically ill patients who received sustained neuromuscular blocker therapy.

Methods: Adult patients (>17 years of age) admitted to the trauma intensive care unit (TICU), referred to the Nutrition Support Service (NSS) for EN, and who received intravenous NMB (rocuronium, cisatracurium, vecuronium) pharmacotherapy for greater than forty-eight hours were retrospectively evaluated. Patients with hemodynamic instability or those who required vasopressor therapy were excluded. Patients received NMB pharmacotherapy to assist in the management of Adult Respiratory Distress Syndrome or trauma-induced elevated intracranial pressure resistant to conventional therapy. Gastric feeding intolerance was evaluated while the patient received sustained NMB therapy up to a maximum of 7 days. A daily assessment of feeding tolerance was made by members of the NSS. A patient was considered to have gastric feeding intolerance if a prokinetic agent (metoclopramide, erythromycin, or both) was initiated with an elevated gastric residual volume > 300 mL, distention of the abdomen by physical exam, regurgitation, or emesis. Patients were evaluated at the end of the first 3 days of combined EN and NMB and at 7 days from initiation of NMB with concurrent EN for those who received prolonged NMB (> 6 days of NMB). Demographic, laboratory, nutritional data including amount of EN received, and details regarding the NMB were recorded during the observation period. Continuous data were expressed as mean $\pm$ SD. Student t-test or Mann-Whitney U test were used to compare continuous variables. Chi-Square analysis or Fisher's Exact test were used for dichotomous variables. A P value of < 0.05 was considered significant.

Results: Forty-seven critically ill patients were identified for study (Table 1). Ten patients (21%) were found to be intolerant to EN when assessed after three days from initiation of NMB. Of the 18 patients who received NMB therapy for > 6 days, 9 were intolerant to EN (50%, $p = 0.033$ compared to 3 days). No statistically or clinically relevant differences were found between patients who tolerated EN versus those intolerant to EN at either evaluation time point with respect to patient demographics, survival, presence of infection, nutritional markers (albumin, prealbumin, nitrogen balance), inflammation (C-reactive protein), abdominal surgery, blood glucose, serum potassium, or amount of EN received at the time of intolerance (Table 2). Seven out of 19 total patients (37%) intolerant to intra-gastric EN were given parenteral nutrition after failure of EN and prokinetic therapy.

Conclusion: Most patients tolerated intra-gastric EN during short-term NMB. However, longer courses of NMB are associated with a higher incidence of gastric feeding intolerance.

Financial Support: n/a

Table 1. Patient demographics, serum laboratories, and clinical outcomes

Variable	Results
N	47
Sex, Male/Female, n/n	42/5
Race,	
Caucasian, n	25
African-American, n	22
Age, y	34 ± 13
Mechanism of injury	
MVC, n	33 (70%)
GSW, n	9 (19%)
Other, n	5
Initial GCS	10 ± 5
TBI with ICP monitoring, n	17 (36%)
Height, cm	179 ± 7
Weight, kg	94 ± 25
BMI, kg/m^2	29.3 ± 6.9
Obese, n	29 (62%)
Abdominal surgery, n	32 (68%)
Infection during NMB, n	24 (51%)
C-reactive protein, mg/dL*	26.9 ± 8.3
Prealbumin, mg/dL*	6.3 ± 3.2
Albumin, g/dL*	2.6 ± 0.7
Serum creatinine, mg/dL*	1.0 ± 0.7
BUN, mg/dL*	22 ± 14
NBAL, g/d*	-9.4 ± 9.6
NMB duration, d	5 ± 3
NMB ICU start day, d	7 ± 5
Survived/Died, n/n	32/15

*Baseline measurements. BG, blood glucose; BMI, body mass index; BUN, blood urea nitrogen, d, days; EN, enteral nutrition; GCS, Glasgow coma score; GSW, gunshot wound; ICP, intracranial pressure; K, serum potassium; MCC, motorcycle crash; MVC, motor vehicle crash; n, number of patients; NBAL, nitrogen balance; NMB, neuromuscular blocker; TBI, traumatic brain injury; Tmax, maximum temperature

Table 2. Comparison of Patients who Tolerated or Not Tolerated EN.

Variable	Tolerated EN	Intolerant to EN	P-value
Day 3 after initiation of NMB			
N	37	10	
Age, y	35 ± 14	29 ± 9	0.154
Weight, kg	94.3 ± 25	93.7 ± 25	0.962
BMI, kg/m^2	29.1 ± 7	30.3 ± 6.6	0.863
EN received, mL	1054 ± 63	690 ± 501	0.425
% of goal EN	64.3 ± 33.7	46.7 ± 37.4	0.985
BG, mg/dL	152 ± 36	153 ± 37.1	0.882
Serum, Potassium, mEq/L	4.1 ± 0.5	4.1 ± 0.6	0.486
Tmax, °C	38.2 ± 0.8	38.2 ± 0.9	0.922
WBC, cells/m^3	19.1 ± 8.5	18.6 ± 10.2	0.444
Abdominal surgery, n	26 (70%)	6 (60%)	0.704
NBAL, g/d	-9.7 ± 9.9	-8.4 ± 9.1	0.756
C-Reactive Protein, mg/dL	26.8 ± 8.4	27.4 ± 8.7	0.855
Prealbumin, mg/dL	6.1 ± 3.4	6.9 ± 2.9	0.532
Albumin, g/dL	2.6 ± 0.7	2.5 ± 0.5	0.877
Infection during NMB, n	19 (51%)	5 (50%)	1.000
TBI with ICP monitoring, n	13 (35%)	4 (40%)	1.000
Survived, n	27 (73%)	5 (50%)	0.252
Day 7 after initiation of NMB			
N	9	9	
Age, y	31 ± 13	26 ± 7	0.267
Weight, kg	98.4 ± 43	103.3 ± 25	0.462
BMI, kg/m^2	30.7 ± 11	32.3 ± 6.6	0.397
EN received, mL	1221 ± 623	618 ± 586	0.955
% of goal EN	73.9 ± 30.2	40.9 ± 39.2	0.280
BG, mg/dL	144 ± 38	148 ± 44	0.964
Serum Potassium, mEq/L	3.8 ± 0.3	4.3 ± 0.5	0.056
Tmax, °C	38.5 ± 0.9	38.2 ± 0.9	0.880
WBC, cells/m^3	16.2 ± 6.9	18.1 ± 8.6	0.447
Abdominal surgery, n	2 (22%)	3 (33%)	1.000
NBAL, g/d	-9.7 ± 9.7	-12.2 ± 10.4	0.655
C-Reactive Protein, mg/dL	28.0 ± 6.9	29.2 ± 7.0	0.762
Prealbumin, mg/dL	6.4 ± 3.6	7.7 ± 3.9	0.497
Albumin, g/dL	3.3 ± 0.9	2.6 ± 0.6	0.111
Infection during NMB, n	7 (78%)	4 (44%)	0.335
TBI with ICP monitoring, n	4 (44%)	6 (67%)	0.637
Survived, n	6 (67%)	6 (67%)	1.000

BG, blood glucose; BMI, body mass index; EN, enteral nutrition; ICP, intracranial pressure; MVC, motor vehicle collision; n, number of patients; NBAL, nitrogen balance; NMB, neuromuscular blocker; TBI, traumatic brain injury, Tmax, maximum temperature

P95 - Beneficial effects of a long-acting GLP-2 analog, HM15912, after switching from daily or weekly GLP-2 analog drugs in animal models

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Purpose: The widespread use of Gattex® (teduglutide), which is only approved drug in the United States for short bowel syndrome (SBS), may be still limited due to insufficient efficacy and leading to a significant burden for public health by the frequent administration as well as complicated preparation steps for its reconstitution. Hence, several long-acting GLP-2 analog drugs targeting once a week subcutaneous administration are

currently in clinical development. Previously, we confirmed that HM15912, a long-acting GLP-2 analog, significantly increased small intestine mass compared to teduglutide as well as in-house synthesized weekly GLP-2 analogs at equimolar doses even after extended dosing interval. Here, we further investigate that HM15912 enables to achieve more intestinotrophic effect after switching from daily or weekly GLP-2 analog drugs.

Methods: To investigate additional intestinotrophic efficacy after switching from teduglutide to HM15912, C57BL/6 mice treated with twice daily administration of teduglutide for 2 weeks were switched to once-weekly administration of HM15912, or continued the typical treatment of teduglutide for the remaining 2 weeks. To further investigate beneficial effect after switching from weekly GLP-2 analog drugs to HM15912, GLP-2 analogs designed to have same sequences with glepaglutide and apraglutide were synthesized. SD rats treated with every other day administration of weekly GLP-2 analogs for 2 weeks were switched to HM15912 or continued the typical treatment of them for the remaining 2 weeks. In both studies, small intestine mass was measured at week 2, 3 and 4, and blood D-xylose concentrations were measured to evaluate absorption capacity after oral challenge of D-xylose at the end of study.

Results: In C57BL/6 mice, HM15912 treatment significantly increased wet weight of small intestine (72.9% over vehicle) compared to teduglutide treated group (39.4% over vehicle) after 2 weeks as we previously confirmed. After 2 more weeks treatment, while showing the maintained small intestine increment in teduglutide treated group (58.3% at week 3 and 41.1% at week 4 over vehicle), small intestine mass was further increased after switching to HM15912 (61.2% at week 3 and 68.5% at week 4 over vehicle). In SD rats, HM15912 treatment significantly increased wet weight of small intestine compared to weekly GLP-2 analog drug treated groups after 2 weeks (84.4% versus 41.5% or 26.6% over vehicle). After 2 more weeks treatment, while showing the slight increment in small intestine mass in weekly GLP-2 analogs (50.5% and 37.4% over vehicle), small intestine mass was further increased after switching to HM15912 (82.1% and 90.7% over vehicle, respectively). In line with these results, absorption capacity of small intestine was also significantly increased after switching to once weekly administration of HM15912, which is mimicking once monthly administration in human.

Conclusion: Based on these results of the further increased intestinotrophic efficacy with significantly less administration frequency, HM15912 may be novel therapeutic option for the SBS patients who are suffered from parenteral support with or without typical GLP-2 medication, teduglutide or any weekly GLP-2 analog drugs in clinical development.

Financial Support: Hanmi Pharm. Co., Ltd.

ENCORE

Publication: Mullins A, Modrykamien A, Carter M, Flynn K, Roberts S, Whitford M, Dzekunskas M, Tueller D, Gannon S, Wood C, Daoud Y. 715975 - Utilization of Indirect Calorimetry for Calculation of Nutritional Goals and Its Effect in Ventilator-free days and Muscle Thickness in Septic Mechanically Ventilated Patients (abstract). Supporting Information. ASPEN Nutrition Science & Practice Conference: March 28–31, 2020, JPEN J Parenter Enteral Nutr. 2020 Feb;44(2):55-57.

P96 - Utilization of Indirect Calorimetry for Calculation of Nutritional Goals and its Effect in Ventilator-free days and Muscle Thickness in Septic Mechanically Ventilated Patients

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Purpose: Septic patients on mechanical ventilation (MV) develop muscle atrophy soon after MV initiation. Nutrition delivery is frequently less than prescribed nutritional needs resulting in further muscle atrophy and loss of physical function. Additionally, the variation in energy expenditure (EE) during critical illness further complicates establishing nutrition targets and optimal delivery. Although indirect calorimetry (IC) is recognized as best practice for determining EE, it has not been universally adopted due to limitations including cost of equipment and maintenance of an effective IC protocol. The objective of this study was to assess whether utilization of IC for caloric goal calculation compared to the Penn State (PS) predictive equation results in improvement in muscular structure as measured by, diaphragm muscle thickening fraction (DTF) and quadricep muscle layer thickness (QMLT), and number of ventilator-free days (VFD) in patients with sepsis. A secondary aim of the study was to examine changes in QMLT and DMT in malnourished versus adequately nourished patients.

Methods: Twenty-five MV adult patients admitted to the medical intensive care unit (ICU) with sepsis were prospectively randomized to IC or PS equation to obtain a measured or estimated, respectively, EE. Upon inclusion, IC and the PS equation were assessed at baseline in all subjects and then twice weekly. Target nutrition support (NS) in both groups was based on the method, IC or PS equation, utilized per randomization to establish EE. Bedside ultrasonography of the DTF and QMLT was peformed upon enrollment and repeated every 3–5 days while on MV or through ICU day 14. Outcomes included DMT and QMLT change, feeding adequacy, presence of malnutrition, VFD, ICU length of stay (LOS), hospital LOS, ICU and

hospital mortality. Data was summarized as mean, standard deviation (SD), median, quartiles (Q1- Q3), frequency and percentages. Student t-test or Fisher exact-test/Chi square were used to compare the two groups.

Results: The two groups' baseline demographics were comparable and no significant differences in outcomes between feeding groups were found. No associations between feeding adequacy and clinical outcomes including VFD, QMLT and DTF change, and ICU and hospital LOS were seen. Differences in clinically relevant outcomes were observed between malnourished and adequately nourished patients. Malnourished patients had significantly less VFD compared to the adequately nourished (4.7 vs 15.4, p = 0.0186). Malnourished patients had significantly less QMLT at initial measurement (0.6 cm vs 1.95 cm, p = 0.0163), and they tended to experience less overall QMLT loss (-0.04 cm vs -0.22 cm, p = 0.1322). This outcome was observed despite comparable nutrient delivery in malnourished and adequately nourished patients.

Conclusion: This preliminary study including a small number of MV patients with sepsis does not suggest use of IC versus the PS equation improves clinical outcomes. Patients with malnutrition, regardless of the method used to determine EE, had less VFD. Paradoxically, malnourished patients had less net loss of QMLT which may have occurred due to less baseline lean body mass. Additional research with a larger sample size is needed to further clarify these findings.

Financial Support: n/a

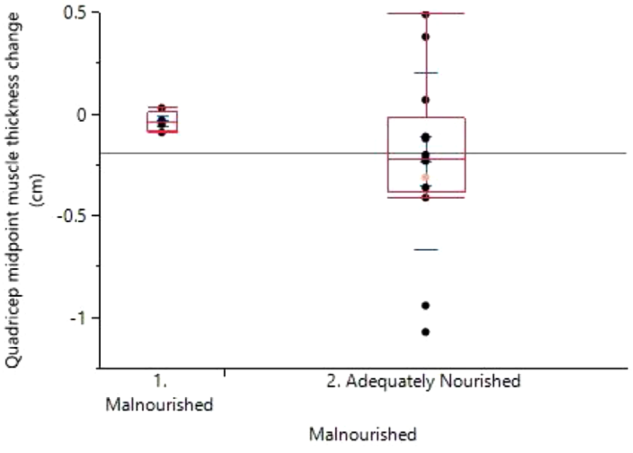
Table 1: Outcomes and Demographics of Feeding Groups

Characteristic		Feeding Group		P value
		Indirect Calorimetry (n=11)	Penn State Equation (n=14)	
Age (years)	Mean ± SD	65.6 ± 18.2	56.9 ± 16.7	0.2276
	Median (Q_1 - Q_3)	67.0 (53.0 - 83.0)	59.5 (44.0 - 72.3)	
Gender (male)		9 (81.8%)	11 (78.6%)	1.0000
APACHE 4	Mean ± SD	105.6 ± 43.6	84.4 ± 32.9	0.1950
	Median (Q_1 - Q_3)	122.0 (72.0 - 129.0)	82.5 (54.8 - 106.8)	
Body mass index (kg/m2)	Mean ± SD	27.4 ± 8.1	31.2 ± 8.9	0.2842
	Median (Q_1 - Q_3)	27.0 (23.9 - 33.3)	29.9 (23.9 - 36.9)	
Malnourished		3 (27%)	4 (29%)	1.0000
Measured energy expenditure (kcals)	Mean ± SD	1,963.5 ± 438.5	2,151.2 ± 600.7	0.3761
	Median (Q_1 - Q_3)	1,990.0 (1,481.0 - 2,323.0)	2,246.0 (1,654.5 - 2,662.8)	
% Adequacy of caloric delivery	Mean ± SD	63.2 ± 23.0	70.3 ± 18.6	0.4117
	Median (Q_1 - Q_3)	71.0 (42.8 - 84.4)	72.2 (58.0 - 78.8)	
% Adequacy of protein delivery	Mean ± SD	70.0 ± 26.7	77.0 ± 13.4	0.4411
	Median (Q_1 - Q_3)	74.2 (53.4 - 92.0)	74.1 (68.3 - 90.5)	
Initial quadricep mid-point muscle (cm)	Mean ± SD	1.5 ± 0.8	1.6 ± 0.9	0.7522
	Median (Q_1 - Q_3)	1.4 (0.8 - 2.2)	1.7 (0.8 - 2.2)	
Quadricep midpoint muscle thickness change (cm)	Mean ± SD	-0.2 ± 0.4	-0.2 ± 0.4	0.9916
	Median (Q_1 - Q_3)	-0.1 (-0.5 - 0.1)	-0.2 (-0.4 - 0.0)	
Diaphragm muscle thickness change	Mean ± SD	2.8 ± 13.5	1.6 ± 9.0	0.8373
	Median (Q_1 - Q_3)	4.9 (-5.5 - 14.3)	0.4 (-6.4 - 9.8)	
Vent Free Days	Mean ± SD	12.5 ± 10.4	12.4 ± 10.4	0.9646
	Median (Q_1 - Q_3)	16.0 (0.0 - 21.0)	15.5 (0.0 - 21.3)	
ICU length of stay (days)	Mean ± SD	11.0 ± 6.4	14.8 ± 12.3	0.3374
	Median (Q_1 - Q_3)	9.5 (6.5 - 14.3)	10.5 (10.0 - 15.5)	
Hospital length of stay (days)	Mean ± SD	18.2 ± 13.4	18.9 ± 12.1	0.8931
	Median (Q_1 - Q_3)	15.0 (12.5 - 18.0)	15.5 (13.8 - 21.0)	

Table 2: Outcomes of Malnourished and Adequately Nourished subjects

Characteristic		Malnourished (n=7)	Adequately Nourished (n=18)	P value
Age (years)	Mean ± SD	54.3 ± 18.5	63.2 ± 17.0	0.2928
	Median (Q_1 - Q_3)	64.0 (45.0 - 69.0)	63.5 (53.0 - 79.3)	
Gender (male)		6 (85.7%)	14 (77.9%)	1.0000
APACHE 4	Mean ± SD	88.1 ± 36.9	95.9 ± 40.2	0.6539
	Median (Q_1 - Q_3)	70.0 (59.0 - 123.0)	99.0 (66.0 - 126.8)	
Body mass index (kg/m2)	Mean ± SD	24.8 ± 7.5	31.3 ± 8.5	0.0848
	Median (Q_1 - Q_3)	27.5 (16.1 - 31.7)	28.1 (24.9 - 37.9)	
Measured energy expenditure (kcals)	Mean ± SD	1,741.1 ± 529.1	2,195.9 ± 491.7	0.0766
	Median (Q_1 - Q_3)	1,728.0 (1,271.0 - 2,012.0)	2,288.0 (1,771.3 - 2,549.5)	
% Adequacy of caloric delivery	Mean ± SD	66.2 ± 31.9	67.5 ± 15.4	0.9166
	Median (Q_1 - Q_3)	72.3 (42.5 - 90.6)	71.6 (57.1 - 78.0)	
% Adequacy of protein delivery	Mean ± SD	63.0 ± 28.2	78.2 ± 15.0	0.2160
	Median (Q_1 - Q_3)	76.7 (37.4 - 86.6)	73.3 (68.3 - 93.1)	
Initial quadricep mid-point muscle (cm)	Mean ± SD	0.9 ± 0.6	1.8 ± 0.9	0.0163
	Median (Q_1 - Q_3)	0.6 (0.4 - 1.6)	2.0 (0.9 - 2.3)	
Quadricep midpoint muscle thickness change (cm)	Mean ± SD	0.0 ± 0.1	-0.2 ± 0.4	0.1322
	Median (Q_1 - Q_3)	0.0 (-0.1 - 0.0)	-0.2 (-0.4 - 0.0)	
Diaphragm muscle thickness change	Mean ± SD	-0.9 ± 8.9	3.4 ± 11.5	0.4335
	Median (Q_1 - Q_3)	-5.7 (-6.5 - 7.1)	6.8 (-4.2 - 11.9)	
Vent Free Days	Mean ± SD	4.7 ± 8.7	15.4 ± 9.2	0.0186
	Median (Q_1 - Q_3)	0.0 (0.0 - 11.0)	20.0 (7.5 - 21.5)	
ICU length of stay (days)	Mean ± SD	13.6 ± 6.7	13.1 ± 11.6	0.8936
	Median (Q_1 - Q_3)	12.0 (10.0 - 17.0)	10.0 (7.5 - 14.0)	
Hospital length of stay (days)	Mean ± SD	18.6 ± 16.2	18.6 ± 11.1	0.9912
	Median (Q_1 - Q_3)	15.0 (10.0 - 17.0)	15.0 (14.0 - 21.0)	

Figure 2: Initial quadricep muscle thickness by presence of malnutrition



P97 - Pilot Quality Improvement Study: Exploring PEG Placements in Critically Ill COVID-19 Patients

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Purpose: Since the start of the COVID-19 pandemic, health care knowledge related to COVID-19 patient care has continually evolved. Clinicians are trying to balance optimizing care and minimizing the risk of staff contracting COVID-19. Critically ill COVID-19 patients admitted to the intensive care units (ICUs) at our facility that are intubated will start receiving enteral nutrition support within one to two days. Those who require intubation for about two weeks or greater will often get a tracheostomy tube placed. Under normal circumstances, our ICU team often places a percutaneous endoscopic gastrostomy (PEG) tube for critically ill patients who are expected to need nutrition support for more than 4 weeks. The above-mentioned procedures are all aerosolizing processes that increase the risk of staff getting COVID-19. During this pandemic, our ICU teams have been hesitant to routinely place PEG tubes to limit staff exposure. The purpose of this quality improvement study was to characterize the baseline and health outcomes of critically ill COVID-19 patients with and without PEG placements.

Methods: Inclusion criteria included critically ill COVID-19 patients, age 18 or older, admitted to our ICUs starting March 10, 2020, and required nutrition support. Data was gathered retrospectively from electronic medical charts, and data collection is ongoing.

Results: A total of 22 patients (average age 57.2 $\pm$ 16.6 years, 27.6% female, 50% Hispanic, average BMI at admission = 33.2 $\pm$ 7.2 kg/m2) were included in our study. Sixteen of the patients did not receive PEG tubes prior to discharge while six patients had PEG tubes while in the ICU. In general, the patients that received PEG placements appeared to be more critically ill as evidenced by admission data (higher BMI of 36.4 $\pm$ 9.9 kg/m2 versus BMI of 32.0 $\pm$ 5.8 kg/m2 in the no PEG group, 66.7% with hypertension versus 56.3% in the no PEG group, and 66.7% with diabetes mellitus versus 37.5% in the no PEG group), 100% receiving tracheostomies (versus 50% in the no PEG group), having a longer length of stay of 47.3 $\pm$ 4.7 days (versus 36.8 $\pm$ 12.6 days in the no PEG group), and a higher incidence of death at 50% (versus 37.5% in the no PEG group). On average PEG placement occurred on length-of-stay day number 33.0 $\pm$ 19.2.

Conclusion: Our preliminary data support routine PEG placements in COVID-19 patients inline with ASPEN practice guidelines. Our COVID-19 Task Force team is now placing PEG tubes towards the end of ICU stays, after a negative COVID-19-test has been confirmed, which ensures staff safety. As this study is ongoing, we hope to report further findings that can inform PEG placement practices in critically ill COVID-19 patients.

Financial Support: n/a

P98 - Impact of Vasoactive Medication on Enteral Nutrition in Pediatric Acute Respiratory Distress Syndrome

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Purpose: Pediatric Acute Respiratory Distress Syndrome (PARDS) remains a significant cause of morbidity and mortality (19%). Early enteral nutrition (EEN) has been shown to reduce mortality, length of stay, and hospital charges in critically ill children. EEN in children with PARDS has not been a major standard of care due to reluctance to initiate nutrition and findings that, while not significant, showed that children experience longer time on mechanical ventilation following EEN. Additionally, the tenuous cardiovascular and hemodynamic status can be prohibitory to initiating feeding. The vasoactive-ionotropic score (VIS) is a method of quantifying cardiovascular support. This score is derived from the doses of Epinephrine, Norepinephrine, Vasopressin, Milrinone, Dopamine and Dobutamine a patient receives. The maximum score during the initial 48-hour period has been found to be predictive of both length of stay and morbidity (in specific patient populations). In this study, we look to establish thresholds to support clinical decision-making using VIS and the individual vasoactive agents it represents with regards to EEN.

Methods: Charts from the 151 subjects in the same data set as the parent study, Nutritional Practices & Outcomes in Patients with Pediatric Acute Respiratory Distress Syndrome, were reviewed to determine the individual subject's doses of vasoactive agents received within the first seven days of PARDS diagnosis. Data were collected to calculate the hourly VIS scores. The highest dose received in the hour was recorded to determine the VIS for that hour. Additionally, the single highest VIS score in the first 48hrs was calculated. We hypothesized that subjects who receive EEN will have a lower maximum VIS than those who did not in the first 48 hours following diagnosis. We also hypothesized that the most potent vasoconstrictor drugs will be used less frequently in the EEN group.

Results: A total of 1954 unique VIS scores were obtained from the study population. The maximum VIS score in the first 48 hours was lower in the EEN group and patients in the EEN group received significantly lower doses of Epinephrine, Norepinephrine, and Vasopressin ($p < 0.001$ for all of these agents).

Conclusion: Many factors contribute to the choice to initiate nutritional support for critically ill children. In those with PARDS, the amount of cardiovascular support can be prohibitory for beginning nutrition. We found that for the most potent vasoactive agents, there is overlap between the maximum dose received in the EEN group and the median dose received in the non-EEN group. This overlap between these measures represents a threshold at which EEN could be initiated.

Financial Support: This research was made possible by an internal grant from the Department of Pediatrics at the Medical College of Wisconsin through MSSRP

P99 - Adequacy and complications of enteral nutritional therapy in critically ill patients with COVID-19

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Purpose: A new disease has spread worldwide. With it new challenges to nurture critically ill patients with several complicating factors, such as the use of vasoactive drugs, neuroblockers, propofol and prone position. We present a study evaluating the adequacy of the proposed volume of enteral nutrition and its complications in critically ill patients with COVID-19 compared with critically ill patients without COVID-19.

Methods: A multicenter retrospective study was conducted involving 5 ICUs from private hospitals in Brasília (Brazil). Critically ill patients undergoing enteral nutritional therapy were separated into two groups: group I were the patients with COVID-19, and group II patients hospitalized for other reasons. The adequacy of the infused versus prescribed enteral nutrition was evaluated, being considered as adequate when there was an infusion greater or equal than 80% of the prescribed volume, as well as the number of days that each group remained without receiving enteral nutrition. As assessed complications, diarrhea was considered when the patient had three or more liquid bowel movements for at least two consecutive days, hyperglycemia when there was at least two blood glucose levels greater than 180 mg/dL in 24 hours and constipation when the patient remained at least three days without evacuate. The data were analyzed using the qui-square test.

Results: A total of 1.029 patients were evaluated, 557 from group I and 472 from group II. The mean number of days in enteral nutritional therapy in group I was 10.1 ± 7.5 and in group II, 9.6 ± 8.4. Group I patients spent more days without receiving diet (6.0% vs. 3.5%, OR: 1,78; IC95% 1,46 – 2,15) as well as having fewer days receiving more than 80% of the prescribed volume diet (70.8% vs. 75.8%, OR: 0,77; IC95% 0,70 – 0,84). Regarding complications, there was no difference between the groups regarding the prevalence of vomiting (2.1% vs. 2.6%, OR: 0,79; IC95% 0,61 – 1,02). Group II patients had a higher prevalence of diarrhea (3.2% vs. 5.1%, OR: 0,62; IC95% 0,51 – 0,76). Group I patients, on the other hand, had more frequent constipation (22.1% vs. 12.4%, OR: 2,00; IC95% 1,80 – 2,23) and hyperglycemia (34.7% vs. 30.9%, OR: 1,18; IC95% 1,09 – 1,29).

Conclusion: Nutritional therapy is essential for the short and long-term recovery of patients with COVID-19. It has been a challenge to conduct nutritional therapy for this group of patients while we are still learning the best ways to manage it. Attention should be given to optimize the volume administered of the diet as well as measures to minimize the frequency of constipation and glycemic changes in patients with COVID-19.

Financial Support: n/a

	Group I	Group II	OR (IC95%)	p
Enteral nutrition days	10.1 ± 7.5	9.6 ± 8.4		
Received enteral nutrition > 80% of prescribed volume	70,8%	75,8%	0,77 (0,70 – 0,84)	<0,0001
Days without receiving diet	6,0%	3,5%	1,78 (1,46 – 2,15)	<0,0001
Vomiting	2,1%	2,6%	0,79 (0,61 – 1,02	0,07
Diarrhea	3,2%	5,1%	0,62 (0,51 – 0,76)	<0,0001
Constipation	22,1%	12,4%	2,00 (1,80 – 2,23)	<0,0001
Hyperglycemia	34,7%	30,9%	1,18 (1,09 – 1,29)	<0,0001

P100 - Challenges in Parenteral Nutrition in Adult Ultra-Short Gut: A Case of Cachexia

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Purpose: BACKGROUND: Patients with ultra-short gut, defined as loss of small intestine length to less than 10cm or 10% expected length for age, have inadequate absorption of enteral nutrients. Parenteral nutrition(PN) is required to meet nutritional requirements due to Type III Intestinal Failure(IF). Targeting energy prescriptions using indirect calorimetry in this population with ultra-short gut has not been reported in adults. PURPOSE: Describe a case of cachexia in a patient with type II IF and discuss challenging aspects of management.

Methods: An 18-year-old man admitted for nutritional support post extensive small bowel resection from a volvulus due to congenital bands complicated by small bowel ischemia resulting in 10cm of duodenum sewn off with a g-tube to drain and the colon in discontinuity. PN was the primary source of nutrition and incrementally provided a mixed fuel substrate at 45kcal/kg/day (without uremia, hyperglycemia, or hyperlipidemia) for

weight gain (Table-1). However, the patient continued to lose weight (26.9kg), resulting in a severely underweight body mass index of 11.4kg/m2 and altered body composition on CT with skeletal muscle index of 17.2 cm2/m2 (Figure-1). Serial indirect calorimetry demonstrated the nutritional targets based on measured REE were exceeded by the caloric intake with PN, however, the RQ was consistently measured at 0.77. Regarding anabolic status, the patient had low normal IGF-1 at 199ug/L (135-495 ug/L), low testosterone at 4.1nmol/L (8-29.5nmol/L), and normal TSH at 1.38mU/L (0.2-4 mU/L). The patient had high c-reactive protein initially due to intraabdominal infections and fungemia that improved with prolonged antibiotics. Subsequently, the patient developed an acute renal insufficiency and cholestatic liver injury, likely multifactorial from PN, antibiotics, and sepsis. To obviate PN cholestasis, dextrose was reduced, the patient was switched from ClinOelic 20%TM to OmegavenTM 5/7 days with SMOF 2/7 days, and cycled to 20 hours. These changes led to improvement but not normalization.

Results: Cachexia, a metabolic disorder resulting in muscle and fat loss despite adequate caloric intake, is becoming more recognized in diseases other than malignancy. The etiology of cachexia is unclear, however, there is an established role of inflammatory and metabolic disturbances. Cachexia in patients with short gut has not been described, as patients primarily suffer from starvation that improves with nutritional supplementation. This case demonstrated cachexia given a lack of weight gain with PN and CT characteristics of muscle loss. Providing sufficient PN was difficult in this case due to evolving IF and PN-associated liver disease. The measured REE was consistently low, possibly due to futile cycling. To optimize anabolism, this patient had testosterone injections, encouraged mobilization, and active treatment for any underlying infection/inflammation. In the context of ultrashort gut with IF, the role of utilizing the gastrointestinal tract for nutrition supplementation or the use of GLP-2 analog for intestinal adaptation is unclear and could be a future endeavor.

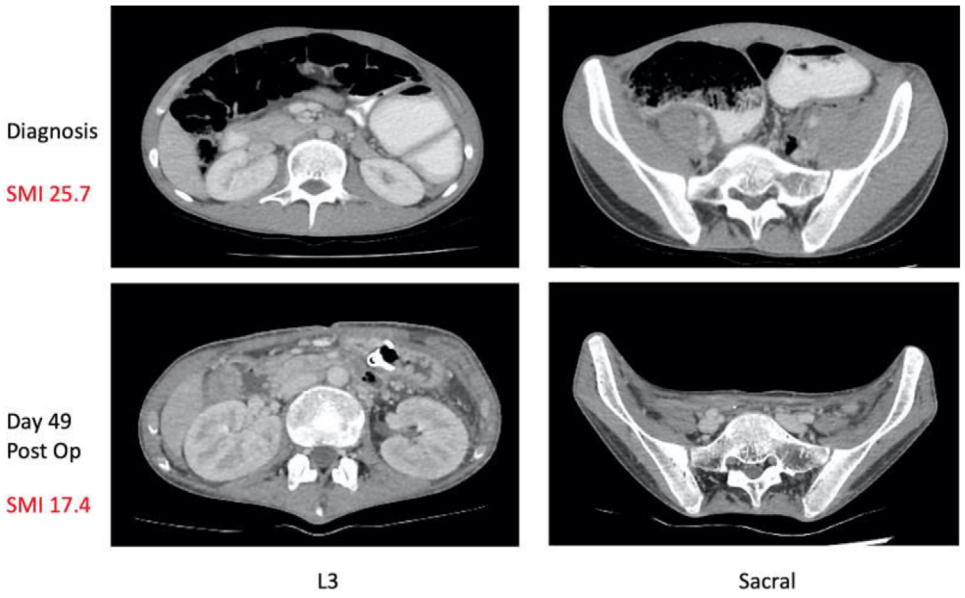
Conclusion: This unique case highlights the difficulties in managing parenteral nutritional therapy in adult patients with ultra-short gut and cachexia. This patient was referred for small bowel transplantation given the complications of cachexia and significant liver cholestasis.

Financial Support: n/a

Table 1

Parameter	Baseline	Day 57 Pre Op	Day 22 Post Op	Day 63 Post Op	Day 78 Post Op
Weight (kg)	61	43.6	40.5	33.6	34.1
BMI (kg/m²)	20.5	14.6	13.5	11.2	11.4
Indirect Calorimetry					
		1090 kcal	1013kcal	840kcal	853kcal
Predicted		1586 kcal	1218kcal	1224kcal	1241kcal
Measured RQ		1.08	0.77	0.76	0.77
PN Nutrition					
Total Cal		1900kcal	2104kcal	1589kcal	1669kcal
Dex		300g	280g	245g	245g
Travasol		100g	125g	90g	110g
Lipid		48g	72g	39.6g	39.6g
(Type)		SMOF	OO/SO	SMOF 2/7 FO 5/7	SMOF 2/7 FO 5/7
C-reactive protein		130	12.2	12.4	5
WBC (x 10^9/L)		7.2	4.5	5.3	7.2
ALT (IU/L)		9	70	186	312
Alkaline Phosphatase (IU/L)		88	276	257	212
Bilirubin (µmol/L)		13	26	123	62

Figure 1



Body Composition on Abdominal CT at diagnosis (baseline) and Day 49 post-op. The L3 cut was used for calculating the SMI, and the sacral cut highlights the loss of abdominal domain post-op. SMI-Skeletal Muscle Index

ENCORE

Presentation: Southern Regional Burn Conference, Lubbock, TX, December 2020

P101 - Retrospective Examination of Copper Supplementation in Burn Patients

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Purpose: Copper deficiency can have a significant impact on the burn patient recovery. Copper is rarely assessed and not routinely available at most clinical chemistry lab. This trace element deficiency often presents as poor wound healing, impaired blood vessel and connective tissue formation, weakened immunity, and elevated reactive oxygen species (ROS). Adequate levels of copper are paramount to the successful recovery of burn injury patients. Many studies have attempted to determine a formula to correct a copper deficiency in burn patients. However, a lack of congruent evidence on copper deficiency in burn patients necessitates future research to determine whether current measurement and supplementation methods are adequate. The focus of our study was to assess copper levels in patients after a severe burn injury and the impact on wound healing, as well as determine the prevalence of copper supplementation and establish a community-wide viewpoint on copper deficiency.

Methods: We conducted a retrospective clinical study that included patients aged 1–90 years that were admitted from August 2017 to May 2019 for a burn injury or necrotizing soft-tissue infection in which copper levels were evaluated. Using the electronic health records, we stratified the patients by copper serum levels to categorize the patients into a normal copper cohort (>63.7mcg/dL) or a copper-deficient cohort. Once categorized, we then compared the variables of TBSA, zinc supplementation, mortality, length of stay, infection episodes, and wound healing rates between the two cohorts for statistical significance ($P < 0.05$). We sent an IRB approved anonymous survey to ABA verified regional burn centers that remained open for six weeks. The 10-question survey collected data on the frequency of checking copper levels, level of importance placed on copper supplementation, and the method used to supplement copper.

Results: A total of 262 patients were admitted over the two-year period and 59 patients had a copper valued drawn. The average copper value across all patients throughout their hospital stay was 105.8 mcg/dL (s.e. = 4.2) with five total patients below the normal threshold (< 63.7 mcg/dL). There was a significant inverse relationship between TBSA and serum copper levels ($r = -0.49$, $t = -3.87$, $p = 0.0003$) but no significant relationships between copper serum and zinc supplementation ($r = 0.01$, $t = 0.06$, $p = 0.95$). Our survey had 51 total responses out of 310 total surveys sent. A total of 65% of burn centers believed that copper values were important and 53% of burn centers checked copper levels in burn patients. Copper gluconate was the most commonly used supplementation method (50%) and other trace elements often recorded included selenium, zinc, and iron.

Conclusion: Our study found only minimal patients with a copper level below the threshold considered normal. However, this value was averaged across their hospitalization and might bias an early copper deficiency in burn patients. There was an inverse relationship with copper and total burn area showing that the larger a burn, the more deficient the patient was in copper. Overall, most burn centers thought copper values were important

in burn care, and over half routinely checked copper levels in severe burns. Additionally, most burn centers check other trace elements as part of a complete analysis for severely burned patients. Despite the lack of copper deficiency found at our burn center, overall, the consensus is that copper levels are critical to proper management of severely burned patients. These results suggest that further research is needed to monitor copper levels and wound healing in the severely burned patient.

Financial Support: n/a

P102 - Utilization of Peptide Based Diets in Severely Ill Patients

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Purpose: Enteral tube feeding (ETF) is a life-sustaining therapy used to provide nutritional requirements to patients with compromised volitional intake. Selection of nutritional formula ideally reflects the patient's clinical requirements, as related to product characteristics. Often ETF product selection also reflects hospital availability. Specialty ETF formulas contain ingredients that support different aspects of clinical care that aid in the medical management of various disease conditions. It is established that up to 75% of critically ill patients on ETF experience gastrointestinal (GI) intolerance symptoms, often associated with inadequate nutrient delivery and poor clinical outcomes. In addition, critically ill patients are at increased risk of malnutrition due to the impact of inflammation and altered metabolism. Peptide-based formulas are nutritionally complete ETFs in which the protein is hydrolyzed to different degrees and fats typically contain a portion of medium chain triglycerides (MCT), unlike standard enteral tube feeding (SETF) wherein protein content is intact and fat content is varied. The aim of this observational, retrospective study is to identify characteristics of hospitalized patients receiving 100% whey peptide-based ETF (WPBD) and SETF, using real world evidence (RWE) data.

Methods: Using the Premier Healthcare Database, clinical and demographic characteristics were examined for adult patients (≥ 18 years) from October 1, 2015 to October 31, 2019 in US hospitals. Patients receiving Peptamen® formulas (WPBD), containing enzymatically hydrolyzed 100% whey protein and a minimum of 50% MCT for enhanced GI absorption and tolerance, as well as those receiving SETF formulas for 3 consecutive days or 3 of 5 consecutive days were included. Patients with more than one type of ETF product billed during the same inpatient stay were excluded. Comparisons of medians (25th-75th percentiles) using Wilcoxon Rank Sum tests and of frequencies using Chi-square tests were made between WPBD and SETF formulas.

Results: Results: A total of 28,476 patients (3,883 WPBD and 24,593 SETF) were included in this data query. Patients were treated across 79 hospitals, 27 of which had both types of ETF formulas, 50 of which had only SETF, and 2 WPBD only. Median age was 68 years, with patients receiving WPBD (64 years, 25th-75th percentiles: 53, 74) significantly younger than those receiving SETF (68 years, 25th-75th percentiles: 58, 78) ($p< 0.0001$). Overall, patients were 46% female, 14% Black, and 4% Hispanic or Latino ethnicity. Distribution of APR-DRG severity of illness (SOI) and risk of mortality (ROM) categorizations as minor, moderate, severe, and extreme were significantly different between groups (both $p< .0001$). Patients SOI and ROM were classified as extreme for 67% and 58% of patients receiving WBPD and for 48% and 39% of patients receiving SETF, respectively. Additional clinical characteristics are presented in Table 1.

Conclusion: Specialty ETF formulas are therapeutic modalities of clinical care. Increased severity of illness is associated with increased incidence of symptoms of GI intolerance. Tolerance to ETF has been shown to improve nutrient provision. Adequate and optimal delivery of ETF is a strategy to prevent and treat malnutrition in hospitalized patients. This descriptive data requires adjusted analysis to better understand if there are clinical outcome differences associated with use of WBPD and SETF as related to severity of illness and GI tolerance.

Financial Support: Nestlé Health Science

Table 1. Clinical Characteristics of Patients Receiving WBPD and SETF

Discharge diagnosis or procedure	WPBD	SETF	P-value
Mechanical Ventilation	75.7%	35.0%	0.0001
Critical Illness Myopathy	2.1%	0.8%	0.0001
Pneumonia	40.0%	26.4%	0.0001
Septicemia	45.4%	28.2%	0.0001
Liver Disease	16.3%	9.5%	0.0001
Obesity	26.6%	14.4%	0.0001
Nausea & Vomiting	1.4%	2.0%	0.0124
Abdominal Pain	0.6%	1.0%	0.0154

P103 - Association of Nutritional Delivery on Skeletal Muscle Wasting and Inflammation in Critically Ill Adult Patients: A Systematic Review

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Purpose: Skeletal muscle wasting and weakness is the single greatest contributor of persistent functional disability in critical care survivors. Nutrition therapy presents a huge potential in addressing ICU-associated skeletal muscle wasting by targeting excess substrate availability and inflammation. Critical care nutrition therapy is moving towards an individualized precision intervention based on several predictive factors including metabolic profile and inflammatory phenotype. However, the association has not yet been established. A deeper understanding of the relationship between nutritional delivery and the changes in skeletal muscle mass and inflammation during critical illness will spur a paradigm shift toward individualized treatment. The aim of this systematic review was to examine the association of energy/protein delivery on skeletal muscle mass and inflammatory changes in critically ill adult patients.

Methods: The MEDLINE and EMBASE databases were searched for interventional and observational studies of nutrition therapy in critically ill patients aged 18 years or older, published in English up until 26 June 2020. Inclusion criteria were measurements of skeletal muscle mass/volume at 2 or more time points and documentation of the nutrition therapy/feeding protocol used during their stay in the intensive care units. The primary outcome was skeletal muscle mass changes, and the secondary outcome was inflammatory marker changes.

Results: The search yielded 203 results, of which 6 (3 randomised controlled trials and 3 prospective cohort studies) were included in this review. Of the included studies, the population was largely heterogenous with 3 studies taken place in a general ICU, 2 in medical patients, and 1 in head injury patients only. Among the 243 participants in total, the Acute Physiology and Chronic Health Evaluation (APACHE II) on ICU admission varied widely (range 11–33), as did participant age (range 19–90 years), and sex (59%-100% male). Participants in the included studies experienced a varying degree of reduction in skeletal muscle mass/volume; median loss were 3–20% by the first week, 18–20% by 10 days, and 20–22% by the second week of ICU admission. Critical illness was associated with an acutely elevated levels of inflammatory mediators, followed by subsequent reductions within 7 days. A variety of methodologies and markers were used to assess skeletal muscle mass and inflammation, which deemed a meta-analysis inappropriate. No clear relationship between energy/protein delivery and skeletal muscle mass changes was identified. Nutrition therapy appeared to have an anti-inflammatory and immune-enhancing effect, observed with low- to moderate- quality evidence.

Conclusion: This systematic review highlighted a lack of high-quality evidence to clearly define the association between energy/protein delivery and skeletal muscle mass changes in critically ill patients. Nutrition therapy appeared to have an anti-inflammatory and immune-enhancing effect, but the true association needs to be further investigated. Results from this systematic review also highlighted the difficulties in interpreting results when there is substantial variation in the methodology and great heterogeneity in the patient population. Future research investigating the association should ideally be performed in adequately powered, unbiased clinical datasets generated in observational studies or randomized controlled trials, with detailed documentation of energy/protein dose, timing, and delivery.

Financial Support: n/a

P104 - The Effect of Preoperative Non NPO Feeding Protocol on Nutrition Delivery and Pneumonia Incidence in Critically-Ill Trauma Patients

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Purpose: Nil per os (NPO) after midnight (MN) is a common practice prior to scheduled procedures. As a result, nutrition is often withheld in critically-ill patients for prolonged periods of time. Our Shock Trauma ICU (STICU) has implemented a preoperative non NPO feeding protocol, known as Hermann Uninterrupted Gastric Route via Enteral Alimentation (HUNGREA), to reduce fasting time before planned procedures. In this quality improvement study, we compared fasting time, nutritional deficits, and pulmonary aspiration incidents between patients who were NPO after MN and patients who followed the HUNGREA protocol.

Methods: All trauma patients aged ≥18 admitted to STICU from 11/2017 to 2/2018 were included. Patients having sustained non-trauma or fatal injuries were excluded. Demographics, admission diagnosis, duration of fasting, nutritional deficits, pulmonary aspiration incidents in operating room (OR) and pneumonia incidents were collected each time a patient underwent a procedure. Patients were categorized into four groups: 1. Intubated + NPO after MN: enteral nutrition (EN) was stopped after MN. 2. Intubated + HUNGREA: EN was stopped one hour before a scheduled procedure. At the time EN was stopped, gastric contents were aspirated via a nasogastric tube. 3. Intubated +HUNGREA+ Procedure Canceled. 4. Non-intubated + NPO after MN: oral diet was stopped after MN. Statistical analysis was done by using Kruskal-Wallis test and Fisher's exact test.

Results: A total of 138 patients admitted to the STICU met the inclusion criteria. Their median age was 39 (interquartile range 16, 89), BMI was 25.9 kg/m2 (interquartile range 17, 58), and 65% were male. During the study period, 239 procedures were performed. Among the 4 groups (Table 1), "Non-intubated + NPO after MN" had the longest fasting time – 19.0 hours, followed by "Intubated + NPO after MN" – 17.0 hours, "Intubated + HUNGREA" – 5.0 hours, and "Procedure Canceled" – 0.0 hours. Thirty-four procedures (14.2%) were cancelled. However, this group of patients had zero nutritional deficits because they followed the HUNGREA protocol. Their procedures were cancelled before the EN stop time. Among intubated patients, caloric deficits in the NPO group were about 4-fold higher than the HUNGREA group (1512 kcal vs 372 kcal; $P < 0.001$). Their protein deficits were also about 4 times higher (94 g vs 24 g; $P < 0.001$). This finding was not surprising given their 3.4-fold longer total NPO time (17.0 hours vs 5.0 hours; $P < 0.001$). The amount of pneumonia incidents was not significantly different between NPO and HUNGREA in intubated groups (7.9% vs 8.8%; $P = 0.85$), although it was significantly higher in intubated versus non-intubated groups (7.9% vs 0.0%; $P = 0.019$). Notably, there were no pulmonary aspiration events in either of the groups.

Conclusion: The use of the preoperative non NPO feeding (HUNGREA) protocol resulted in a significant decrease in nutritional deficit in the critically-ill injured patients due to the reduced fasting time. Moreover, the implementation of the HUNGREA protocol is safe, as evidenced by zero incident of pulmonary aspiration and no significant increase of pneumonia incident among the intubated patients. Future study will focus on reducing the fasting time of patients receiving an oral diet.

Financial Support: n/a

Table 1. Total number of NPO hours and outcome of the study groups

	Intubated + NPO after MN (n=63)	Intubated + HUNGREA (n=68)	Intubated + HUNGREA & Procedure Canceled	Non-Intubated + NPO after MN	*P* Value
Total no. of NPO hours	17 (14, 31)	5 (3,8)	0 (0, 9)	19 (14, 32)	< 0.001
No. of pulmonary aspiration incident n (%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	N/A
Caloric Deficits (kcal per procedure)	1512 (960, 2040)	372 (186, 738)			<0.001
Protein Deficits (grams per procedure)	94 (59, 116)	24 (12, 48)			<0.001

Data are presented as median (interquartile range) unless otherwise indicated. HUNGREA: Hermann Uninterrupted Gastric Route via Enteral Alimentation (a preoperative non NPO feeding protocol), MN: midnight, NPO: Nil per os.

P105 - The impact of a carbohydrate loading drink on postprandial glycemic responses and gastric emptying in adults with prediabetes and type 2 diabetes mellitus

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Purpose: Enhanced recovery after surgery (ERAS) pathways aim to optimize perioperative management of surgical patients to improve outcomes. Of the multimodal perioperative care components, there is an emerging role for nutrition, including preoperative carbohydrate loading. In patients with normal glycemia, use of preoperative carbohydrate loading, compared with overnight fasting, substantially improves pre- and postoperative patient well-being and reduces postoperative insulin resistance. However, most studies demonstrating a benefit of preoperative carbohydrate loading are in individuals without type 2 diabetes mellitus. There is a lack of consensus by professional society guidelines on this practice in patients with diabetes due to limited evidence and theoretical concerns. The objective of the current study was to examine postprandial glycemic responses and gastric emptying rates following consumption of a carbohydrate loading drink in adults with and without diabetes. It was hypothesized that gastric emptying rates would not differ between those with and without diabetes and that glucose levels would return to baseline earlier in participants without diabetes compared to those with diabetes.

Methods: A single-arm, non-randomized trial was conducted in adults without diabetes (non-DM; n = 27, 47.5±2.5 y), with prediabetes (pre-DM; n = 28, 55.8±3.0 y) and with well-controlled diabetes (DM; n = 25, 56.2±2.5 y) across 3 US sites. Following an overnight fast, participants consumed a 50 g carbohydrate drink (Ensure Pre-Surgery). Immediately following, participants ingested 1.5 g liquid paracetamol. Venous blood samples were collected at baseline (i.e., t = 0 minutes) and at 15, 30, 45, 60, 90, 120, 150, 180, 210, and 240 minutes to measure plasma glucose and serum insulin and paracetamol concentrations. Subjective appetitive sensations were assessed before and after consumption and at the end of the postprandial

period. Product liking was also assessed after consumption. Data were analyzed using analysis of covariance while adjusting for covariates including study site, glycemia group, gender, BMI, and age. The Weibull model was used to fit the mean paracetamol response for each participant. P<0.05 was considered statistically significant.

Results: Participants with DM were older and had higher BMI than non-DM (28.2±0.9 kg/m2 vs. 31.2±0.9 kg/m2; P<0.05). Fasting glucose and HbA1c levels differed significantly across groups (non-DM: 95.4±3.6 mg/dL, 5.2±0.1%; pre-DM: 111.6±3.6 mg/dL, 5.8±0.1%; DM: 167.4±3.6 mg/dL, 7.2±0.1%). As compared with non-DM, DM had increased glucose responses at 30–180 minutes, but lower insulin responses at 15–60 minutes, following beverage ingestion (P<0.05). Additionally, glucose responses returned to baseline levels at 150 minutes in non-DM and pre-DM compared with 210 minutes in DM. Peak plasma glucose values and time to reach peak values did not differ among the groups. However, peak serum insulin values were significantly lower in DM (53.7±10.4 μIU/mL) compared with non-DM (104.3±11.2 μIU/mL) and pre-DM (124.3±64.0 μIU/mL; P<0.05). Mean paracetamol concentrations were not significantly different between non-DM and DM. Non-clinically relevant differences in serum paracetamol concentrations were observed at 150 and 180 minutes between pre-DM and DM (P<0.05). Subjective appetitive ratings and liking did not differ among the groups.

Conclusion: Blood glucose responses returned to baseline levels within ~2.5 hours in non-DM and pre-DM and within ~3.5 hours in participants with DM following ingestion of a carbohydrate drink. Additionally, gastric emptying rates following carbohydrate drink ingestion were not significantly different between participants regardless of glycemic control status.

Financial Support: This study was supported by Abbott Nutrition.

P106 - Increasing Hypermetabolism during Hospitalization in COVID-19 Patients Undetected by Common Predictive Energy Equations

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Purpose: Indirect calorimetry (IC) is considered the gold-standard for predicting energy needs and is the recommended means of determining energy requirements in a critically-ill population. Our initial IC data displayed persistent hypermetabolism in intubated COVID-19 patients and an increasing measured resting energy expenditure (mREE) during hospitalization. Study objectives included longitudinally assessing mREE using IC and comparing mREE and select predictive energy equations. To date, no studies have compared IC derived mREE to predictive energy equations in a critically-ill, COVID-19 patient population.

Methods: The Q-NRG Metabolic Monitor was used to obtain IC data for intubated COVID-19 patients. IC data were chosen based on a variance of < 10% and time period of >10 minutes and later compared to the Harris Benedict (HB), Mifflin St-Jeor (MSJ), and Penn State University (PSU) 2003b and PSU 2010 equations on the day of IC collection. Anthropometric data for all predictive energy equations were taken upon admission. Maximum temperature and minute ventilation were taken on the day IC was completed for PSU equations. Data represented in kcal/kg were determined using admission weight. Two-sided t-tests were used to report differences between means of IC derived mREE and REE determined by predictive energy equations. Data are reported as mean +/- standard error of the mean and significance was determined by a 2-sided p-value of < .05.

Results: IC measurements were obtained for 34 COVID-19 patients. The majority of patients were male (62%), Black or African American (50%), Non-Hispanic (71%), and obese (56%). Average IC derived mREE increased from 22.9 ± 1.3 kcal/kg, to 25.4 ± 2.3 kcal/kg, and to 28.6 ± 2.6 kcal/kg during ICU weeks 1, 2, and 3; respectively (p = 0.22). No predictive energy equations detected this longitudinal caloric increase and frequently under-predicted needs. Throughout ICU LOS, patients required an overall average of 1997.7 ± 99.5 kcal/day which was 125.3% ± 4.6%, 120.7% ± 4.6%, and 100.3% ± 3.6% in MSJ, HB, and PSU equations; respectively. The PSU equations produced average REE closest to IC in ICU weeks 1, 2, and 3 without significant differences (Table 1).

Conclusion: No predictive energy equation optimally predicted increasing mREE during COVID-19 ICU length of stay. The PSU equations may produce the closest prediction to mREE in intubated COVID-19 patients when compared to IC derived mREE, yet do not ideally account for increasing REE during hospitalization. These findings provide the most practical guidance for caloric prescription without the use of IC in intubated COVID-19 patients. Given these data, we believe IC should move to become the standard of care for predicting energy needs in critically- ill COVID-19 patients.

Financial Support: This is an investigator-initiated study funded by Baxter.

The Comparison of IC Derived mREE and Predictive Energy Equations by ICU Week

Table 1

	Resting Energy Expenditure (kcals/kg)	*P* value
ICU Week 1		
IC (mean ± SEM)	22.9 (1.3)	
MSJ	18.6 (0.5)	<0.01
PSU	23.5 (0.9)	0.74
HB	19.2 (0.4)	0.01
ICU Week 2		
IC (mean ± SEM)	25.4 (2.3)	
MSJ	18.4 (0.9)	0.01
PSU	22.9 (1.7)	0.39
HB	19.1 (0.8)	0.02
ICU Week 3		
IC (mean ± SEM)	28.6 (2.6)	
MSJ	17.8 (0.9)	0.01
PSU	22.1 (1.8)	0.07
HB	18.7 (0.9)	0.02

IC – Indirect Calorimetry, MSJ – Mifflin St. Jeor, PSU – Penn State University, HB – Harris Benedict

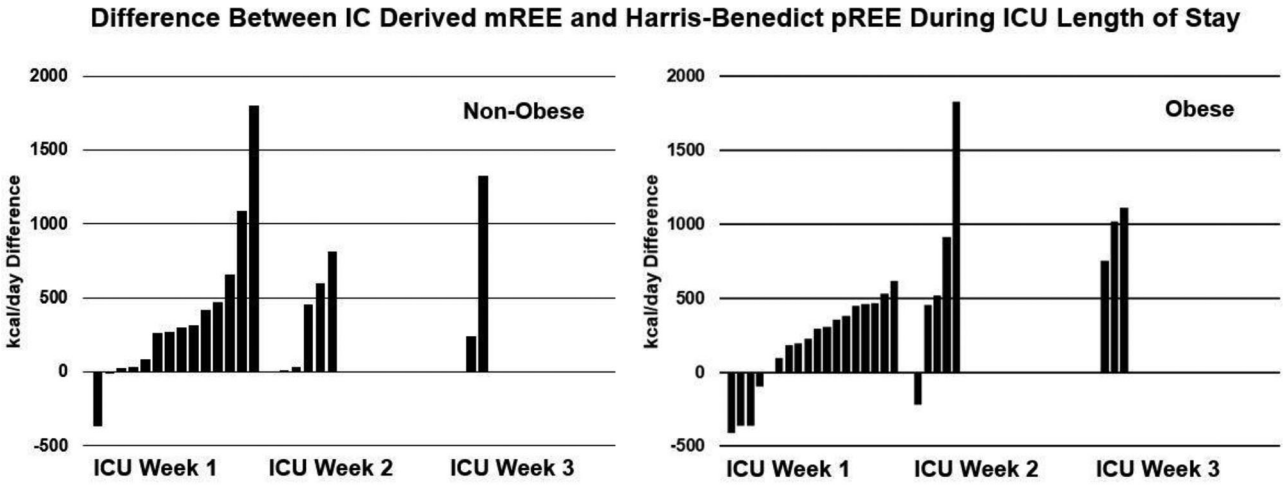

Figure 1 utilizes bars to show the differences between weekly averages of IC obtained mREE and Harris-Benedict (HB) pREE in each patient during ICU length of stay. Not all patients had IC readings in each ICU Week. This graph displays the frequent underestimation of REE by the HB pREE equation.

P107 - Respiratory Quotient as a Predictor of Clinical Outcomes in Intubated, Critically Ill COVID-19 Patients

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Purpose: Understanding the metabolic and nutritional phenotype of COVID-19 is critical to optimizing outcomes. Our initial data utilizing indirect calorimetry measures in COVID-19 ICU patients demonstrated these patients are severely catabolic and are at risk for underfeeding, especially during the second and third weeks of hospitalization (PMID: 32988390). As our data indicates, direct measurement of metabolic rate, obtained via now readily available new indirect calorimeter (IC) technology is crucial to accurate estimation of energy requirements and should be ideally used to guide nutrition throughout these patients' ICU course. Additionally, recent data examining the role of the respiratory quotient (RQ) in outcomes has shown that persistent reduced RQ (< 0.8) correlates with worsened clinical outcomes (PMID: 32867825). Given the need to evaluate nutrition goals, metabolic rate, and RQ data using IC in COVID-19 ICU patients, the purpose of this study was to assess the impact of initial IC measures on outcomes in critically ill COVID-19 patients.

Methods: A prospective longitudinal cohort analysis of critically-ill COVID-19 positive adult patients admitted to the Duke University Medical Center (DUMC) intensive care unit (ICU) requiring mechanical ventilation (MV) from April 20, 2020 to August 7, 2020. All patients underwent RQ measurements following hospitalization. The primary outcome was to determine the impact of initial RQ on mortality in critically ill COVID-19 patients. Secondary outcomes included length of time on MV, ICU length of stay (LOS), and overall LOS. Multivariate linear and logistic regressions models were developed, controlling for age, admission BMI, and steroid and Remdesivir therapy. Variables are reported as Mean ± Standard Deviation.

Results: Of the 34 patients who had RQ measurements upon admission to the ICU, patients' age was 57±16, BMI was 31±9, and 41% (n = 14) died. 79% (n = 27) were treated with Remdesivir, and 62% (n = 21) were treated with steroids. The mean initial RQ was 0.729±0.017. Time on MV was significantly predicted by initial RQ measurements with lower RQ predicting longer time on MV (p = 0.01; CI -159 -19, Table). No other covariates listed above significantly affected MV time. BMI significantly affected mortality (p = 0.03, OR 0.87), and lower admission RQ showed a trend toward significance for increased overall mortality (p = 0.08). There was a trend towards significance for total ICU LOS with reduced early post-admission RQ leading to an increased ICU LOS (p = 0.06). Initial IC, nor any other covariate, impacted total hospital LOS.

Conclusion: This is the first analysis of critically ill COVID-19 patients' initial ICU basal metabolic rates in relation to clinical outcomes. Our results demonstrate that COVID patients with a higher initial RQ measurement have improved outcomes. RQ is a better predictor of patients' time on MV than commonly perceived key clinical factors, including age, BMI, and current COVID-19 therapies (Remdesivir and/or steroids). This data correlated with a recent analysis of septic patients on MV. Moreover, this study also shows that initial RQ likely impacts overall mortality and ICU LOS. BMI was the only other significant predictor of outcomes found in this analysis. Surprisingly, Remdesivir and steroid treatment did not affect outcomes in this population. In conclusion, not only should IC be used to determine nutritional needs in critically-ill COVID-19 patients, RQ can be a useful measure to predict outcomes in this population.

Financial Support: This is an investigator-initiated study funded by Baxter.

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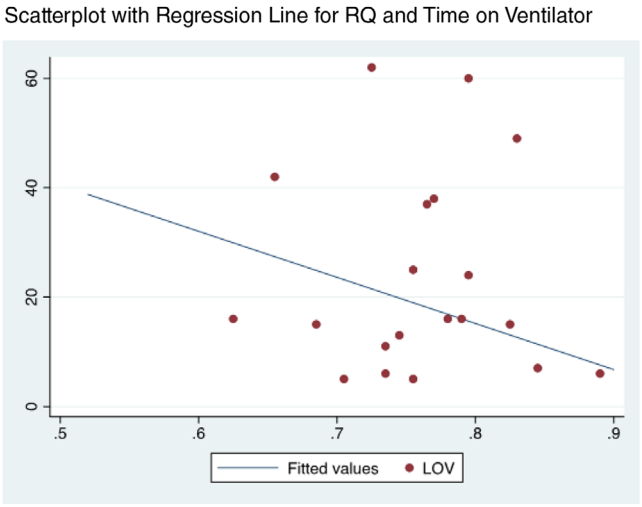
ICU LOS (day)				
	Coef	p-value	CI	
BMI	-0.47	0.19	-1.19	0.25
Age	0.12	0.58	-0.33	0.58
Resp Q	-68.52	0.06	-140.00	2.97
Remdesivir	9.21	0.25	-6.96	25.37
Steroids	6.78	0.30	-6.46	20.02
Time on Ventilator (day)				
	Coef	p-value	CI	
BMI	-0.59	0.10	-1.29	0.12
Age	-0.06	0.79	-0.50	0.39
Resp Q	-89.35	0.01	-159.27	-19.42
Remdesivir	5.03	0.52	-10.78	20.85
Steroids	4.97	0.44	-7.99	17.92
Mortality				
	OR	p-value	CI	
BMI	0.87	0.03	0.77	0.99
Age	1.04	0.39	0.95	1.13
Resp Q	0.00	0.08	0.00	4.45
Remdesivir	0.33	0.38	0.03	3.93
Steroids	1.40	0.77	0.15	13.12



P108 - Micronutrient INTake from Enteral nutrition in critically ill adult patients expressed as a percentage of the Australia and New Zealand Nutrient Reference Values: a retrospective observational study.

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Purpose: Micronutrients play an essential role in metabolic and immune processes during critical illness. The most common mode of nutrition in the Intensive Care Unit (ICU) is enteral nutrition (EN), but minimal literature exists on micronutrient intake from EN in the ICU. Our objective was to determine the intake of vitamins B12, D, C, A, folate, and thiamine, and minerals and trace elements iron, zinc, and selenium delivered from EN in critically ill adults expressed as a percentage of the Australia and New Zealand Nutrient Reference Values set for healthy individuals.

Methods: A two-year (January 2018- January 2020) single-centre retrospective observational study was conducted in a 20-bed university-affiliated teaching ICU in Melbourne, Australia. Mechanically ventilated patients prescribed EN as the sole nutritional support were considered for inclusion. Patients were excluded if they received any other form of nutrition support. The outcomes were micronutrient intake expressed as the percentage of the recommended dietary intake and the upper level of intake. Subgroup analyses included: 1) medical versus surgical admissions, 2) severity of illness dichotomised as Acute Physiology and Chronic Health Evaluation II Score (APACHE II) above or below 20, 3) early ICU admission days (≤3 days) versus late (4-7 days), 4) hours fasted above or below the median value, 5) percentage energy adequacy above or below the mean value, and 6) ICD-10-AM coding for malnutrition. Results are presented as means (standard deviation) or medians [interquartile range], with a $p < 0.05$ considered significant.

Results: Ninety-nine patients were screened, and 57 patients were analysed (67% male, 62 (16) years, APACHE II score 23 (8)). EN was provided for 5 [4-6] days, patients were fasted for 4 [3-6] hours per day and 47 (20)% energy adequacy was achieved. EN delivery met 60–201% of the recommended dietary intake, with five (vitamin A, D, folate, zinc, and selenium) of the nine micronutrients not reaching the recommended level. No micronutrients exceeded upper level of intakes. Medical compared to surgical patients had a higher recommended dietary intake of iron (150 (69)% vs. 98 (60)%; $p = 0.04$) and those with lower disease severity had a higher recommended dietary intake of vitamin D (152 [69-214]% vs. 68 [40-116]%; $p = 0.017$). Intake of all micronutrients was higher on ICU admission days 4–7, in patients fasted for less hours, and in patients with a higher energy adequacy ($p< 0.001$). No differences in recommended micronutrient intake or upper level of intake were identified in patients according to malnutrition coding.

Conclusion: EN delivery did not meet the recommended dietary intake for five of the studied micronutrients and did not exceed the upper limit for any micronutrient in the first seven days of ICU admission when approximately 50% energy adequacy was achieved. Intake varied between subgroups. Prospective multicentre research is warranted to confirm these findings and guide next steps in this novel area of critical care nutrition research.

Financial Support: n/a

P109 - The effect of intermittent or continuous feeding and amino acid concentration on urea-to-creatinine ratio in critical illness

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Purpose: Acute muscle wasting is the most common complication of critical illness, affecting more than 50% of patients. To date, no intervention has been found to be effective in reducing its development or associated morbidity and mortality. The use of intermittent feeding regimens and high dose essential amino acid concentrations have been proposed as a method to abate critical illness associated muscle wasting, secondary to their potential anabolic effects. Urea-to-creatinine ratio has been recognised as a biochemical signature of catabolism in critical illness. Differences in urea-to-creatinine ratio between feeding regimens may therefore correlate to alterations in patient muscle mass as a result of increased amino acid metabolism and thus activation of the urea cycle, and a decrease in creatinine secondary to muscle loss. The objective of our study is to assess the effect of intermittent or continuous feeding regimens and essential amino acid concentration on the longitudinal profile of urea-to-creatinine ratio.

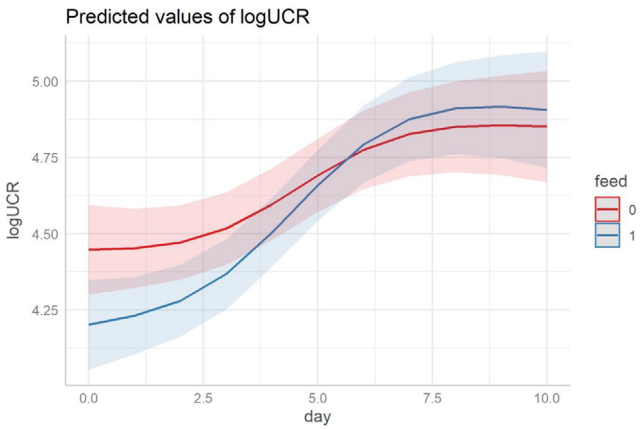
Methods: This was a reanalysis of a multicentre trial of patients from critical care units in the United Kingdom randomised at a 1:1 ratio to intermittent or continuous feeding. Participants included were critically ill adults anticipated to be mechanically ventilated for >48 hours, requiring enteral feeding via a nasogastric tube. The primary outcome measure was serum urea-to-creatinine ratio from day 0 through to day 10. Urea-to-creatinine ratio was assessed between feeding groups with the use of a linear mixed effects model. K-means trajectory clustering was performed using an unsupervised machine learning technique, based on urea-to-creatinine ratio values, to investigate metabolic phenotypes. Total amino acid, essential amino acid, glutamine, aspargine, citrulline, arginine, and leucine concentrations were all also modelled individually against urea-to-creatinine ratio.

Results: There was significant difference in urea-to-creatinine ratio trajectory between feeding regimens ($p = 0.016$). Patients receiving intermitted feeding had a higher pre-randomisation urea-to-creatinine ratio, but thereafter demonstrated a flatter urea-to-creatinine ratio trajectory over a 10-day period (figure 1). These patients also had a lower predicted day 10 urea-to-creatinine ratio, with a crossover seen between the two groups at approximately day 6. These findings were further supported by our K-means clustering analysis. Total amino acid, total essential amino acid, and individual amino acid concentrations did not correlate with urea-to-creatinine ratio. The use of renal replacement therapy was associated with a reduced UCR ($p = 0.002$). Increasing patient age ($p = 0.024$) and c-reactive protein were both associated with an increase in urea-to-creatinine ratio ($p = 0.034$).

Conclusion: The use of an intermittent or continuous feeding regimens can significantly affect urea-to-creatinine ratio. Patients randomised to the intermittent feeding group demonstrated a flatter urea-to-creatinine ratio trajectory despite receiving a larger nitrogen intake. More data is required to define the relationship between feeding characteristics and muscle preservation. Urea-to-creatinine ratio may be a useful metabolic endpoint by which effect of feeding regimens may be compared in observational and pilot interventional studies.

Financial Support: n/a

Figure 1.



Predicted values of logUCR split by feed from the linear mixed effects model. Feed 0 – intermittent feeding regimen; feed 1 – continuous feeding regimen

P110 - NUTRIC Scores in Trauma Patients: A Comparison of Energy and Protein Needs

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Purpose: The Nutrition Risk in Critically Ill (NUTRIC) score was developed and validated to assess nutrition risk in the intensive care unit (ICU) setting, primarily in the medicine population. Additional studies have been recently published that confirm that the NUTRIC score predicts mortality in trauma patients. Patients with a high NUTRIC score ($\geq$ 5, range 0 to 9) have increased survival with early adequate nutrition, though this is not correlated with patients that have a lower score. Harborview Medical Center (HMC) utilizes the NUTRIC score because weight history, nutritional intake history, and nutrition focused physical exam can be difficult to obtain in the ICU. We hypothesized that higher NUTRIC scores could be correlated with higher calorie and protein needs, as well as increased risk of mortality in the trauma/surgical ICU (T/SICU) population at HMC.

Methods: We performed a retrospective analysis of adult patients admitted to the Trauma/Surgery ICU (T/SICU) service from July 2018 to November 2020 for whom Enteral Nutrition (EN) was started during the first 72 hours after admit to the ICU, received EN for at least 3 days, and had TUNs and indirect calorimetry for average measured energy expenditure (AMEE) performed. All patients were prescribed nutrition support according to the hospital's EN protocol. Patients with a serum creatinine $\geq$ 2.0 mg/dL, end-stage liver or renal disease, and/or malnutrition diagnosis were excluded. NUTRIC score was calculated through a novel electronic medical record (EMR) tool. Statistics performed included paired t-test.

Results: There were 201 patients who met criteria for evaluation. EN was started on the same hospital day (HD) for patients regardless of NUTRIC score (Table 1). NUTRIC score was not associated with a difference in measured protein needs per TUN (Figure 1) or AMEE (Figure 2). The high NUTRIC group had less negative nitrogen balance for both the first and second TUNs. The low NUTRIC group received more protein, but was in a larger negative nitrogen balance than the high NUTRIC group. There was no statistical difference in length of stay (LOS), or mechanical ventilation days. While difference in ICU LOS was not statistically significant between the two groups, those with a high NUTRIC score trended toward having longer ICU stays. Those with a high NUTRIC score did have a statistically significant difference in mortality.

Conclusion: Regardless of NUTRIC score, T/SICU patients were shown to have similar calorie and protein needs based on indirect calorimetry and TUN studies. Therefore, we would not recommend using NUTRIC score to predict nutrition risk or risk for malnutrition in trauma patients. However we recommend early EN for all patients requiring it despite their NUTRIC score. While there was no statistically significant difference in length of stay or mechanical ventilation, high NUTRIC scores can be used to predict mortality.

Financial Support: n/a

Table 1. Comparing Low NUTRIC scores (0-4) with High NUTRIC scores (5-9)

Variable	All (N = 201)	Low NUTRIC (0-4) (N = 148)	High NUTRIC (5-9) (N = 53)	P value
Demographic Data				
Age	46.1 ± 17.1	41.1 ± 15.4	59.7 ± 13.9	0.000
% Male	75%	78%	66%	
BMI	30.5 ± 15.0	28.2 ± 7.1	37 ± 26.0	0.001
NUTRIC	3.51 ± 1.43	2.90 ± 1.04	5.3 ± 0.58	0.000
% Trauma patients	90%	95%	75%	
Nutrition Data				
Hospital Day AMEE performed (days)	7.1 ± 5.6	6.8 ± 5.7	8.0 ± 5.6	0.17
AMEE (kcal)	2628 ± 648	2644 ± 597	2617 ± 784	0.35
Hospital Day TUN completed	5.9 ± 3.4	5.8 ± 3.4	5.9 ± 3.4	0.33
Calculated Protein needs per TUN (g)	165 ± 71	168 ± 71	155 ± 72	0.22
Nitrogen Balance (g)	-7.8 ± 12.8	-8.7 ± 13.4	-5 ± 10.9	0.07
Hospital Day 2nd TUN completed	10.3 ± 5.6	9.9 ± 5.4	11.2 ± 6.2	0.16
Calculated Protein needs per 2nd TUN (g)	199 ± 74	201 ± 76	191 ± 68	0.30
2nd Nitrogen Balance (g)	-7.6 ± 13.8	-9.6 ± 14.0	-0.7 ± 11.0	0.003
HD EN Started (days)	2.50 ± 0.90	2.47 ± 0.96	2.52 ± 0.61	0.22
% Protein provided in first week*	69 ± 45	72 ± 45	61 ± 44	0.07
Outcomes Data				
Length of Stay (days)	36.6 ± 33.5	34.5 ± 28.6	42.2 ± 44.2	0.14
ICU Length of Stay (days)	20.7 ± 24.6	18.1 ± 15.0	27.9 ± 40.0	0.06
Mechanical Ventilation (days)	14.1 ± 12.8	13.5 ± 12.4	15.8 ± 13.7	0.17
Mortality	12%	8.2%	22.7%	0.02

*Documented protein provision was compared to 1.5 g/kg to obtain percentage of goal protein provided

Figure 1. NUTRIC score vs Measured Protein per TUN

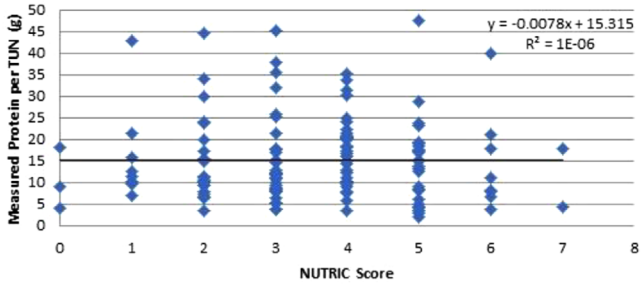
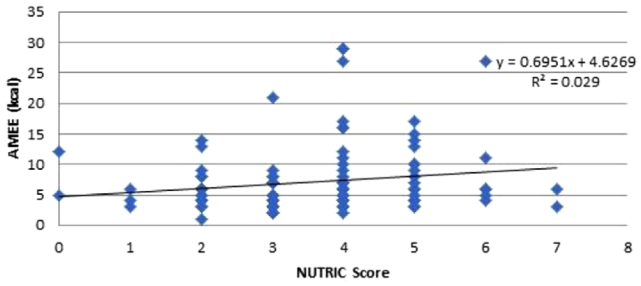


Figure 2. NUTRIC score vs AMEE



GI and Other Nutrition and Metabolic Related Concepts

P111 - Chronic metabolic acidosis induced hypophosphatemia from topiramate: a case report

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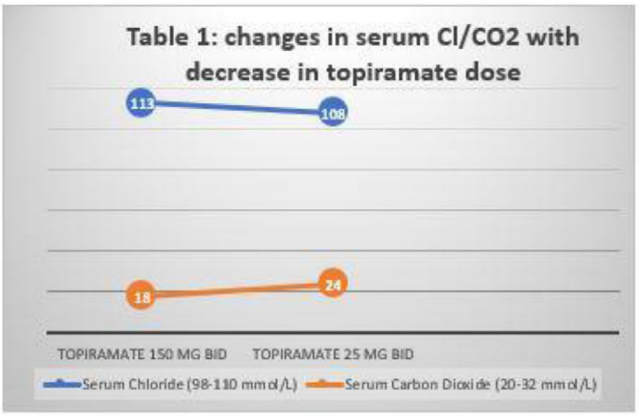
Purpose: Topiramate (Topamax®) is an FDA approved drug given orally to prevent and control seizures and prevent migraine headaches. Topiramate is also approved for use in multiple sclerosis (MS) to control neuropathic pain and slow disability progression. A serious side effect of topiramate is metabolic acidosis, a buildup of acid in the blood, a side effect often unknown to the nutrition support clinician and interdisciplinary team. Symptoms may include fast breathing, nausea, vomiting and lethargy. Chronic metabolic acidosis can lead to metabolic bone disease, calcium nephrolithiasis and growth retardation. Metabolic acidosis induces renal wasting of phosphate disproportionate to its effect on mobilization of tissue phosphorous. Clinical features of moderate to severe hypophosphatemia, may include muscle weakness, respiratory failure, heart failure, seizures, coma, rhabdomyolysis and increased mortality.

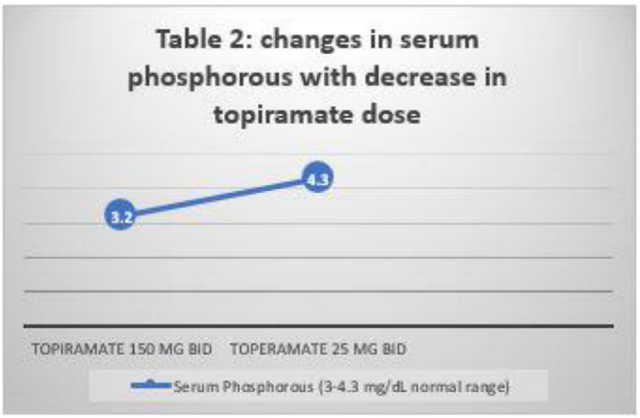
Methods: AJ, a 30 year old female with multiple sclerosis (MS), autonomic dysfunction, gastroparesis, and s/p gastric sleeve pyloroplasty admitted for g-j tube dislodgement, subsequently removed due to local strangulated hernia, small bowel resection with multiple revisions. Oral medications included topiramate 150 mg bid, gabapentin 200 mg tid, famotidine 20 mg bid, danazol 200 mg bid and baclofen 20 mg tid. Patient was later transitioned to infusion provider for home parenteral nutrition (HPN). At home, routine PN lab showed persistent chronic metabolic acidosis and mild hypophosphatemia of unclear etiology. The patient denied new medications or changes to current medications. Despite maximizing acetate salts in the PN formulation to correct metabolic acidosis, labs continued to reflect mild acidosis with serum chloride levels maintained in the range of 111–113 mmol/L (slightly elevated) and serum CO2 levels in the range of 18–22 mmol/L (low to low normal range). The PN formulation contained supratherapeutic amounts of phosphorous at 40–50 mMol daily which maintained serum phosphorous level in a low normal range of 3.2-3.3 mg/dL.

Results: PN patients are commonly treated with multiple drugs for various disease processes; therefore, are at risk for drug induced metabolic disturbances. The nutrition support clinician and interdisciplinary team must be aware of drug induced metabolic complications and recommend adjustments to the PN formulation accordingly. In this case, this patient was on multiple drugs for GI related disease processes, as well as neurological conditions. Despite efforts to correct metabolic acidosis via PN, serum lab values improved but did not completely correct. The patient was eventually evaluated by a nephrologist, who determined persistent metabolic acidosis was topiramate induced chronic metabolic acidosis with hypophosphatemia. The topiramate dose was gradually reduced to 25 mg bid which was the lowest effective dose without exacerbating patients symptoms. Graph 1 and 2 show lab value changes once topiramate dose was decreased. Acetate and phosphorous amounts were eventually able to be decreased in HPN.

Conclusion: Ongoing surveillance of patient's medication profile by the interdisciplinary team is critical to safely managing home PN patients. A thorough understanding of underlying pathophysiologic mechanisms of drug induced metabolic aberrations and associated risk factors are of vital importance to ensure safe HPN support and prevention of complications.

Financial Support: N/A





P112 - Prevalence of Vitamin D Deficiency in Patients Undergoing Chronic Haemodialysis

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Purpose: Vitamin D deficiency is a common finding even in healthy populations living near to the equator. Chronic kidney disease patients are at higher risk of developing vitamin D deficiency. Poor vitamin D status can lead to multiple complications. Data about vitamin D status in Sri Lankan patients on dialysis is very limited. This study was carried out to identify vitamin D status of Sri Lankan chronic kidney disease patients on haemodialysis.

Methods: A descriptive cross-sectional study was carried out in Kandy, the central part of Sri Lanka at Hanthana haemodialysis centre, National Hospital Kandy. Data were collected between March to June 2020, during these months the sun is directly above the latitudes of Sri Lanka. Blood samples were taken to assess vitamin D, Calcium, Parathyroid hormone and phosphate levels.

Results: There were 154 registered patients for dialysis and 118 were selected randomly, the mean age is 52 years (SD – 12.3). There were 90 males (78.9%) and mean duration of dialysis is 2 years (SD – 1.7). Among the participants, 46.6% (55) had vitamin D deficiency (< 20 ng/ml) and 44.1% (52) had vitamin D insufficiency (< 30 ng/ml). Only 9.3% (11) had vitamin D sufficient levels they all were males. The mean level is 22.3 ng/ml (SD – 9.5) and females had low mean value than males, they were 18.8 (SD - 2.6) and 23.4 (SD – 10.5) respectively. No one had severe vitamin D deficiency (< 10 ng/ml) and all participants were taking 0.25 μg/d 1-alpha-hydroxy-cholecalciferol. The parathyroid hormone level ranged from 6.2 to 1718 pg/ml and median was 212.6 pg/ml. Furthermore, 57.8% had hypocalcaemia and the mean calcium level was 2.13 mg/dl (SD – 0.25). Also, 62.8% had hyperphosphatemia with mean phosphate level of 1.69 mg/dl (SD – 0.67).

Conclusion: Vitamin D deficiency and insufficiency are very common findings in chronic haemodialysis patients even with 1-alpha-hydroxy-cholecalciferol supplementation. This may precipitate multiple other electrolyte and hormonal complications. Frequent assessment and supplementation of adequate doses of vitamin D will help to control complications.

Financial Support: n/a

P113 - Why do Patients Stop Teduglutide? A Quality Improvement Review of 230 Drug Discontinuations

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Purpose: In 2012, the FDA approved teduglutide, the first commercially available glucagon-like-peptide -2 (GLP-2) analog as a treatment for adults with Short Bowel Syndrome (SBS) who are dependent on parenteral support (PS). In May of 2019, the label was expanded to include children over 1 year of age. (1) For patients that initiate teduglutide therapy, discontinuation remains a perplexing issue with wide ranging anecdotal reports of discontinuation as high as 60%. The purpose of this review is to gain a better understanding of when and why teduglutide patients discontinue therapy, which may aid in the development of earlier interventions to prevent discontinuations and improve clinical outcomes.

Methods: Two hundred and thirty (N = 230) patients with SBS receiving teduglutide therapy through an infusion services provider that discontinued therapy between January, 2017 and December, 2019 were included as part of this review. Evaluation included teduglutide discontinuation reasons as well as length of therapy prior to discontinuation.

Results: Subjects in this review included 160 females and 70 males with ages ranging from 20–86 years old. Length of time on teduglutide with this provider prior to discontinuation ranged from 2 days to greater than 48 months. Figure 1 outlines the discontinuation reasons across the study population. Discontinuation reasons within the "other" category included: moved out of country, incarcerated, pregnant (2), unable to reach (10), coverage denied/no coverage (7).

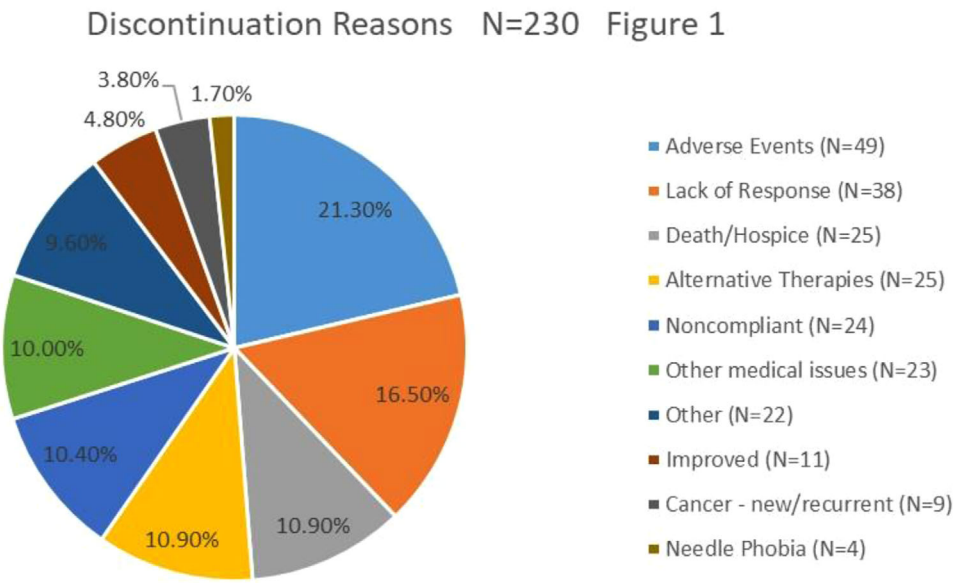
Discontinuation related to Adverse Events was the most common reason for stopping teduglutide amongst the study subjects with the majority, 71%, occurring during the first 6 months of therapy.

Lack of Response was the second most cited reason for discontinuations of which 71% occurred during the first 9 months. (Figures 2 & 3)

Conclusion: This is the first series review on when and why patients discontinue teduglutide therapy. Many variables are involved in guiding a patient to a successful clinical outcome with teduglutide therapy. To address and potentially prevent teduglutide discontinuations, an internal quality improvement focus is essential for early identification of treatment barriers and appropriate interventions. Individualized dosing based on clinical history and close, early follow-up are essential in mitigating side effects that though anticipated, may lead to unwarranted therapy discontinuation. Setting clear, measurable, realistic goals is important to patient success. The timing of clinical response varies from case to case based on GI anatomy, existing disease, compliance and the degree to which the patient has been clinically optimized prior to starting therapy. The high number of discontinuations in our data due to a perceived lack of response within 9 months suggests the importance of appropriate patient selection and the need for early education regarding clinical goal setting and identifying measurable signs of clinical response.

Financial Support: None

Adverse Events, Length of Therapy (N = 49) Figure 2



ENCORE

Publication: Thavamani A, Umapathi KK, Sferra TJ, Sankararaman S. Undernutrition and Obesity Are Associated with Adverse Clinical Outcomes in Hospitalized Children and Adolescents with Acute Pancreatitis. Nutrients. 2021 Jan;13(1):43.

P114 - Nutritional Status Adversely Predicts the Severity of Acute Pancreatitis in Hospitalized Pediatric Patients.

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Purpose: Recent studies show an increasing incidence of acute pancreatitis (AP) among the pediatric population. The increasing prevalence of obesity and associated health consequences is one of the reasons attributed to this rise. Similarly, the prevalence of malnutrition (undernutrition) is also increasing in the United States. We aimed to analyze the effect of nutritional status on the clinical outcomes of acute pancreatitis in children.

Methods: We analyzed the US Kids' Inpatient Database between 2003 and 2016 and included all patients (age ≤ 21 years) with a primary diagnosis of AP using specific ICD-9-CM and ICD-10-CM codes. Using ICD codes, we classified the patients into three groups, 1) Undernourished group – having a diagnostic code for protein-calorie malnutrition, kwashiorkor, marasmus, BMI less than 5th centile, 2) Obese group – including codes for obesity and morbid obesity, 3) Control group – comprising of patients without any of the diagnoses mentioned above. We compared clinical outcomes between the groups. We also analyzed various etiologies, procedures, and associated comorbid conditions. Multivariate regression models were constructed to investigate the association of nutritional status with the primary outcome of severe acute pancreatitis (2012 revised Atlanta classification) and secondary outcomes, including healthcare resource utilization (length of stay and inflation-adjusted hospital costs). We excluded any patients with a diagnosis of chronic pancreatitis. Cochrane Armitage test was used for trend analysis.

Results: Total number of AP admissions = 39,805. The proportion of AP patients with adverse nutritional status increased from 7.5% in 2003 to 19.5% in 2016. The undernourished group had more associated comorbid conditions and increased complications during hospitalizations. Cholelithiasis is the common comorbid condition in both obese and control groups. The prevalence of severe AP is higher in undernourished and obese groups than the control group (15.7% vs. 5.8% vs. 3.5%, respectively, $P < 0.001$). Multivariate regression models showed that undernutrition and obesity were associated with 2.5 times and 1.6 times increased risk of severe AP, $P < 0.001$. Undernutrition was associated with six additional days of hospitalization while incurring almost 16,000$ higher total costs while obesity was associated with 0.5 additional days and almost 2000$ additional hospitalization costs, $P < 0.001$

Conclusion: In recent years, almost 1 in 5 children with AP had either undernutrition or obesity, and these extremes of nutritional status adversely prognosticate the severity of pancreatitis resulting in prolonged hospital stay and higher hospitalization costs. It is important for clinicians to be cognizant of these at-risk groups to tailor management for better clinical outcomes.

Financial Support: None

Table 1. Comparison of demographics, hospital factors, associated disease, and etiologies in acute pancreatitis patient groups based on nutritional status: KID database 2003, 2006, 2009, 2012 and 2016.

Parameters	Normal N=34,660	Undernourished N=782	Obese N=4363	P Value
Demographics				
Age in years (Mean ± SD)	15.1±4.8	13.9±5.9	16.3±3.3	<0.001
Gender				
Male	14350 (41.9%)	354 (45.3%)	1,363 (31.3%)	<0.001
Female	19,867 (58.9%)	428 (54.7%)	2,992 (68.7%)	
Race				
Caucasian	15,402 (44.4%)	337 (43.1%)	1,545 (35.4%)	
African American	3,460 (10%)	106 (13.6%)	456 (10.4%)	<0.001
Hispanic	7,674 (22.1%)	156 (19.9%)	1,575 (36.1%)	
Others	8,123 (23.4%)	183 (23.4%)	788 (18.1%)	
Insurance				
Public	13,953 (40.3%)	336 (43%)	2,278 (52.2%)	<0.001
Private	15,837 (45.7%)	330 (42.3%)	1,474 (33.8%)	
SP/Other/Uninsured	4,870 (14.1%)	115 (14.7%)	611 (14%)	
Location/Teaching Status				
Rural	3,922 (11.6%)	36 (4.8%)	345 (8.1%)	<0.001
Urban Non-Teaching	10,482 (31.1%)	171 (22.8%)	1,419 (33.1%)	
Urban Teaching	19,329 (57.3%)	544 (72.4%)	2,518 (58.8%)	
Hospitalization				
Elective	2,250 (6.5%)	55 (7.1%)	228 (5.2%)	<0.01
Non-Elective	32,288 (93.5%)	724 (92.9%)	4,123 (94.8%)	
Comorbid Conditions				
Acute cholangitis	223 (0.6%)	17 (2.2%)	37 (0.8%)	<0.001
Cholelithiasis	7,788 (22.5%)	98 (12.5%)	1,908 (43.7%)	<0.001
Other Biliary Diseases	1,088 (3.1%)	46 (5.9%)	163 (3.7%)	<0.001
Hypertriglyceridemia	737 (2.1%)	31 (4%)	369 (8.5%)	<0.001
Hypercalcemia	111 (0.3%)	10(1.2%)	10 (0.2%)	<0.001
Abdominal trauma	122 (0.4%)	≤10	≤10	<0.001
Anomalies of pancreas	202 (0.6%)	≤10	≤10	<0.001
Diabetic ketoacidosis	704 (2%)	20 (2.6%)	121 (2.8%)	
SLE	181 (0.5%)	14 (1.8%)	12 (0.3%)	<0.001
Cystic Fibrosis	295 (0.9%)	14 (1.8%)	≤10	<0.001
IBD	815 (2.4%)	29 (3.7%)	18 (0.4%)	<0.001
Malignancies	872 (2.5%)	60 (7.7%)	25 (0.6%)	<0.001

Table 2. Univariate analysis comparing surgical interventions and clinical outcome measures in acute pancreatitis patient groups based on nutritional status: KID database 2003, 2006, 2009, 2012 and 2016.

Parameters	Normal N=34,660	Undernourished N=782	Obese N=4363	P Value
Outcomes				
Severe acute pancreatitis	1,219 (3.5%)	123 (15.7%)	254 (5.8%)	<0.001
Length of stay (Mean ± SE) in days	4.8±0.02	14.1±0.73	5.4±0.09	<0.001
Total hospital costs (Mean ± SE in USD)	9327±107	34,089±3339	11,827±295	<0.001
Mortality	55 (0.2%)	≤10	≤10	0.97
AKI	465 (1.3%)	62 (7.9%)	79 (1.8%)	<0.001
Respiratory Failure	729 (2.1%)	75 (9.6%)	178 (4.1%)	<0.001
Invasive Mechanical Ventilation	339 (1%)	30 (3.8%)	56 (1.3%)	<0.001
SIRS with organ dysfunction	23 (0.1%)	≤10	10 (0.2%)	0.002
Use of Vasopressors	18 (0.1%)	≤10	≤10	<0.001
CVC placement	1,959 (5.7%)	198 (25.3%)	245 (5.6%)	<0.001
Parenteral Nutrition	1,967 (5.7%)	241 (30.9%)	243 (5.6%)	<0.001
Sepsis	341 (1%)	62 (7.9%)	54 (1.2%)	<0.001
PE/DVT	46 (0.2%)	15 (1.9%)	23 (0.5%)	<0.001
Pseudocyst	953 (2.7%)	91 (11.7%)	199 (4.6%)	<0.001
Cholecystectomy	4,773 (13.8%)	52 (6.6%)	1,063 (24.4%)	<0.001
Any ERCP	2,521 (7.3%)	55 (7%)	472 (10.8%)	<0.001
Percutaneous/Open Biliary Procedures	151 (0.5%)	≤10	≤10	0.08
Pancreatectomy	144 (0.4%)	19 (2.4%)	27 (0.6%)	<0.001

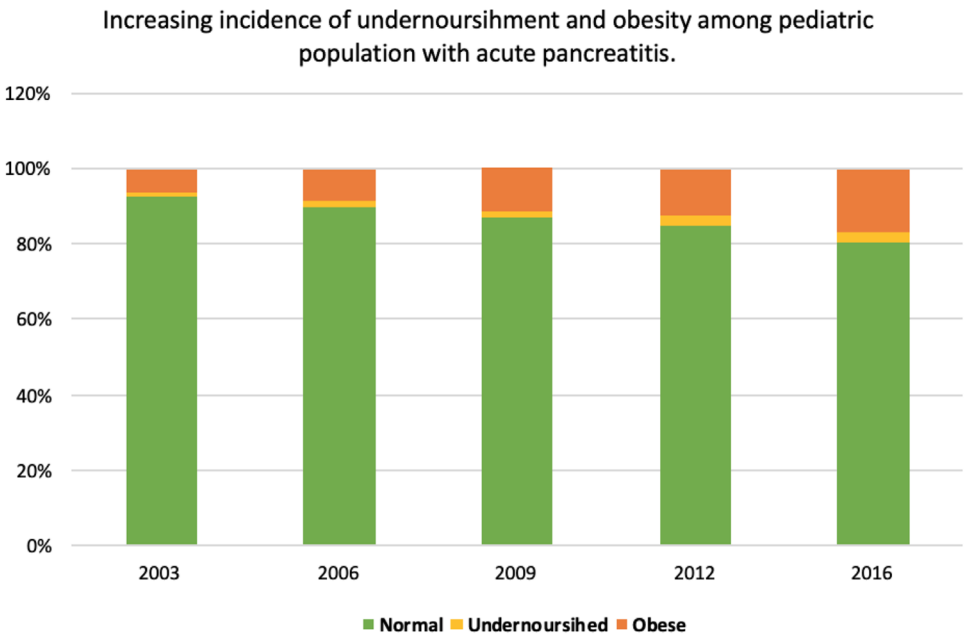
AKI – Acute Kidney Injury; SIRS – Systemic Inflammatory Response Syndrome; CVC – Central Venous Catheter.
Any column with less than 10 patients cannot be reported as per Hospitalization Cost and Utilization Project (HCUP) data user agreement and were represented as ≤10

Table.3 Multivariate Analysis evaluating the impact of nutritional status on the outcomes of severe acute pancreatitis, length of stay and total hospitalization costs among all patients with acute pancreatitis.

Outcomes	Odds ratio	95% CI	P value
Severe Acute pancreatitis			
Normal population	Reference		
Undernutrition vs Normal Population	2.55	2.03 to 3.20	<0.001
Obese vs Normal Population	1.62	1.39 to 1.89	<0.001
	Average Difference	**95% CI**	**P value**
Length of stay (in days)			
Normal population	Reference		
Undernutrition vs Normal Population	6.12	5.67 to 6.57	<0.001
Obese vs Normal Population	0.53	0.32 to 0.73	<0.001
Total Hospitalization costs (in USD)			
Normal population	Reference		
Undernutrition vs Normal Population	15,919	14,317 to 17,520	<0.001
Obese vs Normal Population	1,952	1,237 to 2,667	<0.001

USD – United States Dollar

Figure 1: Increasing proportion of undernourishment and obesity among pediatric population with acute pancreatitis between 2003 and 2016.



Poster of Distinction

P115 - Can tributyrin supplementation protect intestinal health in a mouse model of antibiotic and Clostridium difficile exposure

Fatemeh Ramezani, PhD[1]; David Shapiro, BSc[2]; Yingchun han, MD[2]; Gail A.M. Cresci, PhD, RD, LD, CNSC[3]

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Purpose: Clostridium difficile (CD) is a toxin-producing bacterium that can induce serious antibiotic-associated diarrhea. Antibiotic therapies impose strong selection for the depletion of commensal bacteria associated with diminished bacterial fermentation by-products, including the short-chain fatty acids, butyrate, that has an important role in intestinal health. Here, we tested the supportive effect of butyrate on Clostridioides difficile colonization and intestinal immune response in mice.

Methods: Female mice were randomly grouped to receive either saline (Control; n = 4) or tributyrin (TB), a butyrate pro-drug. Following broad-spectrum antibiotic treatment, mice randomly received either saline (Abx-S; n = 5 and Abx-TB; n = 5) or were exposed to CD spores (CD-S; n = 5 and CD-TB; n = 5). Throughout the study period, fecal samples were collected and cultured for bacterial overgrowth and CD colonization. Mice were euthanized on day 11 after CD exposure and the proximal colon was dissected and stored at -80oC for further analysis.

Results: All mice exposed to antibiotic mixture had an overgrowth of enterococcus and gram-negative bacteria that returned to baseline levels 7 days after cessation of antibiotic delivery. Interestingly, gram-negative bacteria cleared faster (3 days earlier) in antibiotic groups (ABx-S, ABx-TB) and in CD-TB group. Although all mice in CD groups colonized with CD one day after initial exposure to CD spores, the TB-supplemented group revealed a tendency to clear CD faster by day 5. This finding was associated with a significant fecal overgrowth of lactobacillus ($P < 0.0001$) with TB treatment. However, at euthanasia, the mRNA expression of lactate receptor, GPR81, was significantly lower ($P = 0.002$) in the proximal colon in the CD-TB with no differences in the levels of fecal Lactobacillus compared to the CD-S group. Both CD groups showed reduced immune responses demonstrated by lower mRNA expression of both proinflammatory and anti-inflammatory cytokines ($P < 0.003$) associated with no differences in the expression of intestinal injury marker.

Conclusion: Supplementation with tributyrin during CD colonization following broad-spectrum antibiotic exposure might enhance the growth of lactobacillus leading to diminished CD colonization, an inhibitor for the pro-inflammatory response. These data require further analysis at earlier time points, before and during CD colonization resolution.

Financial Support: ASPEN Rhoad Research Foundation Grant

P116 - A First-in-Human, Double-blinded, Randomized, Placebo-controlled, Single Ascending Dose Study to Assess Safety, Tolerability, Pharmacokinetics and Pharmacodynamics of HM15912 in Healthy Subjects

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[1]Hanmi Pharmaceuticals .Co., Ltd., Seoul, Seoul-t'ukpyolsi; [2]Hanmi Pharmaceuticals. Co., Ltd., Seoul, Seoul-t'ukpyolsi; [3]Clinical Trial Center at Asan Medical Center, Seoul, Seoul-t'ukpyolsi

Purpose: HM15912 is a novel long-acting glucagon like peptide-2 (GLP-2) agonist with extended half-life through reduced renal clearance and FcRn-mediated vascular endothelial recycling. HM15912 has shown an intestinotrophic effects in mouse and rat animal models and the HM15912 treatment induced intestinal growth and improvement of absorption capacity in the rat SBS model. The purpose of this phase 1 trial is to investigate safety, tolerability, pharmacokinetics (PK) and pharmacodynamics (PD) of single ascending dose of HM15912 in adult healthy volunteers.

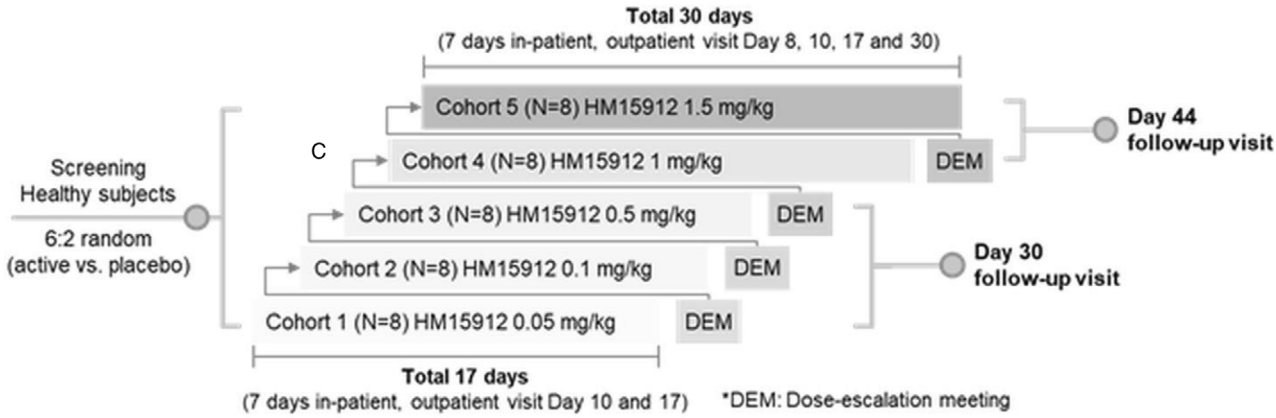
Methods: This is a first-in-human (FiH), double-blinded, randomized, placebo-controlled, single ascending dose study to assess the safety, tolerability, PK and PD of HM15912 in adult healthy volunteers. The study is designed to test 5 sequential dosing cohorts (HM15912; 0.05, 0.1, 0.5, 1.0 and 1.5 mg/kg, respectively), enrolling 8 subjects per cohort. Subjects were randomized to HM15912 or placebo in a ratio of 3:1 (6 on active treatment, 2 on placebo) (Figure 1).

Results: The trial is ongoing currently at the submission. The blinded interim safety results concluded at the end of Cohort 1,2,3 and 4 were safe and well-tolerated without clinical meaningful safety profile change. The reported blinded adverse events (AEs) were only mild and moderate. Most common AEs were nasopharyngitis (4/32; 12.5%), injection site bruising (3/32; 9.4%), presyncope (3/32; 9.4%) and headache (3/32; 9.4%). There have been no serious adverse events (SAEs) and no subjects have discontinued study due to AEs. Serum concentration of HM15912 reached its peak levels (Tmax; median) in 69 to 144 hours. Dose proportionality analysis demonstrated Cmax and AUCinf have shown in a supra- proportional manner with a single ascending dose of HM15912 from 0.1 to 1.0 mg/kg and the median half-life (T1/2) were 108.0 to 153.4 hours. The cohort 5 (1.5 mg/kg) is currently ongoing and completed unblinded data will be presented during ASPEN 2021

Conclusion: In conclusion, the healthy volunteers exposed to single ascending doses of HM15912 confirm a favorable safety profile. The T1/2 was over 100 hours and the minimum serum concentration level (over lower limit of quantification (LLOQ)) of HM15912 was detected up to Day 30 from dose of HM15912 0.5 mg/kg that could support an ultra-long dosing schedule potential. HM15912 is planning a phase 2, PoC trial with SBS-IF patients including a stoma or colon-in-continuity (CiC).

Financial Support: The study was sponsored by Hanmi Pharmaceuticals, Co., Ltd.

Figure 1. Phase 1 study scheme for HM15912



ENCORE

Publication: Eliasson J, Hvistendahl MK, Meyer C, Bolognani F, Jeppesen PB. O25-Safety and efficacy of apraglutide in patients with short bowel syndrome intestinal failure: a double-blind, crossover, randomized, placebo-controlled, phase 2 trial. Clin Nutr ESPEN. 2020 Sep;40(2020):436.; Eliasson J, Hvistendahl MK, Meyer C, Bolognani F, Jeppesen PB. OP159-Safety and efficacy of apraglutide in patients with short bowel syndrome intestinal failure: a double-blind, crossover, randomized, placebo-controlled, phase 2 trial United European Gastroenterol J. 2020 Oct;8(8):110.

P117 - Apraglutide, a once weekly glucagon-like peptide-2 analogue, improves intestinal absorption in patients with short bowel syndrome intestinal failure: a placebo-controlled, randomized phase 2 trial

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Purpose: Apraglutide is a novel long-acting glucagon-like peptide-2 (GLP-2) analogue designed for once weekly dosing with an estimated half-life of approximately 72-hours. Apraglutide has the potential to promote intestinal adaptation in patients with short bowel syndrome intestinal failure (SBS-IF) thereby increasing intestinal absorption and reducing parenteral support (PS) requirements or enabling enteral autonomy. This trial investigated the safety and efficacy of once weekly subcutaneous apraglutide in patients with SBS-IF.

Methods: In this single-center, phase 2, repeated dose, placebo controlled, double blind, randomized cross-over trial, 8 adult patients with SBS-IF were treated with apraglutide according to Figure 1. Main inclusion criteria were a fecal output ≥1500 g/day and PS ≥3 times per week for ≥12 months. Safety was the primary endpoint of this trial. Secondary endpoints included change from baseline to end of treatment in 24-hour urine production and urine sodium excretion compared to placebo. Urine collections were performed at home before and after each treatment period during which oral fluid intake and PS were kept constant

Results: Most patients experienced at least one treatment related adverse event, all of which were mild to moderate with no obvious difference between the active dose levels (Table 1). They were consistent with the expected, physiological effect of GLP-2. A total of 8 serious adverse events were reported, none were considered related to apraglutide. Treatment with once weekly 5 and 10 mg apraglutide significantly increased urine production compared to placebo (Table 2). 10 mg apraglutide also significantly increased urine sodium excretion, similar trends were seen for the 5 mg dose, but did not reach statistical significance (Table 2). No significant differences between the two dose levels were found (Table 2).

Conclusion: Once weekly dosing of apraglutide 5 mg and 10 mg was well tolerated in patients with SBS-IF. The safety of apraglutide was generally comparable to treatment with native GLP-2 and other GLP-2 analogues. Injection site reactions were few, reflecting the once weekly dosing regimen. Apraglutide demonstrated significant benefits on intestinal absorption as illustrated by increases in urine production and urine sodium excretion. No additional benefit was obtained by increasing the dose from 5 mg to 10 mg. Apraglutide, with its once weekly dosing, is expected to positively contribute to patient care and compliance, which in turn may improve quality of life.

Financial Support: The trial was sponsored by VectivBio AG.

Table 1. Common related adverse events

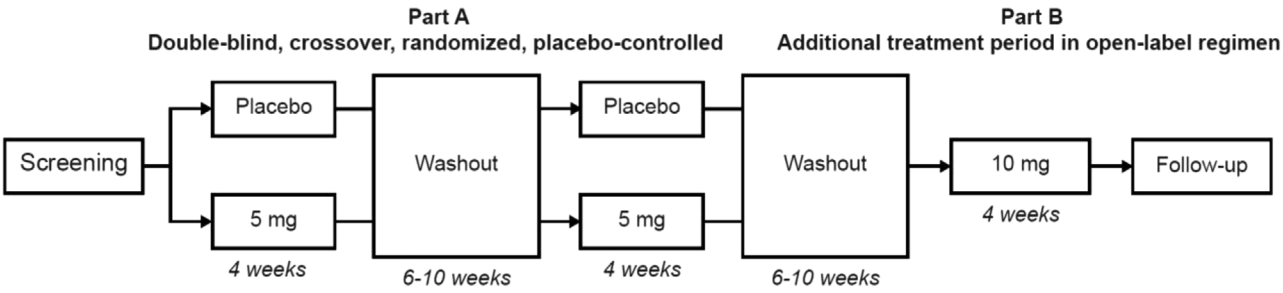
	Placebo (n=8) n	5 mg (n=8) n	10 mg (n=8) n	Total (n=8) n (%)
Any related adverse events	8	8	8	8 (100%)
Polyuria	1	4	6	7 (88%)
Gastrointestinal stoma output decreased	0	3	6	6 (75%)
Stoma complication	0	6	6	6 (75%)
Gastrointestinal stoma complication	0	5	5	5 (63%)
Gastrointestinal stoma output abnormal	0	4	4	5 (63%)
Thirst decreased	0	3	4	5 (63%)
Edema	0	2	2	4 (50%)
Increased weight	0	1	2	3 (38%)
Decreased appetite	0	1	2	3 (38%)
Any injection site reactions	0	1	3	3 (38%)

Table 2. Change from baseline to end of treatment in urine production and urine sodium excretion

	Analysis Part A+B								
	5 mg vs placebo (n=8)			10 mg vs placebo (n=8)			5 mg vs 10 mg (n=8)		
	Mean	(95% CI)	*p-value*	Mean	(95% CI)	*p-value*	*Mean*	(95% CI)	*p-value*
Absolute urine production (mL/day)	711	(132 to 1,289)	*P*=.021	795	(195 to 1,394)	*P*=.014	*84*	(-514 to 682)	*P*=.761
Relative urine production (%)	48	(12 to 84)	*P*=.014	34	(-4 to 71)	*P*=.072	*-14*	(-51 to 23)	*P*=.420
Urine sodium excretion (mmol/day)	56	(-10 to 123)	*P*=.087	88	(20 to 156)	*P*=.017	*32*	(-37 to 101)	*P*=.325
Urine sodium excretion (%)	166	(-342 to 675)	*P*=.478	432	(-87 to 951)	*P*=.092	*266*	(-266 to 798)	*P*=.287

Calculations are based on changes from baseline to end of treatment for individual dose groups. n = number of patients in the full analysis set. ANCOVA was used to assess the effects of apraglutide compared to placebo, adjusted for the period-specific baseline measurement of the endpoint, oral fluid intake and parenteral support.

Figure 1. Trial design



Screening was performed up to 25 days before the baseline visit. Follow-up was performed 4–6 weeks after last dose. The washout period was 6–10 weeks after last dose in the treatment period.

P118 - Dietary and lifestyle predictors of microbiome temporal stability and function

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Purpose: Gut microbiome composition has been associated with many diseases including colorectal cancer, obesity and dementia. In turn, diet has been shown to effect microbiome composition and function. We attempt to describe intra- and inter-individual variation in microbiome composition and assess for personal predictors of variation in microbiome community metrics. We performed a functional analysis by exploring predictors of functional categories of the microbiome including butyrate producing bacteria, Gammproteobacteria and Microbiome Health Index (MHI).

Methods: We recruited 49 healthy patients undergoing elective outpatient orthopedic or urologic procedures to assess and characterize changes/variation in the microbial community, through 16S rRNA gene-based sequencing both across and within individuals. We collected up to three fecal samples per person, isolated total DNA and sequenced the V4 region of the 16S rRNA gene using Illumina sequencing technology and the mothur pipeline. We characterized variation in microbial community using α diversity (Shannon index) to quantify intraindividual variation and β-diversity-based distance metric using θyc to quantify the similarity between two different time points. We explored clinical predictors of variation in these community structure metrics, taxon levels (phylum, class, genus, OTU) and functional microbiome categories (butyrate producing bacteria, MHI) using simple descriptive statistics (Kruskall Wallis test). MHI was calculated by summing bacterial OTU relative abundances by class and using the following ratio: (Bacteroidia + Clostridia) / (Gammaproteobacteria+ Bacilli). This ratio was then dichotomized by the median value. We modeled variation in community structure metrics using linear mixed effect models to adjust for confounding and account for repeated measures.

Results: We collected 144 fecal samples from 49 patients over a one week time period. The median age was 48, median BMI was 26, 33% were female and over 67% of patients owned a pet (Table 1). The median fiber intake was 15 g/day and dairy intake was 0.85 g/day. There was significant intraindividual variation among subjects with mean θyc of 0.21 and 0.23 calculated between the first visit and the second visit and the first visit and the third visit, respectively. Thirty seven percent of follow up visits were different than baseline community enterotypes (Figure 2). Subsequently, we did not find any clinical variables associated with these measures of intraindividual variation. We found that fiber intake, dairy intake, pet ownership, age and BMI were significantly associated with relative abundance of butyrate producing bacteria. Fruit intake was associated with Proteobacteria and microbiome health index.

Conclusion: There is a significant amount intra-individual variation in microbiome community structure over time. We could not explain this temporal instability with the data collected in this study. Butyrate, an end product of fiber fermentation, is the primary source of colonocyte energy and has found to be protective against the risk of many far reaching diseases including cardiovascular disease, obesity, non-alcoholic fatty liver disease and colorectal cancer. Future interventions should explore fiber supplementation as a mediator of microbiome function to mitigate disease risk.

Financial Support: n/a

Table 1. Baseline demographics of study participants.

Characteristic	N = 49
Age	48 (31, 58)[1]
BMI	28.9 (25.8, 31.3)[1]
Female	16 (33%)[2]
Sugar intake (g/day)	10.3 (8.7, 12.8)[1]
Calcium intake (mg/day)	584 (497, 748)[1]
Dairy intake (g/day)	0.85 (0.42, 1.17)[1]
Red meat intake (g/day)	0.29(0.29, 0.50)[1]
Yogurt intake (g/day)	0.06(0, 0.50)[1]
Total number of sequences	19317 (10230, 23541)[1]
Shannon diversity	3.63 (3.31, 3.89)[1]
Butyrate producing bacteria (relative abundance)	9 (6, 20)[1]
Fiber intake (g/day)	15 (12, 19)[1]
Pet ownership	33 (67%)[2]

1, Median (IQR)
2. N (%)

Table 2 – Clinical variables that explain variation in butyrate producing variables, Gammaproteobacteria, Bacteroides Firmicutes, Microbiome Health Index(MHI)

Characteristic	Butyrate Producing[2] Beta(95% CI)[1]	Gammaproteobacteria[2] Beta(95% CI)[1]	Bacteroides[2] Beta(95% CI)[1]	Firmicutes[2] Beta(95% CI)[1]	MHI[4] LogOR(95% CI)[1]
Age	-0.17(-0.36, 0.02)				
BMI	**0.81(0.04, 1.6)**				**0.24 (0.05, 0.44)**
Fiber	**0.83(0.29, 1.4)**		**-0.73 (-1.4, -0.02)**	**0.83 (0.15, 1.5)**	
Pets (y/n)	**-8.1(-14, -2.0)**				1.5 (-0.10, 3.1)
Dairy	-3.7(-7.5, 0.19)				-1.8 (-3.8, 0.26)
Fruit		**-0.33 (-0.66, 0.00)**	2.0 (-0.20, 4.1)	-2.0 (-4.1, 0.12)	**-0.75 (-1.3, -0.21)**
SSRI		**-3.2 (-6.0, -0.30)**			
Calcium					**0.00 (0.00, 0.01)**

1. Confidence Interval (CI)
2. Relative abundance of taxa was modeled using a linear Random effects model with taxa as the dependent variable.
3. Microbiome Health Index was calculating by summing bacterial OTU relative abundances by family and using the following ratio: Bacteroidia+Clostridia/Gammaproteobacteria+Bacilli. This ratio was then dichotomized by the median value into a binary value.
4. Dichotomized MHI was modeled as the dependent value using the binomial random effects model.

International Poster of Distinction

P119 - Influences of a whey-enriched diet on gut ischemia reperfusion injury in a murine prehabilitation model

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Purpose: Both nutritional management and prehabilitation are keys for early recovery after surgery. Our previous study revealed that a whey protein-enriched diet or treadmill running before gut ischemia reperfusion (I/R) reduces inflammatory response and improves survival in mice. Therefore, we expected the combination of both therapies to more beneficially modulate host response after gut I/R. However, the combination diminished the beneficial effects of treadmill running on gut I/R. Cytokine response was enhanced and survival was worsened as compared with prehabilitation only group. To clarify more detail on the influences of the combination, herein, we examined organ injury after gut I/R in mice treated with the combination of a whey enriched diet and treadmill running.

Methods: Five-week-old, male, C57BL/6J mice (n = 19) were randomly assigned to ND (n = 10) and WHEY (n = 9). ND mice received the combination of treadmill running (12 m/min, 60 min, 3 days/week) and control diet intake for three weeks, while WHEY mice received the combination of the same running exercise and whey protein-enriched diet during the same period. The control diet was AIN-93G, and 50% of the protein was replaced by whey protein in the WHEY diet. After the 3 weeks pretreatment, i.e. on the next day after the last running, all mice underwent 45 minutes gut I/R. Lung, liver, jejunum and ileum tissues were harvested at 3 hrs and 6 hrs after reperfusion, immediately fixed in 10% formaldehyde, dehydrated and embedded in paraffin wax. These tissues were stained with hematoxylin and eosin and evaluated for organ injury by light microscopy by a double-blind fashion. The grade of histological organ injury was assessed by Zhu's (lung), Suzuki's (liver) or Chiu's (intestine) score system. Comparisons between ND and WHEY were analyzed by the Student's t-test. The data were expressed as means ± standard error (SE). A p value< 0.05 was considered significant.

Results: Organ injury scores (mean±SE, ND vs. WHEY) at 3 hrs were 3.6±0.1 vs. 5.1±0.2 (p< 0.001, lung), 3.3±0.1 vs. 3.7±0.1 (p = 0.01, liver), 1.2±0.1 vs. 2.4±0.1 (p< 0.001, jejunum) and 1.2±0.1 vs. 2.6±0.1 (p< 0.001, ileum). On the other hand, the scores at 6 hrs were 2.7±0.1 vs. 3.0±0.2 (p = 0.25, lung), 1.9±0.1 vs. 3.5±0.1 (p< 0.001, liver), 1.7±0.1 vs. 2.1±0.1 (p = 0.01, jejunum) and 1.3±0.1 vs. 1.8±0.1 (p = 0.02, ileum).

Conclusion: Addition of whey protein-enriched diet to prehabilitation does not provide synergetic effects in terms of organ injury prevention after gut I/R, but rather lowers beneficial effects of prehabilitation. For better perioperative care, we need to study other nutrients which may more enhance prehabilitation effects.

Financial Support: n/a

P120 - Beta-hydroxy-beta-methylbutyrate (HMB) moderately reverses atrophy of gut associated lymphoid tissue (GALT) induced by lack of enteral nutrition in mice

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Purpose: Parenteral nutrition (PN) can provide enough amount of nutrients to survive conditions under which enteral nutrition (EN) cannot be given. However, PN without EN leads to marked atrophy of GALT, causing failure of mucosal defense both in the gut and extra-intestinal mucosal system. Since there are many patients who cannot tolerate EN, surrogates to preserve GALT during PN should be found. Here we evaluated the effects of HMB, an enhancer of protein synthesis, on GALT in PN-fed mice.

Methods: Five or six weeks old male Institute of Cancer Research (ICR) mice (n = 36) were randomly assigned to Chow (n = 11), Control (n = 8), H600 (n = 9) or H2000 (n = 8) group. After 7 days acclimatization period, mice were inserted a catheter into the right jugular vein, and they were continuously administered 0.2mL/h normal saline solution for 2 days and allowed to take chow and water ad libitum. Then, mice received respective nutritional management. The Chow mice kept receiving IV normal saline, chow, and water. The Control, H600 and H2000 mice received PN according to the following schedule, Day1; 0.3mL/h (7.2mL/24h), Day2; 0.4mL/h (9.6mL/24h), Day3-5; 0.6mL/h (14.4mL/24h). Ca-HMB was dissolved in the TPN solution of the H600 and H2000. The H600 and H2000 mice were administrated 600mg/kg BW and 2000mg/kg BW of Ca-HMB, respectively. After the dietary manipulation, all mice were killed with cardiac puncture under general anesthesia. The whole small intestine was harvested for GALT lymphocyte isolation. Numbers and phenotypes (B cells, CD4+ T cells, CD8+ T cells, $\alpha\beta$TCR+ T cells, $\gamma\delta$TCR+ T cells) of Peyer patches (PPs), Intraepithelial space (IE), and Lamina propria (LP) lymphocytes were evaluated with cell counting and flow cytometry. Kruskal-Wallis test was used for statistical analysis.

Results: Body weight changes (g, Means ± SE.) during the treatment were Chow; -0.9±0.5, Control; -3.1±0.6*, H600; -2.2±0.6, H2000; -3.3±0.6* (*p< 0.05 vs. Chow). Numbers of GALT lymphocytes (X 10^6 cells) and percentages of their phenotypes (%) are shown in table 1 and 2.

Conclusion: Parenteral HMB moderately reversed PN-induced GALT atrophy. Clinical application of HMB-containing TPN needs to be tested.

Financial Support: n/a

Table 1. Numbers of GALT lymphocytes (X 10^6/body)

	Chow(n=11)	Control(n=8)	H600(n=9)	H2000(n=8)
PPs	21.8±2.0	11.5±2.3*†	14.8±2.2	16.2±2.3
IE	18.6±4.3	5.9±5.0	3.6±5.0*	13.3±5.0
LP	28.6±4.3	29.5±5.0	33.9±4.7	33.0±5.0

Mean ± SE., Kruskal-Wallis test

*p<0.05 vs. H2000, †p<0.01 vs. Chow

Table 2. Phenotypes of GALT lymphocytes (%)

	Chow(n=11)	Control(n=8)	H600(n=9)	H2000(n=8)
PPs				
B cell	68.0±2.2	59.6±2.5*	58.1±2.4*	58.0±2.5*
CD4	19.7±1.8	25.0±2.1*	22.5±2.0*	25.9±2.1*
CD8	5.5±0.8	9.1±0.9*	7.7±0.9	7.9±0.9*
αβTCR	17.7±1.7	21.6±2.0	22.0±1.8	23.3±2.0
γδTCR	2.1±2.8	9.2±3.2	3.3±3.0*	2.8±3.2
IE				
B cell	5.0±0.6	5.5±0.7	4.8±0.7	5.4±0.7
CD4	5.9±1.0	5.9±1.1	7.7±1.1	6.8±1.1
CD8	71.7±5.9	78.9±6.9	76.3±6.9	71.2±6.9
αβTCR	10.9±8.9	10.6±7.0	8.9±6.5	10.4±10.0
γδTCR	28.4±4.6	24.7±5.4	33.6±5.4	30.1±5.4
LP				
B cell	17.2±4.6	6.8±5.4	5.8±5.1*	7.2±5.4
CD4	14.1±1.3	13.9±1.6	12.8±1.5	13.3±1.6
CD8	34.1±3.5	49.8±4.1*	53.9±3.9*	45.8±4.1
αβTCR	17.7±2.3	21.8±2.5	21.0±2.5	21.3±2.7
γδTCR	10.2±1.9	15.5±2.2	14.6±2.1	13.0±2.2

Mean ± SE., Kruskal-Wallis test

*p<0.05 vs. Chow.

P121 - Effect of diabetes-specific oral nutritional supplements on postprandial glycemic response in adults with type 2 diabetes mellitus

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Purpose: Nutrition plays an integral role in diabetes management, and oral nutritional supplements (ONS) are often used to help fill nutritional gaps. Understanding the effects on postprandial glucose response is an important factor in selecting an appropriate ONS for people with diabetes. The objective of this study was to determine if diabetes-specific ONS (DS-ONS) provide improved postprandial blood glucose response relative to a standard ONS in individuals with type 2 diabetes (T2DM).

Methods: This randomized, crossover clinical trial enrolled 14 adults with controlled T2DM and assessed glycemic and insulin responses following consumption of isocaloric amounts of two different DS-ONS (BOOST Glucose Control® Drink [DS-ONS1] and BOOST Glucose Control® Drink retail [DS-ONS2]) as well as a standard ONS (control). Products differed in macronutrient distribution and fiber content. Subjects were randomized to one of the three interventions on three separate study days, each one week apart. Blood glucose and serum insulin values were measured at baseline and 10, 20, 30, 60, 90, 120, 150, 180, 210 and 240 minutes after consumption and used to calculate area under the curve (AUC) as well as peak (Cmax) blood glucose and insulin concentrations for each participant. Participants were instructed not to take any diabetes medications before or during the 4-hour intervention visits.

Results: All 14 participants completed the study. Data for two participants were excluded due to unlikely blood glucose values, leaving 12 individuals (n = 5 males, n = 7 females; mean age 61±6 years; mean BMI 28.1±5.7) included in the analysis. There were no differences in blood glucose levels at baseline ($p = 0.38$). As shown in Table 1, mean blood glucose AUC and Cmax for blood glucose were significantly lower for both DS-ONS vs. control ($p < 0.01$ for all comparisons). Cmax for insulin was significantly lower for both DS-ONS vs. control ($p < 0.01$ for both comparisons), but there were no differences in insulin AUC ($p = 0.08$) or first-phase insulin response (AUC0-30 min) ($p = 0.054$) among the three products.

Conclusion: DS-ONS attenuated the overall blood glucose response and produced lower postprandial blood glucose peaks compared to a standard ONS. Specially formulated DS-ONS can be a useful tool to provide nutritional support as part of an overall diabetes management plan in individuals with T2DM.

Financial Support: Nestlé Health Science

Table 1. Glucose and insulin responses for two DS-ONS vs. control (standard ONS)

	Control	DS-ONS1	DS-ONS2
Glucose AUC, mg/dL	3515±5205	-14±3422*	100±3484*
Glucose Cmax, mg/dL	189±48	162±43*	151±30*
Insulin Cmax, µIU/mL	37±33	22±22*	19±22*

Values are mean ± standard deviation; *p<0.01 vs. control

P122 - Gaps and Opportunities in the Management of Short Bowel Syndrome: An International Inquiry

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Purpose: Short bowel syndrome intestinal failure (SBS IF) is a rare condition. Evidence-based guidelines and expert opinion papers are used to guide practice, but there remains a dearth of globally accepted patient care standards. With emerging treatment options, it is important to identify gaps in care and opportunities to improve practice standards and patient experiences.

Methods: An independent, interdisciplinary, academic workgroup was founded, including 11 international experts on SBS, and partially supported by Zealand Pharma. The group convened to identify gaps in SBS IF management through literature review, investigate current global management practices, and suggest opportunities to improve patient care. Members identified, reviewed, and discussed the most relevant literature to identify and prioritize gaps and opportunities for care based on frequency and importance.

Results: Fourteen pieces of pertinent literature between 2003 and 2020 were selected and analyzed (Table 1). Eleven areas of care for SBS IF were identified as important, yet gaps in management guidelines exist (Table 2). The most frequently identified gaps were management of high stool output, including medication choices, timing, and dosing; followed by financial support for SBS IF programs (e.g. source of funding); and micronutrient monitoring and supplementation recommendations. Additional gaps were found in the use of oral rehydration solutions, clinical monitoring, use of GLP-2 analogues, management of oral drug absorption, surgical management of SBS IF, quality of life measurement tools, use of analgesic medications, and transition of care from children to adults.

Conclusion: Based on a recent review of available guidelines and expert opinion practice papers there are many gaps in care related to SBS IF management. The central issues relate to strategies to reduce high stool output and improve autonomous hydration and nutrient absorption. Further investigation of global clinical practices is warranted in order to identify evidence-based best practice standards.

Financial Support: Zealand Pharma

Table 1 Important SBS Publications

Pironi et al. *Clin Nutr* 2016
Pironi et al. *Clin Nutr* 2018
Matarese et al. *Nutr Clin Prac* 2005
Pironi et al. *Clin Nutr* 2020
Pittiruti et al. *Clin Nutr* 2009
Parrish et al. *Prac Gastroenterol* 2014
Kumpf et al. *J Parent Enteral Nutr* 2014
Mueller et al. 2017 *ASPEN Adult Nutrition Support Core Curriculum,* 3rd ed
Matarese et al. *J Parent Enteral Nutr* 2014
Ayers et al. 2020 *ASPEN Parenteral Nutrition Handbook*
Seidner et al. *J Parent Enteral Nutr* 2013
Buchman et al. *Gastroenterol* 2003
Dreesen et al. *J Parent Enteral Nutr* 2014
Abu-Elmagd et al. *Ann Surg* 2019

Table 2 Gaps in SBS Management

Management of high stool output
Financial support of SBS programs
Micronutrient recommendations
Use of oral rehydration solution
Clinical monitoring
Use of GLP-2 analogue
Quality of life measurement
Oral drug absorption
Surgical management of SBS
Quality of life measurement tools
Use of analgesic medication
Transition of care from children to adults

P123 - Home Parenteral Nutrition in Patients with Gastrointestinal Fistulas: Clinical Characteristics and Outcomes

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Purpose: Gastrointestinal fistulas (GIF) have various etiologies including traumatic, infectious and inflammatory. One of the common therapeutic interventions is complete bowel rest and use of parenteral nutrition (PN). For patients discharged from the hospital, PN can be safely and effectively delivered in the home setting. Special conditions that should be considered include fluid, electrolyte and mineral losses through the fistula. GIF may also increase risk for catheter-related blood stream infections (CRBSI). Due to lack of published literature on patients with GIF receiving home PN (HPN), a decision was made to evaluate the experience of a large home infusion provider with this unique population.

Methods: A point in time retrospective chart review was completed for all patients with primary ICD-10 of K63.2, intestinal fistula who received HPN between January - May 2019. Data collected included demographics; payer information; fistula location; 24 hour fistula output volume > or < 500cc; co-morbid conditions; weight change; length of HPN therapy; volume, protein, calorie and electrolyte content of the PN prescription; medications; number of CRBSI in the past 2 years; use of oral rehydration solution (ORS); and oral intake of liquids or food.

Results: 140 patients were identified with a primary ICD-10 of K63.2. Patients were 60 years old on average at start of care, and 60% of the population was female. The payer mix was 40% commercial, 47% Medicare, 6.5% Medicaid, and 6.5% other. Medical record category for fistula location

is shown in Figure 1 and available in 49% of cases reviewed. 24-hour fistula output volume > and < 500cc was 30% and 70% respectively. The mean length of therapy (LOT) was 323, standard deviation 632 days. Catheter infections of > 2 per year were found in 7% of patients. Figure 2 shows co-morbid diagnosis categories, which were recorded in 83% of records. 49% of patients were on proton pump inhibitors, 44% on intravenous antibiotics, 29% on narcotics, 19% on antidiarrheals, 14% on octreotide, and 6% on teduglutide. 58% of patients consumed an oral diet. Table 2 details the average daily PN prescription. To better characterize patients with short LOT (ST) of < 90 days versus long LOT (LT) of > 90 days, sub-analysis of weight change, fistula output, and allowance of oral diet was completed. 18% of ST and 19% of LT patients lost weight between start of care and the data collection point with a range 0.2-15 kg. 8% of ST and 54% of LT patients gained weight, with a range of 0.1-19 kg. 62% of ST and 42% of LT patients had no weight change, and 9% had no data available.

Conclusion: Gastrointestinal fistulas are a unique medical problem in which patients are often on HPN for a prolonged time period. Our data suggest these patients are older and that fistulas are in various locations in the GI tract, most commonly the small bowel. Most patients were able to maintain or gain weight while on HPN. Just over 50% of the patients were consuming food or fluids by mouth. Not all patients adhered to the recommended NPO status. Antidiarrheals were uncommonly used. The incidence of patients with multiple catheter infections was low even though GIF allow gastrointestinal contents to reach the skin surface. Antibiotics were prescribed more frequently for non-CVC complications. Less than half of cases identified fistula location and output, indicating that transmission of records on GIF location and output from the hospital to the homecare provider is not consistent. This information is critical to ensure clinically appropriate nutrition recommendations. The complexity of GIF diagnosis and related co-morbidities may impact long term quality of life. Evaluation of this population should be further explored.

Financial Support: n/a

Oral Intake Versus Fistula Output

	Allowed to consume Oral Intake		Not Allowed to Consume Oral Intake	
Fistula Output (N=59)	**LOT < 90 days % (N)**	**LOT > 90days % (N)**	**LOT < 90 days % (N)**	**LOT > 90days % (N)**
< 500 mL/day	13% (8)	37% (22)	8% (4)	12% (7)
> 500 mL/day	0% (0)	10% (6)	2% (1)	18% (11)

Average Daily PN Prescription

Average Daily PN Content	
Volume	1965 mL
Calories	24 kcal/kg
Protein	1.3 g/kg
Sodium	161 mEq
Potassium	62 mEq
Chloride	134 mEq
Bicarbonate	62 mEq
Magnesium	17 mEq

Figure 1

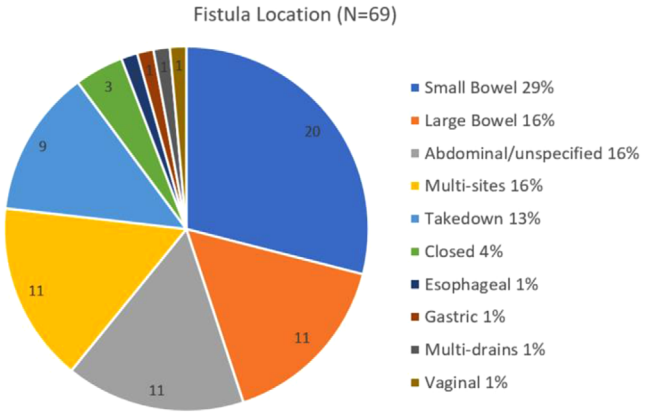
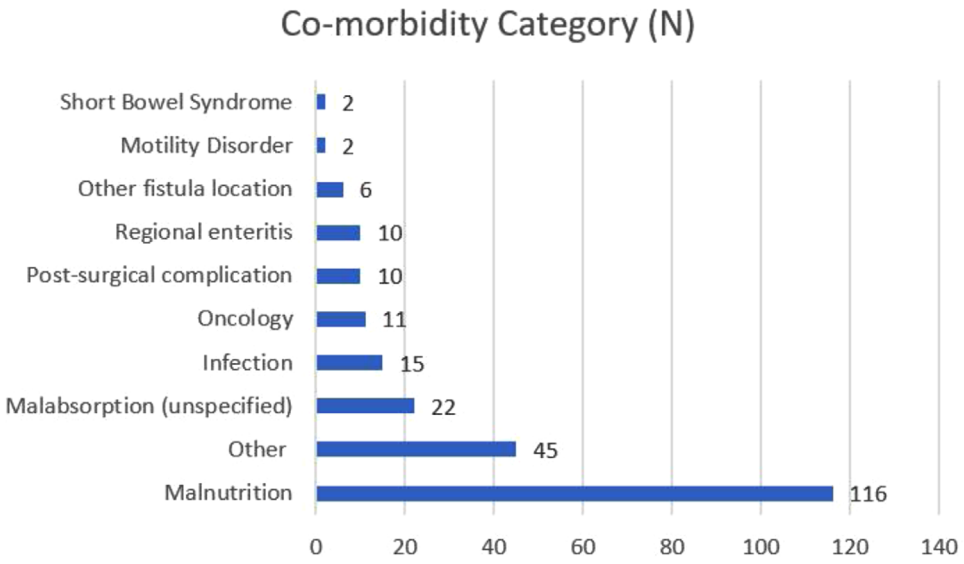


Figure 2



Co-morbidities by Category

International Poster of Distinction

P124 - A specialized nutritional formulation reduces hippocampal inflammation induced by intracerebroventricular infusion of amyloid-Îš peptide oligomers (AÎšOs) in mice

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Purpose: Glucose hypometabolism and amyloid-β (Aβ) deposition are hallmarks of Alzheimer's disease (AD), along with brain oxidative stress, lipid peroxidation, and neuroinflammation, culminating in synapse failure and cognitive impairment. Intracerebroventricular (i.c.v.) infusion of amyloid-β oligomers (AβOs) comprises a well-established acute mouse model of AD that induces AD-related neuropathological changes and memory deficit, which can be verified from 24 hours post-infusion and persists for at least 3 weeks. Our previous data showed that a nutritional formulation (referred to as AZ), which provides ketone bodies as an alternative source of energy along with additional antioxidant and anti-inflammatory nutrients, prevents memory deficit induced by AβOs. It is well known that AβOs trigger neuroinflammation and microglial activation in the hippocampus, and this plays an important role in cognitive impairment. Thus, the aim of this study was to investigate the effects of AZ treatment on hippocampal microglial activation induced by i.c.v. infusion of AβOs in mice.

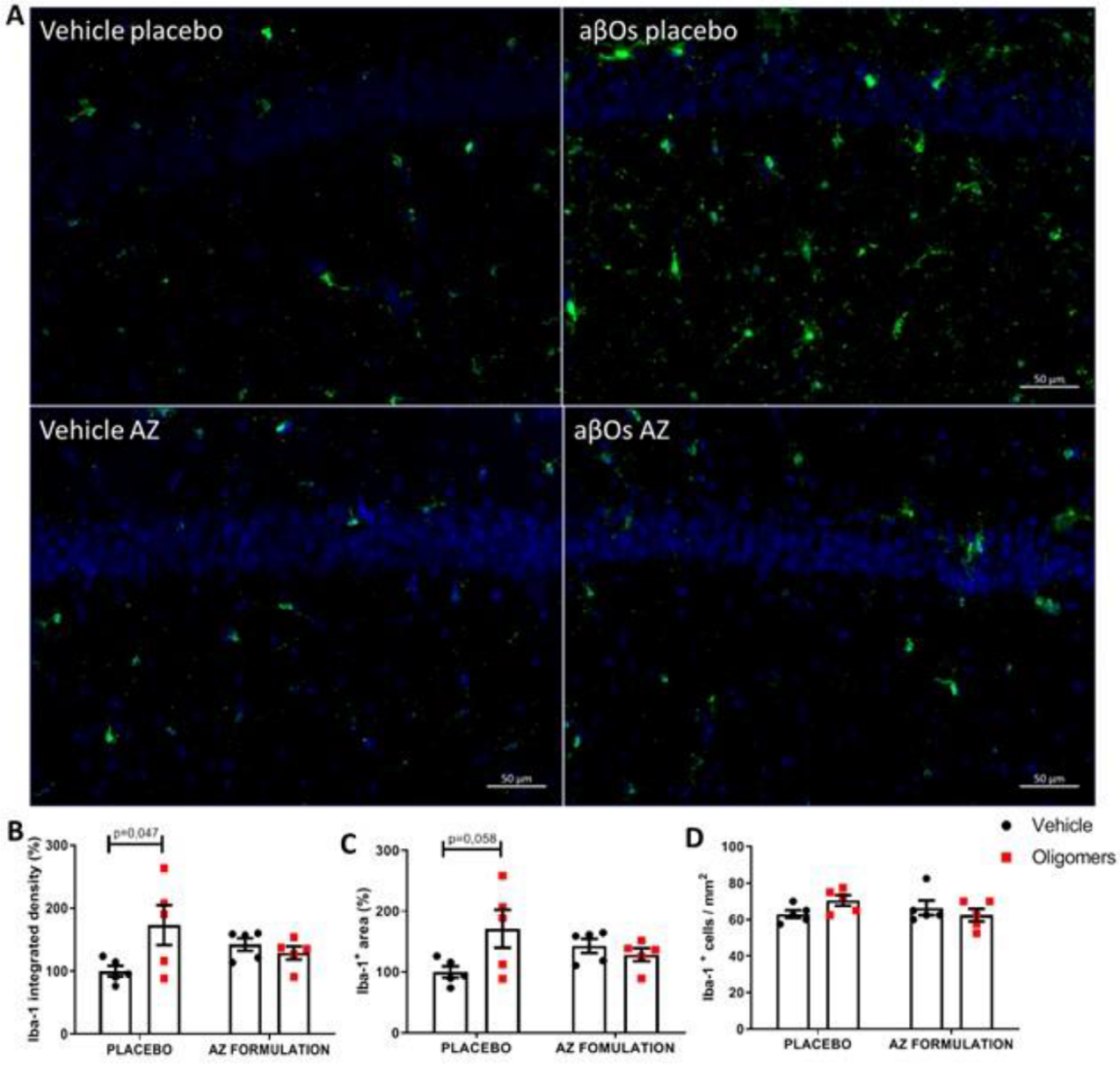
Methods: Three month-old male Swiss mice were pre-treated with AZ formulation (Instanth NEO, Prodiet Medical Nutrition) or an isocaloric placebo diet for 4 weeks orally by gavage. After treatment, the animals received an infusion of 10 pmol AβOs (or equivalent vehicle volume) via i.c.v. in a final volume of 3 microliters and were assessed in cognitive tasks. Ten days after AβOs infusion, the animals were anesthetized and the brains were removed, fixed with 4% paraformaldehyde and cryoprotected in sucrose. To determine if the AZ formulation prevents microglial activation, frozen 40 micrometer coronal brain sections were obtained on a cryostat (Leica Microsystems) and stored in phosphate-buffered saline, 0.05% sodium azide at 4°C. Free-floating immunohistochemistry was performed with groups of 4–5 hippocampal sections per animal. After 2 hours blocking step (0,15% Triton X-100; 5% BSA), the sections were incubated overnight with anti-Iba1 primary antibody (1:400; Wako), washed and incubated for 2 h with an Alexa Fluor 488-conjugated secondary antibody (1:1000; Life Technologies) and mounted with ProLong Gold Antifade Mountant with DAPI. Images were acquired on a ZEISS microscope. Four experimental groups with 5 animals per group were used, 2 groups with control formulation and 2 groups with AZ formulation.

Results: Pre-treatment with the AZ formulation prevented microglial activation induced by AβOs in mice (Fig. 1).

Conclusion: These results suggest a possible mechanism by which the AZ formulation prevents cognitive damage in this mouse model of AD.

Financial Support: grant supported by Prodiet Medical Nutrition

Figure 1. AZ formulation prevents microglial activation induced by AβOs in vivo.



A - Representative image of microglial cels labeled with Iba-1 in CA1 hippocampal sections from 3 month-old male mice 10 days after i.c.v. infusion of AβOs (scale bar = 50um). B-D – Quantification of integrated fluorescence density of Iba-1 labeling in CA1 hippocampal region (B), Iba-1 positive area (C), and total Iba-1+ cells (D). Bars represent means ± SEM; n = 5 mice per experimental group (4-5 CA1 images per animal).

P125 - Iodine Deficiency in the PN dependent pediatric patient: A case study.

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Purpose: Iodine deficiency affects approximately 2 billion people worldwide. Here in the United States it is believed to have been eradicated due the addition of iodine to table salt in the 1920s. However, patients dependent on parenteral nutrition (PN) as their sole source of nutrition are a unique population at higher risk for micronutrient deficiencies including iodine. Iodine is not routinely supplemented in PN. It is mostly supplied by the small amounts of iodine contamination present in lipid formulations. Long term PN patients, especially pediatric patients, are often limited in the amount of lipids they receive in order to prevent PNALD, and the decrease in use of iodine containing skin cleansers used during dressing changes has also reduced the amount of iodine that PN dependent patients receive. A national home infusion company looked at the case of a pediatric patient who was found to have low iodine levels and examined methods of repletion when oral diet is not an option.

Methods: Testing for iodine is done using a spot urine sample and can be repeated every three months if results are abnormal or if the provider initiates an intervention. A 7 year old pediatric patient had routine labs completed and low iodine levels were noted. This patient was on PN for short bowel syndrome and was receiving a four-oil lipid emulsion. The patient was unable to take anything by mouth and unable to sufficiently use the enteral route for nutrition.

Results: All options to supplement iodine were reviewed. Lipid dose could not be increased due to concerns for PNALD. Dressing changes that were available did not include iodine and the patient previously had skin reactions to those dressings that had contained iodine. An iodized salt solution administered enterally was prescribed, but the patient was only able to successfully administer it three times per week. Since the patient was unable to tolerate enough of the salt solution a topical betadine solution was prescribed to help absorb iodine. After three months of the combined interventions, the iodine urine spot test was redrawn and was normal.

Conclusion: Iodine is not routinely supplemented in PN and it is not included in the Food and Drug Administration approved adult or pediatric IV trace element combination products. PN dependent patients are at a higher risk for iodine deficiency. Possible complication with iodine deficiencies include hypothyroidism which if untreated, could lead to abnormal cognition, growth, and metabolism. Iodine contamination can be present in lipid formulations, but long term PN pediatric or adult patients may not receive enough lipid to meet the iodine needs. Due to decreased utilization of iodine containing skin cleansers, limited methods to provide iodine include an iodized salt solution given enterally or a topical betadine solution which contains 10mg of iodine per 1mL. Providers should prescribe routine iodine testing along with regularly scheduled trace element draws for all patients who are PN dependent.

Financial Support: n/a

P126 - Caloric Provisions in the Gastrointestinal Dysmotility Population: Â Compliance vs. Metabolism

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Purpose: Malnutrition-related concerns are present in the gastrointestinal (GI) dysmotility population. Individuals with these complex medical conditions may lose the ability to tolerate oral diet and fail enteral feeding trials. Our aim is to determine what percentage of our GI dysmotility population fall within the calorie range of 20–35 kcal/kg.

Methods: This is a retrospective review of the average daily calories delivered in home parenteral nutrition (HPN) support consumers with GI dysmotility. Inclusion criteria was age greater than 18 years old, oral intake less than 250 kcal/d, and one or more of the following diagnoses: gastroparesis K31.84; dysmotility, chronic intestinal pseudo-obstruction K59.8 and mitochondrial disease E88.40. Data collected: gender, kcal/kg, BMI, fluid volume.

Results: There were 56 patients in our retrospective review, with 50 being female. Thirty four (60%) of the subjects received an average daily HPN calorie provision that fell outside of the predicted range of 20–35 calories per kilogram body weight (kcal/kg). There were 22 (39%) subjects receiving 20–35 kcal/kg, three were male with an average BMI of 20.2 (range 15–26.5) and an average PN volume of 2378 (range 1440–4000) ml/day. There were 25 (45%) subjects receiving < 20 kcal/kg and three were male. The average BMI of the group was 28.6 (range 21.1-41.8), which would classify them as being overweight. The average PN volume was 1878 (range 642–4225) ml/d. In the group receiving >35 kcal/kg, there was a total of 9 (16%) subjects with 100% of them being female. The average BMI was 18.1 (range 15.2-20.4), with an average PN volume of 2294 (range 1900–3250) ml/d.

Conclusion: Review of the data reveals that 89% were female and more than half of the subjects received calories outside of the predicted range. Further attention may need to be focused on individuals with an elevated BMI who received hypocaloric provisions. These individuals received approximately 20% less volume than the other 2 groups possibly due to compatibility issues with hypocaloric PN or due to subjects receiving intravenous fluids (IVF) outside of the PN. Compliance to the infusion order is often scrutinized when HPN provisions fall outside of the expected caloric range. The self-provided food records, which were used to categorize those who consume less than five hundred calories per day, may also need be scrutinized. Underreporting of oral intake, especially calories from beverages, is a point for continued patient discussion. Beyond the scrutiny of noncompliance, some individuals with dysmotility may have an underlying metabolic concern. Six of the individuals in our study included the ICD-10 code mitochondrial disease as their primary, secondary or tertiary billing code but the condition may not have been fully captured using this methodology. This disease group includes many subsets with individual metabolic alterations. As our understanding in this area expands, we may learn why individuals with GI dysmotility exhibit calorie needs which may fall outside of the expected standards of care and billing criteria.

Financial Support: Abstract submission feed paid by employer, ThriveRx.

P127 - Evaluation of Oral Supplementation of Vitamins A, D, and E in Adult Patients with Intestinal Malabsorption. A retrospective chart review.

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Purpose: Specific guidelines for supplementation and timing of lab monitoring frequency of fat-soluble vitamins with intestinal malabsorption are not well established given the wide differences in bowel length, intestinal integrity, and absorptive capacity of each individual. The purpose of this study is to help evaluate current practice and contribute to establishing targeted guidelines for oral supplementation of fat-soluble vitamins in patients with intestinal malabsorption. The primary outcome was to evaluate if current practices and recommendations for oral supplementation of vitamins A, D and E in intestinal malabsorption patients was effective in treating deficiencies while avoiding toxicity. A secondary aim was to determine associated factors that might predict responses oral supplementation.

Methods: A retrospective chart review of eligible adults (>18 years) managed by the Cleveland Clinic Home Nutrition Support (HNS) and the Center Gut Rehabilitation and Transplant (CGRT) teams, between January 2017 and August 2019 was conducted. The electronic medical record and Home Parenteral Nutrition (HPN) registry were reviewed to extract clinical and demographic variables. Subjects with at least one serum vitamin A, D, or E deficiency were included. Patients were excluded if pregnant during the study period, post-intestinal transplant, or did not have a malabsorption diagnosis.

Results: Of 743 charts reviewed, 72 met inclusion criteria. Vitamin D was the most prevalent deficiency at 91%, Vitamin A at 33%, and Vitamin E at 25%. Response per 1 international unit (IU) vitamin D increased levels 0.0011% of normal range, p-value 0.016. Based on the multivariate models for vitamin D, estimates of a patient's response to oral vitamin D for 10k, 20k and 50k IUs was derived. Estimates are independent of baseline vitamin D level or time duration. Length of colon in continuity improved prediction performance for response though was not statistically significant. Patients not taking pancreatic enzymes had a change of vitamin D level 45.37% of normal level more than patients who had pancreatic enzymes, p-value 0.047. Length of HPN therapy was correlated with worsened vitamin A deficiency, p-value 0.035. There was too small of a sample size for patients with Vitamin E deficiency to draw significant conclusions. Vitamin D toxicity was present in 2 patients, 107% and 616% above normal range, both subjects took doses recommended by outside providers and were higher than recommended doses by HNS/CGRT.

Conclusion: As expected, higher doses of vitamin D resulted in higher corrected lab values. However, vitamin D levels were not affected by anatomical configuration, output, medications and other absorptive altering factors as we had predicted. Though not statistically significant, it may be clinically relevant that patients with intestinal malabsorption may respond better to oral vitamin D supplementation when there was colon in continuity. Patients without pancreatic insufficiency had better response to oral vitamin D supplementation to suggest that patients with pancreatic insufficiency may not be compensated enough with pancreatic enzymes and may need even higher doses of vitamins to reach normal levels. Current oral fat soluble vitamin supplementation regimens have the potential to be increasingly effective with more aggressive dosing strategies. Prospective trials are needed to determine more specific guidelines.

Financial Support: n/a

P128 - Determining the Level of Agreement Among Three Validated Fat-Free Mass Equations in Patients on Maintenance Hemodialysis

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Purpose: Protein-energy wasting (PEW) is an independent risk factor for mortality and morbidity in patients on maintenance hemodialysis (MHD). Accurate assessment of fat-free mass (FFM) is key to the early identification of PEW. The aim of this study was to determine the level of agreement between three FFM equations used in the MHD population: Lukaski et al, Segal et al, and Kushner et al.

Methods: This study was a secondary analysis of the existing data from the Rutgers Nutrition and Kidney Database (n = 180). A matched paired t-test was used to determine the group mean differences between equations and an intraclass correlation coefficient (ICC) measured the level of agreement between three FFM equations used in the MHD population.

Results: The study included 180 adult participants with a mean age of 55.8 ±11.8 years, 81.7% (n = 147) were African American, and 58.9% (n = 106) were male. The Lukaski equation had the highest mean estimated fat-free mass (FFM) of 52.0 ± 11.6 kg, followed by the Kushner equation with 46.0 ± 11.2 kg, and the Segal equation estimating 43.4 ± 17.7 kg. All three pairs of equations were significantly different from each other when comparing mean FFM. The largest mean difference in FFM was between the Lukaski & Segal equations (8.6 ± 17.9 kg, p< 0.001),and the smallest mean difference in FFM was between the Kushner & Segal equations (2.6 ± 17.8 kg, p = 0.05). The intraclass correlation coefficient (ICC) showed the Lukaski & Kushner equations had excellent reliability in FFM, with no change when considering sex (male versus female) and age (< 60 years vs. >60 years) (r = 1.00, p< 0.001). There was poor reliability found between the Segal & Kushner equations' estimates of FFM (r-0.44, p< 0.001) and Lukaski & Segal equations' estimates of FFM (r = 0.45, p< 0.001) and when analyzed by sub-group for males [Segal & Kushner (r = -0.16, p = 0.777);

Lukaski & Segal (r = -0.16, p = 0.781)]. However, moderate reliability was found when analyzed by sub-group for females [Segal & Kushner (r = 0.55, p< 0.001); Lukaski & Segal (r = 0.56, p< 0.001)]. Poor reliability was found between the Segal & Kushner equations' estimates of FFM (r = 0.47, p< 0.001) and the Lukaski & Segal equations' estimates of FFM both among participants < 60 years of age (r = 0.47, p< 0.001) and >60 years of age [Segal & Kushner (r = 0.39, p = 0.024); Lukaski & Segal (r = 0.39, p = 0.022)].

Conclusion: Our study highlights the large mean differences in FFM found among three validated fat-free mass equations used in a MHD population and the excellent agreement found between the Lukaski and Kushner equations. Only moderate-poor reliability was found when the Segal equation was used. The use of these equations by clinicians to determine FFM should not take the place of other useful tools such as a physical examination or clinical judgment. There is a need for further validation when using these equations in clinical practice.

Financial Support: n/a

P129 - Association of Health System Change to SMOF with Calorie Delivery and Hospital Length of Stay among Patients Requiring Parenteral Nutrition

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Purpose: Previous research has suggested that in patients receiving parenteral nutrition (PN), the use of a balanced lipid solution containing Soybean oil, Medium-chain Triglycerides (MCT), Olive Oil, and Fish Oil (SMOF) may improve clinical outcomes. The Duke University Health System made a full change to SMOF balanced lipids in May 2017. We examined patient characteristics and length of stay in patients pre- and post- health system change from a pure soybean oil emulsion to SMOF as part of PN.

Methods: A retrospective study was conducted using electronic health record data from 2016–2018, one year prior to switching to SMOF (SMOFlipid) and one year following the switch to SMOF among 3,004 patients requiring PN. Although not FDA approved, SMOF is commonly being used in pediatric populations. Our primary exposure was time period (pre-switch and post-switch), and the outcome was hospital length of stay. We used descriptive statistics to examine demographic/clinical characteristics, adequacy of nutrition delivery (calorie delivery), and length of hospital stay pre- and post-switch to SMOF.

Results: Table 1 shows demographic, clinical, and nutrition delivery characteristics of the cohort. 896 (30%) patients were hospitalized pre-SMOF switch and 2,108 (70%) were hospitalized post-SMOF switch. A wide variety of patients were treated in both time periods (neonatal, pediatric, adult, geriatric), with similar proportions of female patients (45% pre-switch and 47% post-switch), African American patients (31% pre-switch and 33% post-switch), and Hispanic patients (9% pre-switch and 8% post-switch). The median (IQR) body mass index was 17.6 (13.2-24.0) pre-switch and 17.7 (13.4-24.2) post-switch. More patients post-switch had diagnoses of diabetes (5% versus 3%, p = 0.02), intestinal malabsorption (12% versus 9%, p = 0.02), and malnutrition (26% versus 17%, p< 0.001). Total daily calorie delivery was similar between time periods [median (IQR) 661 (137-1564) calories pre-switch versus 697 (148-1624) calories post-switch, p = 0.22], and hospital length of stay was decreased post-switch (median (IQR) 28 (15-53) days pre-switch versus 25 (13-50) days post-switch, p = 0.01).

Conclusion: A switch to SMOF was successfully implemented at Duke University Health System in 2017. Significantly more patients were admitted emergently to the SMOF vs. Intralipid group (p < .001), potentially indicating a higher acuity of illness in this group. Additionally, despite treating patients with more co-morbidities during the time period, the switch to SMOF showed a significant decrease in hospital length of stay while patients received similar amounts of calories. Future research should be aimed at understanding the mechanisms for these findings.

Financial Support: The senior author as stated has funding from Baxter, Fresenius, and Abbott.

Comparison of Populations			
	Intralipid Population	Smoflipid Population	p-value
	N = 896	N = 2108	
Demographics			
Percent Female	401 (44.8%)	987 (46.8%)	0.298
AGE AT ENCOUNTER	4.0 (0.0-47.0)	5.0 (0.0-54.0)	0.127
Race			0.75
White/Caucasian	475 (53.0%)	1106 (52.5%)	
Black or African American	281 (31.4%)	688 (32.6%)	
Other	140 (15.6%)	314 (14.9%)	
Hispanic	79 (8.8%)	162 (7.7%)	0.296
Median BMI	17.6 (13.2-24.0)	17.7 (13.4-24.4)	0.41
Encounter Level Data			
Inpatient LOS Median	28 (15-53)	25 (13-50)	0.011
Emergency Department	170 (19.0%)	513 (24.3%)	0.001
Time Spent in ICU	564 (62.9%)	1392 (66.0%)	0.104
Comorbidities			
Malnutrition	156 (17.4%)	553 (26.2%)	<.001
Intestinal Malabsorption	77 (8.6%)	242 (11.5%)	0.019
Acute Pancreatitis	21 (2.3%)	75 (3.6%)	0.083
Peritonitis	48 (5.4%)	128 (6.1%)	0.445
Gastrointestinal fistula	2 (0.2%)	10 (0.5%)	0.528
Chron's Disease	0 (0.0%)	0 (0.0%)	
Malignancy	167 (18.6%)	357 (16.9%)	0.26
Cirrhosis/chronic liver failure	44 (4.9%)	123 (5.8%)	0.312
Renal Failure	160 (17.9%)	347 (16.5%)	0.35
Diabetes	28 (3.1%)	107 (5.1%)	0.018
Pneumonia	41 (4.6%)	98 (4.6%)	0.931
Bacteremia/Septicemia	187 (20.9%)	418 (19.8%)	0.515
All Cause Infection	223 (24.9%)	518 (24.6%)	0.854
TPN Data			
Day TPN Started: Median	6 (2-12)	5 (2-11)	0.037
Mean	11	10	
Total Days On TPN: Median	10 (5-19)	9 (5-19)	0.419
Mean	17	16	
Total Days receiving Lipids: Median	9 (4-17)	9 (4-18)	0.496
Mean	16	16	
Lipid dosage (grams): Median	50.0 (50.0-50.0)	50.0 (50.0-50.0)	0.133
Mean	50	50.6	
Lipid Infusion Rate: Median	36 (7-75)	40 (8-75)	0.424
Mean	49	50	
Cumulative lipid dosage (grams): Median	0.0 (0.0-290)	0.0 (0.0-270)	0.561
Mean	198	217	
Calorie Summary Data			
Median Daily Protein Based Calories	128 (27-409)	131 (31-428)	0.53
Mean	222	227	
Cumulative Protein Based calories	1115 (252-4453)	1157 (248-4148)	0.732
Mean	3192	3439	
Median Daily Lipid Based Calories	504 (499-504)	504 (499-504)	0.817
Mean	520	513	
Cumulative Lipid Calories	0 (0-2520)	0 (0-2995)	0.202
Mean	1784	2277	
Median Daily Dextrose Based Calories	432 (106-829)	448 (116-842)	0.498
Mean	486	493	
Cumulative Dextrose Calories	3134 (874-9997)	3378 (884-9292)	0.873
Mean	7926	7543	
Median Daily Total Calories	661 (137-1564)	697 (148-1624)	0.221
Mean	857	888	
Cumulative Total Calories	5084 (1235-17681)	5411 (1223-16596)	0.892
Mean	12890	13253	

P130 - Diet coaching enhances compliance to a dietary protein prescription and complements nutrition education.

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Purpose: The ingestion of sufficient quantities of dietary protein is vital to maintaining muscle mass, strength and function or attenuating losses that are common with aging. The primary objective evaluated the effects of an individualized per-meal protein prescription (PRx) and nutrition education with versus without diet coaching on dietary protein intake in middle-aged women. The secondary objectives investigated the effects of changes in protein intake on muscle mass, strength, and function.

Methods: Healthy, female participants, aged 45–64 years, were recruited from eastern South Florida. Fifty-four women, who met study-inclusion criteria, enrolled. Assessments, conducted at baseline and 12-weeks, included: protein intake (three 3-day 24-hour dietary recalls at both time points and at week 4), muscle mass (bioelectrical impedance analysis), strength (hand dynamometer and 5-chair rise test), muscle function (4-meter gait speed test), weight (scale), and physical activity (International Physical Activity Short-Form Questionnaire). All participants received an individualized PRx (0.4g protein/kg body weight/meal) and nutrition education on protein-rich foods (as opposed to more common study-provided supplements) to meet the prescription] by a Registered Dietitian, and were randomized to the with diet coaching (coached) or without diet coaching group (not-coached). Coached-group participants received 10 weeks of diet coaching by phone by a Nurse Practitioner. All participants were instructed to not change physical activity or to try to gain/lose weight. Chi square and repeated measures analysis of variance tests were used to examine within group and intervention effects. A p-value < 0.05 indicated statistical significance. The study was approved by the university's institutional review board.

Results: Fifty-three women (coached n = 25, not-coached group n = 28) completed the study (meeting the sample size of 46 determined by power analysis). No significant differences were found between groups at baseline for age, weight, body mass index, education, race, protein intake, or muscle measures exception for grip strength which was significantly greater in the not-coached versus coached group. At 12-weeks, weight and physical activity did not significantly differ between groups. Protein intake (g/kg body weight) significantly increased from baseline to 12 weeks - not-coached 0.8 + 0.2 to 1.2 + 0.3 g and coached 1.0 + 0.2 to 1.4 + 0.3 g. However, coached-group participants were significantly 7.7 and 2.4 times more likely to meet their PRx at breakfast and all three meals, respectively, than not-coached-group participants. Muscle measurements did not significantly differ between groups; however, statistically significant improvements from baseline to 12 weeks were observed in both groups in chair-rise (not-coached 9.2 + 2.9 to 7.3 + 2.3 seconds; coached 7.9 + 2.0 to 6.8 + 1.8 seconds) and gait times (not-coached 3.3 + 0.6 to 3.0 + 0.4 seconds; coached 3.1 + 0.5 to 2.9 + 0.4 seconds).

Conclusion: A PRx and nutrition education provided with or without diet coaching led to improved protein intakes in a group of middle-aged women; however, a greater percentage of coached-group participants met their PRx at breakfast and for all three meals than not-coached-group participants. Diet coaching enhanced compliance to a dietary protein prescription and complemented nutrition education.

Financial Support: n/a

P131 - Investigation of the relationship between diet and outcomes in hospitalized patients by admission format - a cross-sectional study

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Purpose: To examine our hypothesis that the diet texture is the predictive factor of clinical outcome in patients with scheduled and emergency admission.

Methods: All inpatients in the hospital on the study days of the third Thursday of May, August, November, 2016 and Feb, 2017, were recruited. This was the retrospective chart review study. The subjects were divided into two groups by their admission style, scheduled (group-S) and emergency (group-E). The exclusion criteria were younger than 18 years old, absent from the hospital on the study day, missing data of oral intake. Then all collected data in two groups were compared to examine the hypothesis. The collected data were as the follows and taken from the electric note: (1) demographics- sex, weight, body mass index (BMI), the length between admission and the study day, Charlson Comorbidity Index (CCI), Activity of Daily Living (ADL), the number of medication, (2) laboratory data- C-reactive protein (CRP) measurement as needed during hospitalization, (3) nutrition- average amount of oral intake (%), the capability to take by mouth, diet texture divided in regular or non-regular (soften or liquid) subgroups, (4) outcomes- the length of stay in hospital (LOS) as primary and survival in the hospital and at the 30th day from admission, and the highest value of CRP as the second outcome parameters. To assure the strength of impact of factors on the outcome parameters, the logistic regression analysis was conducted.

Results: 671 inpatients were recruited. After 88 were excluded, the remaining 583 inpatients (365 in group-S, 218 in group-E) were analyzed. Compared all parameters in group S, the follows were statistically different. in group-E: (1) the LOS was longer (27 vs. 20 days, $P< 0.001$), (2) the highest CRP during hospitalization was higher (66 vs. 17 mg/ l, $P< 0.001$), (3) the diet texture was more non- regular (45 vs.11%, $P< 0.001$). As the results of multi-regression analysis, the impact factor on "CRP > 60 mg/ l" was remained diet texture of non-regular and its Odds ratio was 2.658 (95%CI [1.428-4.947], P = 0.002).

Conclusion: This study proved that patients with emergency admission had significantly higher CRP and longer LOS, and fed with non- regular texture, compared with them in patients with scheduled admission. From the stand points of view of dietitian, patients fed with non-regular diet texture might be predictor because of potent relationship of the diet texture with clinical outcomes, such as longer LOS and higher CRP.

Financial Support: n/a

Table 1. Comparison of results in nutritional and outcome parameters between two groups: Scheduled (S) vs. Emergency (E) group.

	Total	group-S	group-E	P Value
Number of subjects	583	365	218	
Nutritional parameters				
ON, N (%)				0.001
present	524 (90)	340 (93)	184 (84)	
absence	59 (10)	25 (7)	34 (16)	
% Daily intake < 75%, N (%)	250 (43)	139 (38)	111 (51)	0.002
Food texture of lunch as regular diet, N (%) *	362 (77)	270 (89)	92 (55)	0.000
Outcome parameters				
Primary outcome				
LOS, days	22 (12, 43)	20 (10, 37)	27 (16, 48)	0.000
Secondary outcomes				
Highest CRP around the study day, mg/l	33 (5, 101)	17 (3, 66)	66 (13, 145)	0.000
Alive at discharge, N (%)	553 (95)	355 (97)	198 (91)	0.001
Living place at home after discharge, N (%) **	474 (85)	326 (92)	148 (75)	0.000

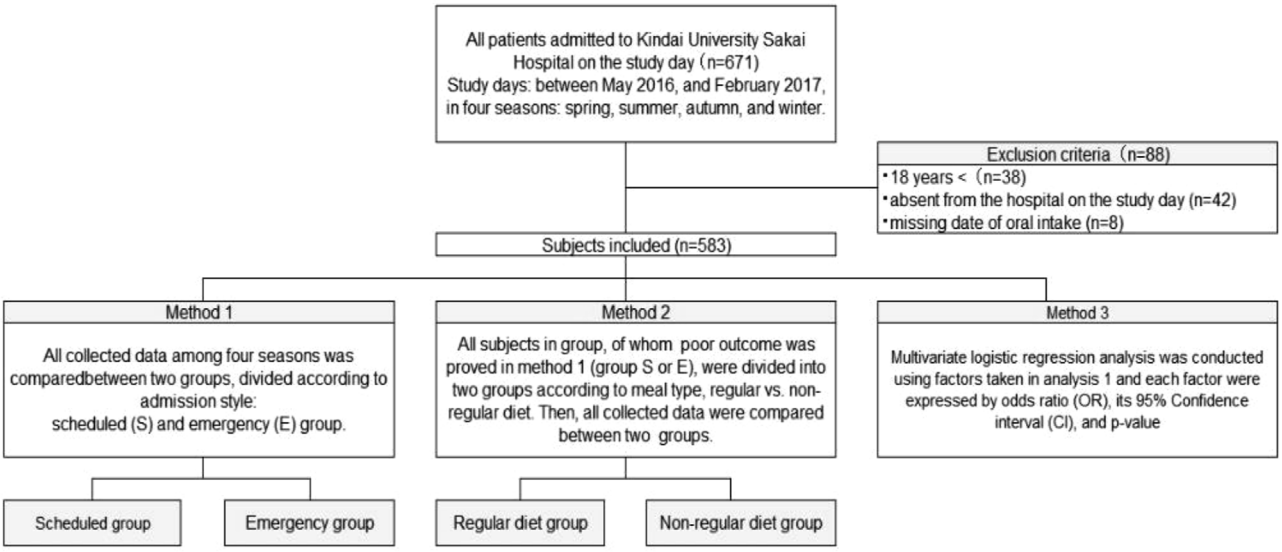
Data values were expressed in median (25, 75 quartiles). Mann-Whitney U-test, chi-square test or Fisher's exact test. * Subjects who did not take lunch were excluded. ** Dead subjects were excluded from analysis. Abbreviations: CRP, C-reactive protein; E, Emergency admission; LOS, Length of Stay; ON, Oral intake Nutrition; S, Scheduled admission.

Table 2. Comparison of outcome parameters between two groups divided by food texture of lunch in Emergency group (group E): Regular vs. Non-regular subgroup.

		Subgroup		
	Total	Regular diet	Non-regular diet	P Value
Number of subjects	167	92	75	
Outcome parameters				
Primary outcome				
LOS, days	25 (15, 46)	22 (15, 46)	26 (15, 46)	0.308
Secondary outcomes				
Highest CRP around the study day, mg/l	53 (10, 120)	29 (7, 101)	73 (18, 160)	0.006
Alive at discharge, N (%)	161 (96)	91(99)	70 (93)	0.065

Data values were expressed in median (25, 75 quartiles). Mann-Whitney U-test, chi-square test or Fisher's exact test. Abbreviations: CRP, C-reactive protein; LOS, Length of Stay.

Figure 1. Flow chart of the study.



Abbreviations: E, Emergency admission; S, Scheduled admission.

ENCORE

Publication: Tsunou A, Hokotachi Y, Amagai T. An Association of the First Three Days' Oral Energy Intake with Post-Hospital Daily Living Activities in Hospitalized Females Above 75 Years Old. Clinics of Surgery. 2020; 4(2): 1–7.

P132 - An Association of the First Three Days' Oral Energy Intake with Post-Hospital Daily Living Activities in Hospitalized Females Above 75 Years Old

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Purpose: To test hypothesis that an oral energy intake during early periods of hospitalization was associated with post-hospital ADL.

Methods: All consecutive female older inpatients aged ≥ 75 years, admitted to a single institution, were recruited. The collected data were demographics, blood test, nutritional, and outcome parameters, included changes of pre- and post-hospital ADL (Δ ADL) The Δ ADL in all individuals was defined by living places into dichotomy, favorable (F) and unfavorable (U) for Δ ADL ≥ or < 0, respectively.1: All collected data in two groups was compared. 2: To determine which factor is associated with Δ ADL, multivariate logistic regression analysis was conducted. 3: To test hypothesis that oral daily energy intake (DEI) is associated to maintain post-hospital ADL, ROC curve analysis was conducted to draw cutoff value of DEI during the first three days of hospitalization to maintain post-hospital ADL.

Results: Among 67 subjects, whose median age and BMI were 87.0 years and 18.4 kg/m2, respectively. 1) DEI were significantly larger in Group-F (25.7 vs. 17.5 kcal/kg, respectively, $p = 0.001$), 2) DEI at admission were proved determinant factors, 3) the cutoff value of DEI was 25 kcal/kg to maintain post-hospital ADL.

Conclusion: We concluded that daily energy intake ≥ 25 kcal/kg orally taken during the first three days of hospitalization was associated with maintaining post-hospital ADL among female inpatients aged ≥ 75 years, and vice versa.

Financial Support: n/a

Table 1. Comparison of collected data between discharge status, Favorable vs. Unfavorable group.

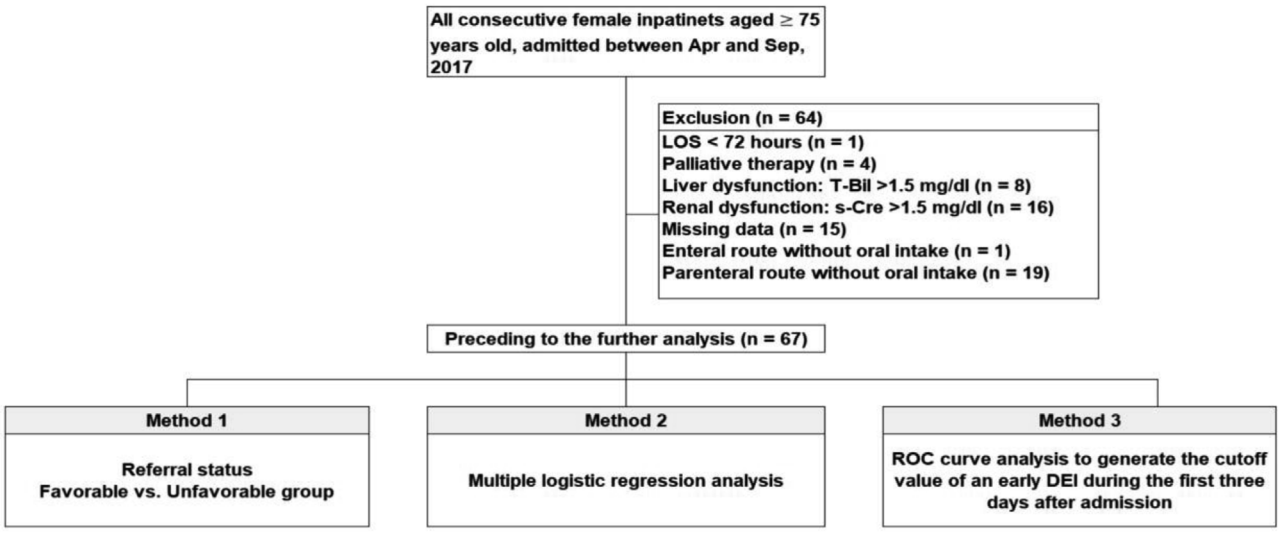
Discharge status	Total	Favorable	Unfavorable	P Value
Demographics	67	51	16	
Age, years	87 (82, 94)	87 (86, 93)	89 (83, 95)	0.560
Height , cm	145 (140, 148)	145 (140, 148)	144 (140, 150)	0.988
Body weight , kg	40.0 (33.6, 44.8)	39.2 (33.0, 44.3)	42.8 (38.1, 50.3)	0.087
BMI, kg/m^2	18.4 (16.9, 21.0)	17.9 (16.5, 20.7)	20.1 (18.4, 23.6)	0.032
CCI score	1 (1, 2)	1 (1, 2)	2 (1, 3)	0.229
Blood test				
Hb, g/dl	11.2 (9.8, 12.4)	11.2 (9.5, 12.1)	11.8 (9.8, 14.1)	0.162
Alb, g/dl	3.3 (2.9, 3.7)	3.3 (2.9, 3.7)	3.3 (2.8, 3.6)	0.256
CRP, mg/dl	1.65 (0.32, 9.56)	1.75 (0.31, 9.62)	1.61 (0.46, 3.99)	1.000
Nutritional data				
Total Daily energy intake (PO+PN), kcal/kg/day	22.9 (14.8, 27.7)	25.7 (19.3, 28.8)	17.5 (8.8, 23.2)	<0.001
Oral Daily energy intake (PO only), kcal/kg/day	22.2 (14.8, 27.3)	23.2 (18.0, 28.6)	16.2 (8.1, 21.2)	<0.001
Total Daily protein intake, g/kg/day	1.0 (0.7, 1.3)	1.1 (0.8, 1.4)	0.6 (0.4, 1.0)	0.001
NPC/N	110 (100, 119)	110 (100, 118)	111 (89, 124)	0.825
Outcome parameters				
ΔADL	0 (0, 0)	0 (0, 0)	-3 (-4, -2)	<0.001
Death, n (%)	3 (4)	0 (0)	3 (19)	0.012
Length of hospitalization, days	19 (12, 34)	18 (10, 30)	32 (14, 47)	0.064
Highest CRP, mg/dl	2.71 (0.46, 9.73)	2.71 (0.32, 12.53)	2.51 (0.62, 4.62)	0.977
Free days of antibiotics	28 (23, 28)	28 (21, 28)	28 (28, 28)	0.093
Number of medication at discharge	4 (1, 5)	4 (2, 5)	2 (0, 6)	0.134

Data are expressed as median (25%, 75% quartile) or n (%). Statistic analysis: Mann-Whitney analysis for contineous values, kai suqare analysis or Fisher analysis for categorized values. Abbreviations, ADL: activities of daily living, Alb: serum albumin concentration, BMI: body mass index, CCI: Charlton comorbidity index, CRP: C-reactive protein, Δ ADL: change of ADL calculated by ADL at discharge minus ADL at admission, Hb: hemoglobin concentration, NCP/N: non-protein calorie/ nitrogen ratio, PN: parenteral nutrition, PO: oral nutrition.

Table 2. Results of multiple logistic regression analysis for determining living dependence level in female inpatients 75 years and older.

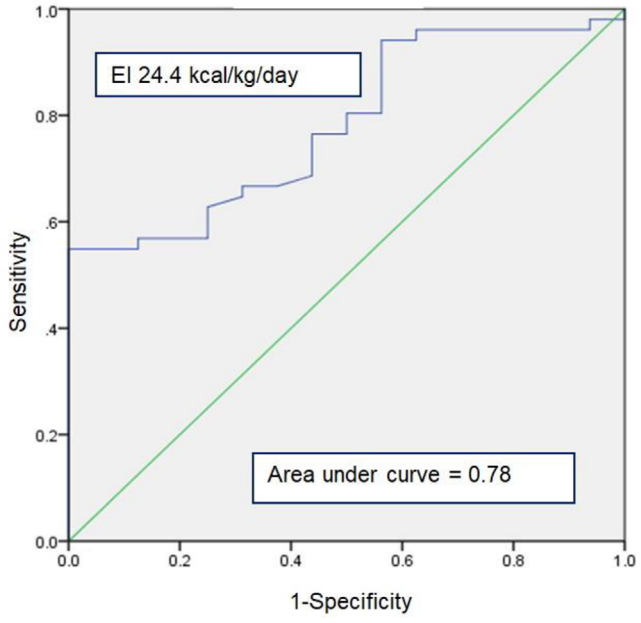
	Referral status	
Independent Variable	OR (95%CI)	Pvalue
Daily energy intake (kcal/kg/day)	13.98 (2.09-93.38)	0.006
ADL	6.68 (1.24-35.95)	0.027

Figure 1. Flow chart of the study.



Abbreviation, s-Cre: serum creatinie concentration, EI: an average energy intake during the first 72 hours after admission, LOS: length of stay in hospital, T-Bil: serum total bilirubin concentration.

Figure 2. Results of receiver operating characteristic curve analysis to draw cutoff value of DEI (kcal/kg of actual body weight). The cutoff value of DEI for maintaining ADL after hospitalization could be determined at 24.4 kcal/kg, with an area under the cure of 0.782 (p< 0.05).



P133 - Comparison of Dialysis-Specific Predictive Equations for Estimating Resting Energy Expenditure in Individuals Receiving Maintenance Hemodialysis

Alainn Bailey, MS, RD, CDN, CNSC[1]; Rebecca Brody, PhD, RD, LD, CNSC[2]; Joachim Sackey, PhD[3]; Scott Parrot, PhD[4]; Emily Peters, MPH[5]; laura Byham-Gray, PhD, RDN, FNKF[5]

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Purpose: Establishing accurate resting energy expenditure (REE) is essential to setting nutritional goals, assessing if energy balance is achieved, and can support health status in patients at risk for catabolism and protein-energy wasting. Dialysis-specific, predictive energy equations (PEEs) offer clinicians a practical way to calculate REE for patients receiving maintenance hemodialysis (MHD). Three PEEs have been formulated via similar statistical methods in different demographic samples. This study was the first to compare the PEEs (The Maintenance Hemodialysis REE, Vilar REE and Cuppari REE) in a US cohort and assess levels of agreement relative to measured REE (mREE) from indirect calorimetry. The objective was to determine if the PEEs can be applied equally to patients receiving MHD. The study also assessed the performance of each PEE within body mass index (BMI) category subgroups of the sample.

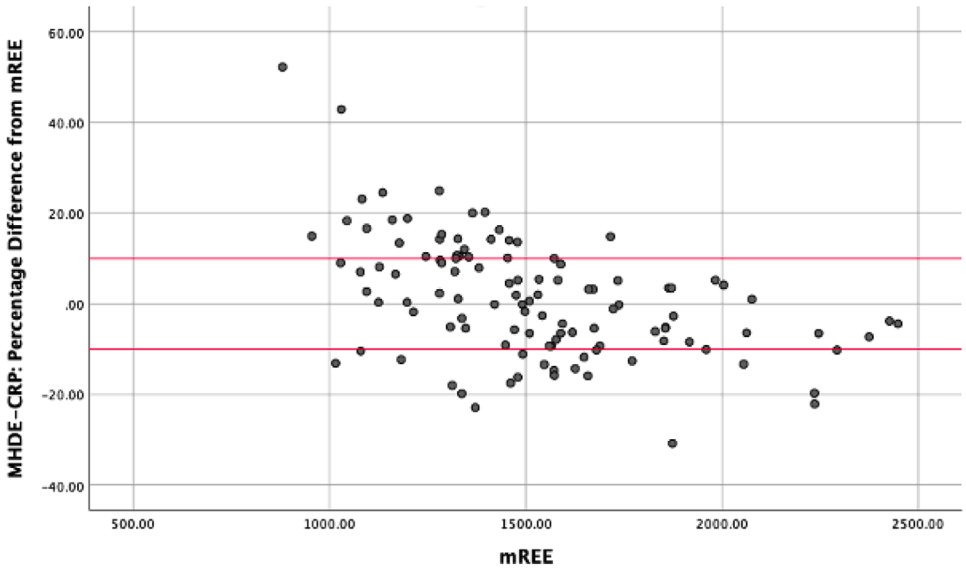
Methods: This was a secondary analysis of 113 individuals from the Rutgers Nutrition and Kidney Database (RNKD), which comprises the clinical and demographic findings from 210 participants across 4 existing studies conducted in outpatient MHD clinics in the northeastern region of the United States. Estimated REE (eREE) values were calculated by the Maintenance Hemodialysis REE (MHDE REE), the Vilar REE and the Cuppari REE. Agreement with mREE was set at > 50% of values within the limits of ± 10%. Overestimation and underestimation were determined using a novel Bland Altman plot, which analyzed the percentage difference of eREE from mREE and provided a graphical illustration of the distribution of values relative to the limits of agreement. Intraclass Correlation (ICC) was applied to determine each PEE's reliability to replicate mREE.

Results: Participants were 58.4% male and 81.4% African American. The mean age of participants was 55.8 ± 12.2 years, and the median BMI was 28.9 (IQR = 25.3 – 34.4) kg/m2. Participants had a median dialysis vintage of 42 (IQR = 21–84) months. The MHDE REE achieved 58.4% of values within the limits of ± 10% from mREE. The Cuppari REE achieved 47.8% agreement, and the Vilar REE achieved 46.0% agreement. Both the Cuppari REE and the Vilar REE tended to overestimate REE in this sample. Reliability assessed by ICC was good for the MHDE REE (ICC = 0.826) and Cuppari REE (ICC = 0.801), and moderate for the Vilar REE (ICC = 0.642) (P < 0.001 for all). Subgroup analyses by BMI indicated that the equations performed less well at the lowest and highest levels of BMI and better where BMI was closer to the median. The MHDE REE achieved 40.7% agreement and the Cuppari REE achieved 29.6% for individuals within the normal and underweight BMI category, and tended to underestimate REE.

Conclusion: Dialysis-specific energy equations showed variable accuracy in this sample of individuals, with only the MHDE REE providing good performance in the total sample. When categorized by BMI, all of the equations performed poorly in at least one sub-group. Research is required to understand the interactions of key variables, and improve and innovate methodologies, before these PEEs can be widely applied to diverse populations.

Financial Support: n/a

Figure 1. Modified Bland Altman Plot of the Percentage Difference between The MHDE REE and mREE



The black line represents zero difference from mREE. The upper red line represents 10% difference from mREE. The lower red line represents -10% difference from mREE.

Figure 2. Modified Bland Altman Plot of the Percentage Difference between The VIlar REE and mREE.

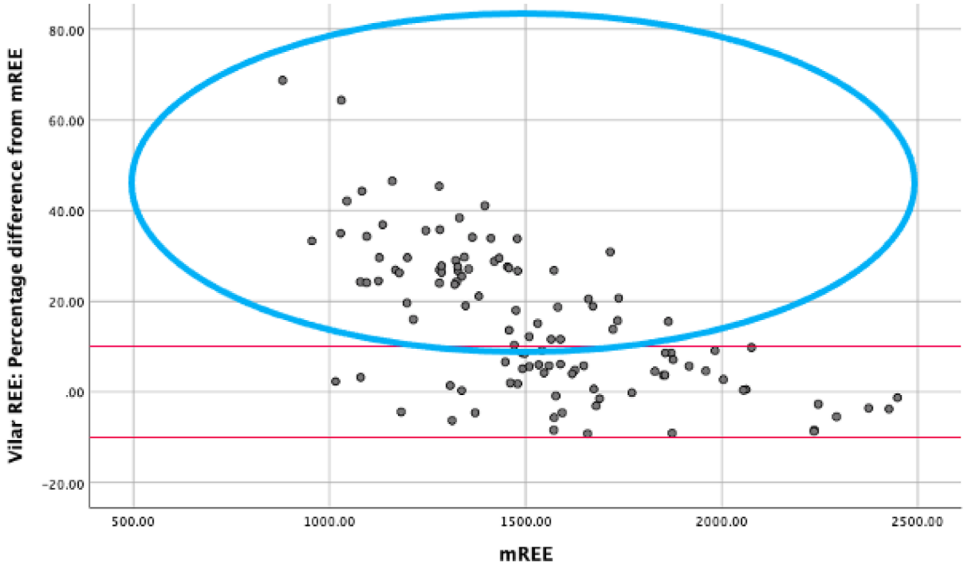
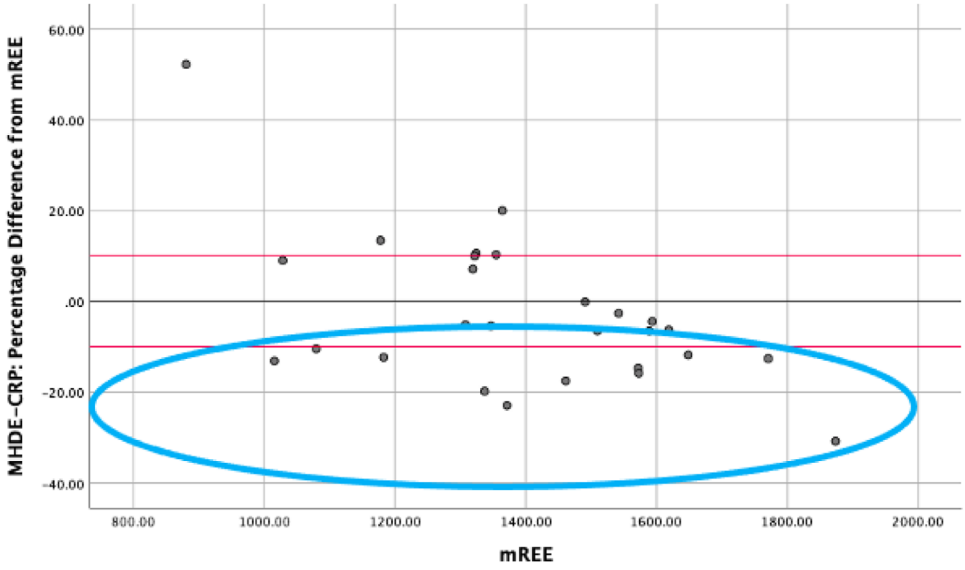


Figure 3. Percentage Difference Between the MHDE REE and mREE in people receiving MHD Categorized as Normal Weight or Underweight.



Pediatric, Neonatal, Pregnancy, and Lactation

P134 - Outcome of blenderized feeds in children with short bowel syndrome

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Purpose: Short Bowel Syndrome (SBS) remains a lifelong condition requiring highly specialized strategies to optimize nutritional status in the setting of complex gastrointestinal symptoms. Blenderized feeds are emerging as a preferred approach to pediatric enteral nutrition (EN) based on favorable outcomes and tolerance in medically complex children. Based on this as well as improved stool pattern in children with SBS receiving puree bolus feeds, blenderized feeds are more commonly considered as an alternative to other formulas in this population. Additionally, commercial blends have recently become more readily available. Prior studies demonstrated favorable outcomes in tolerance and stool pattern with transition to a blenderized diet in pediatric SBS. We aim to further explore the potential role for blenderized feeds to optimize stool quality and nutritional status in children with SBS in order to optimize their use in this fragile population.

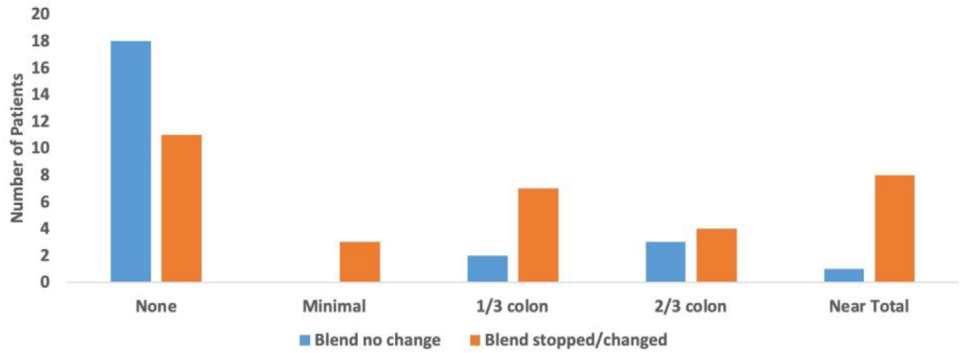
Methods: We conducted a retrospective chart review of 58 pediatric SBS patients in our center who have received blenderized tube feeds ranging from puree boluses to home blends and commercially available blenderized formulas. We evaluated type of feed, tolerance/symptoms on and off the regimen, and assessed for potential correlations with anatomy, reason for SBS and other factors. Summary statistic and regressions are performed using the statistical software Stata.

Results: The majority of our patients tried commercial blends as opposed to home blends and have experienced various outcomes. Our diverse population has a mean age of 8 years and various etiologies of SBS, with NEC as the most common (34%). Mean remaining small bowel length was 65 cm at the time of their last surgery, and the patients' average percent of estimated bowel compared to approximate expected length at the time of surgery was 45% (Range 4%-100%). Over half of our cohort, 33/58 (57%), experienced worsening gastrointestinal symptoms (most commonly diarrhea and gas) requiring discontinuation or adjustment to the regimen. Some improved with transition to an animal protein vs plant-based variety of the blend and/or integration of an elemental formula into the regimen. Length of colon resection was statistically significant in the patients that discontinued the blends ($p = 0.006$) (Figure 1). A third of the patients, 18/58 (31%), lost weight and/or demonstrated poor growth on the blends, despite improved stool quality and symptoms (Figure 2).

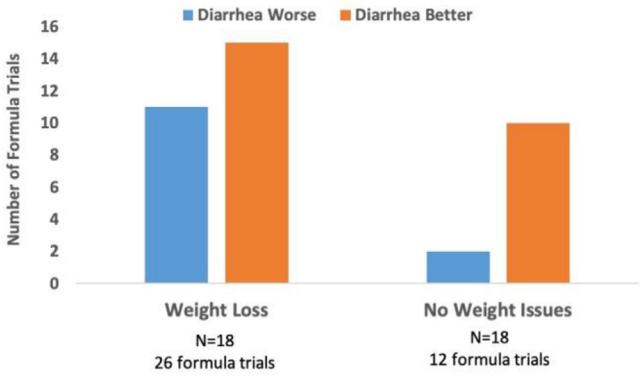
Conclusion: Blenderized tube feeds are a safe, commercially available, and generally well tolerated option for feeding in our population of SBS patients. However, a significant percentage of patients developed intolerance and/or poor growth, warranting cessation of or adjustment to this approach. Possible explanations include anatomy (such as length of colon resection, presence of ICV), presence of SIBO and other microbiome factors, length of remaining bowel, and other nutritional components of the formula (such as fiber and fat type/content). Further studies are indicated to explore these trends to help establish optimal strategies for use of these products in the SBS population.

Financial Support: n/a

Colon Resection Vs. Blend Tolerance



Outcomes on Commercial Blends



Stool quality on commercial blends does not affect weight gain/loss.

Poster of Distinction

P135 - KOALA (Kangaroo Oriented Ad Lib Advancement of Breastfeeding) Blocks: Creating a bridge to breastfeeding

Laura Oltmann, RD, CD, CNSC[1]; Laura Bauer, MSN RNC[2]; Kacia Gauthier, MSN, RN, RN-NIC[3]; Robin Savage, RN-BSN[2]; Karen LeMay, MSN, RNC[2]
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Purpose: Evidence associates breastfeeding with lifelong nutrition and health benefits for mother and infant. Breastfeeding rates are below Healthy People 2020 target. Preterm mother-infant dyads have increased risks to establishing breastfeeding. Legacy Salmon Creek Medical Center NICU identified an opportunity to increase breastfeeding success for preterm infants by targeting infant-driven cue-based breastfeeding around Kangaroo care. This program, "KOALA (Kangaroo Oriented Ad Lib Advancement of Breastfeeding) Blocks," creates a bridge between inflexible NICU feeding schedules and cue-based breastfeeding. We theorized suspending scheduled feedings for a designated time would enable infant-driven breastfeeding, evidenced by increased breastfeeding occurrences, while maintaining adequate growth. This program would also show increased efficacy and duration of breastfeeding.

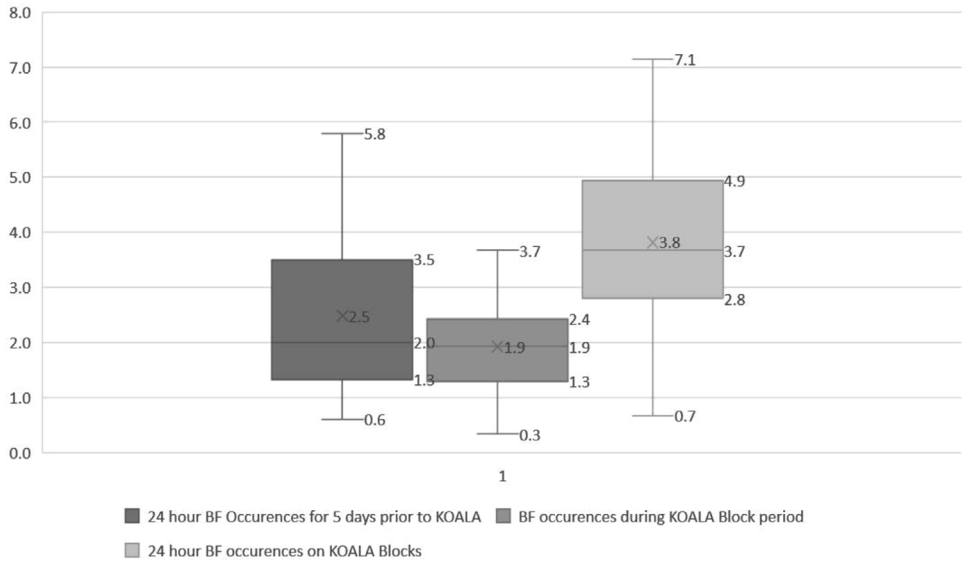
Methods: The multi-disciplinary team identifies qualifying dyads: stable infants greater than 32 weeks PMA with documented milk transfer; mothers providing extensive Kangaroo care with sufficient milk supply and extensive daily availability. The Lactation Consultant or RN introduces the mother to the KOALA program. Initial order reads, "KOALA Block 1: Eliminate one scheduled feed. Breastfeed ad lib from 9 a.m. to 3 p.m." Prior to the Block, the infant is fed per usual schedule. During Block 1, scheduled feeds are suspended for 6 hours and mother breastfeeds based on cues, tallying occurrences. The RN limits interventions and post-breastfeeding weights. After the Block, the infant's feeding schedule resumes. If breastfeeding progresses and weight gain is greater than 20 grams/day, the dyad may progress to Block 2, suspending two scheduled feeds (9 hour Block), then Block 3 (12 hour block). If weight gain is less than 20 grams/day two days in a row, the provider can increase feeding volume, increase fortification calories, or hold/stop KOALA.

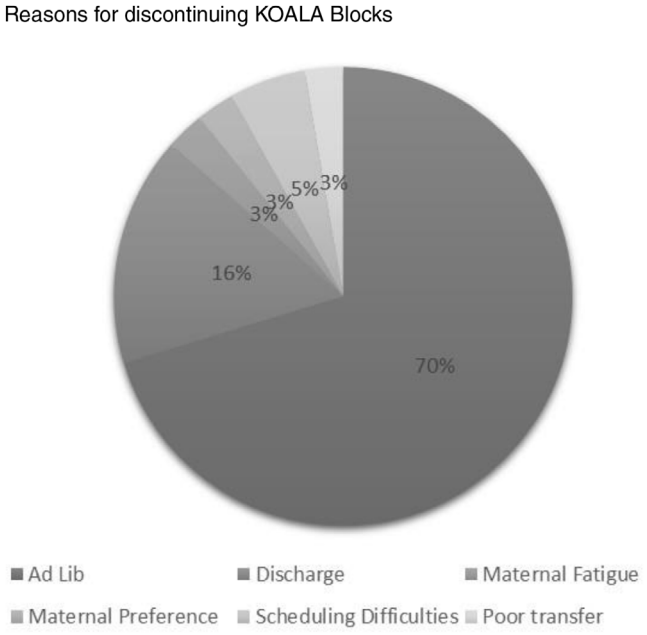
Results: A 2016 pilot enrolled 14 infants. 3 controls were randomly selected per infant, matching birth gestational age and multiples. KOALA infants averaged 3.3 breastfeeding occurrences/day verses 1.4 in controls. Weight gain over last 7 days of admission was comparable, at 24.4 grams/day in KOALA infants verses 24.5 grams/day in controls. From 2017–2019, 40 infants were enrolled (2 excluded for medical reasons). IRB approved a retrospective review. There were no controls and infants were not randomly selected. Average daily breastfeeding occurrences increased from 2.5/day before enrollment to 3.8/day after enrollment. Average weight gain from KOALA start to discharge was adequate at 23.4 g/day. 40.5% of infants progressed to Block 2, and 5.4% progressed to Block 3. Reasons for discontinuing KOALA included: transition to ad lib feeds (70%), discharge (16%), scheduling (5%), maternal fatigue (3%), preference (3%), poor transfer (3%). Participants expressed satisfaction, but breastfeeding self-efficacy, satisfaction, and duration were not measured due to IRB limitations. We plan to survey mothers before KOALA, at discharge, and 6 months after discharge. Limitations to data include: no controls, participants not randomly selected, bias created by mothers motivated to breastfeed, expected increase in breastfeeding occurrences due to increased proficiency and age, and weight as only growth measure.

Conclusion: In conclusion, suspending scheduled feedings for a designated time appears to enable infant-driven breastfeeding, evidenced by increased breastfeeding occurrences and adequate growth maintenance compared to standard regimen.

Financial Support: We have received financial support from the Legacy Health Foundation to assist in the submission process of this abstract. The Foundation had no prior involvement with the project.

Breastfeeding occurrences prior to and during KOALA





Reasons for stopping KOALA Blocks included: transition to ad lib feeds (70%), discharge (16%), scheduling (5%), maternal fatigue (3%), preference (3%), poor transfer (3%).

P136 - Dietary Manipulation and its Use in The Treatment of Metabolic Amino Acid Disorders

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Purpose: Background: Inherited disorders of the amino acid (IDAA) are a large group of metabolic disorders characterized by disruption of metabolic pathways due to deficient enzymes, cofactors, or transporters which invariably lead to the toxic build-up of the substrate and a deficiency of the product. The last decade has brought a greater understanding of the pathophysiology of many inherited metabolic disorders leading to remarkable progress in the development of an array of new treatments, including ameliorating dietary therapies with superior medical foods. The commencement and continued expansion of newborn screening provide the opportunity for prompt treatment, leading to a significant reduction in mortality and disability rates. This review aims to provide an overview of the major dietary approaches and recent advances in the treatment of selected inherited disorders of the amino acid (IDAA) that focus on the basic principles of dietary manipulation, including substrate depletion, natural protein reduction, and dietary supplementation. In addition, the challenges and obstacles of current treatment modalities and future treatment perspectives are reviewed and discussed.

Methods: A systematic search of the literature using electronic databases (Medline, Embase, and Cochrane library) and reference lists of articles or relevant conferences, revealed a total of 122 articles. The GRADE checklist was used to guide this review and critically appraise included studies.

Results: The findings of the literature have gone into discussing dietary nonadherence as the major pitfall of the therapeutic diet to almost all IDAA, further, the lack of consensus in the dietary management of tyrosine metabolic disorders was addressed in several articles. The evaluation of the psychological profile of patients and caregivers was emphasized in many other articles.

Conclusion: At the present time, many emerging non-dietary therapies are being actively studied, however, for the meanwhile manipulation of the diet remains the mainstay in managing IDAA.

Financial Support: N/A

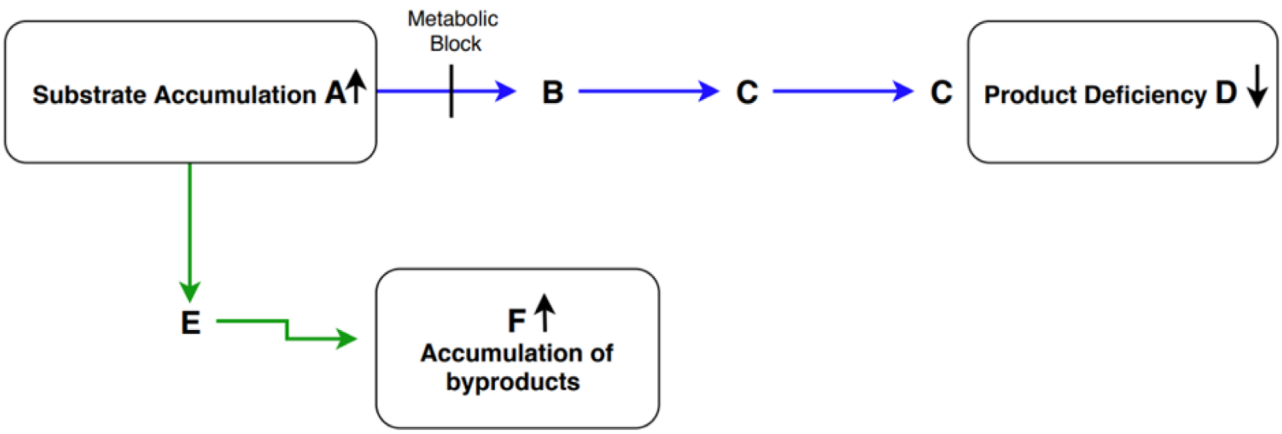
TABLE 1:OVERVEIW OF SELECTED INHIRITED DISORDERS OF AMINO ACIDS (IDAA), THE CAUSATIVE GENES, OMIM NUMBER, AND PREVALENCE.

Amino Acid Disorders	Respective genes	Prevalence	References
Phenylketonuria (PKU)	PAH (OMIM:261600)	1 in 10,000 in European populations; 1 in 50,000 the African-American population	Hofman et al., 1991; Loeber, 2007
Tyrosinemia Type I	FAH (OMIM: 276700)	1 in 12,000 to 1 in 100,000 individuals of Northern European descent	Chinsky et al., 2017
Tyrosinemia Type II	TAT (OMIM:276600)	1 in 250,000 worldwide	DeArmond et al., 2017
Tyrosinemia Type III	HPD (OMIM: 276710)	Less than 1 in 250,000-1,000,000 worldwide	(NICE, 2020)
Maple Syrup Urine Disease (MSUD)	BCKDHA, BCKDHB, and DBT (OMIM: 248600)	1 in 86,800 to 185,000 live births worldwide, 1:200 live births in certain Mennonite populations in Pennsylvania and elsewhere due to a founder variant (c.1312T>A) in the branched-chain ketoacid dehydrogenase complex gene	Puffenberger, 2003; Quental et al., 2010
Homocystinuria (HCU)	MTHFR (OMIM: 236250) and CBS (OMIM: 276600)	1 in 150,000 worldwide	Froese et al., 2016

TABLE 2: THE SELECTED AMINOACIDOPATHIES AND CORRESPONDING KEY WORDS, that were used in in major electronic bibliographic databases.

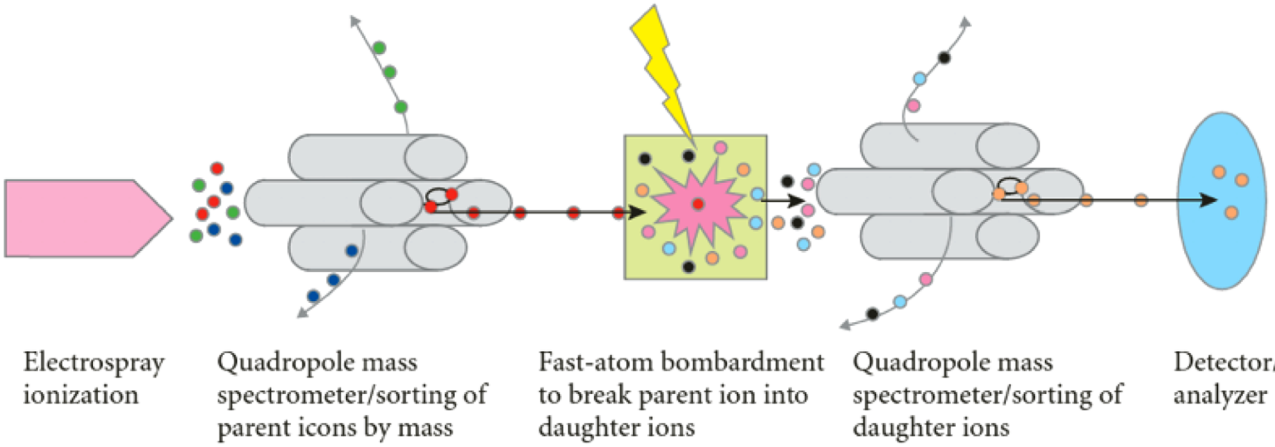
THE APPROACH	KEYWORDS USED IN SEARCH
1. **Inherited Disorders of Amino Acid**	["Inherited Disorders of amino acid" **OR** "Aminoacidopathies" **OR** "Amino acid disorders" **OR** "Inborn Error of Amino acid" OR "Metabolic Amino acid disorders" **OR** "Metabolic AA disorders" **NOT** "Organic acidemia" **OR** "Organic Aciduria" OR "Urea Cycle Defects"] AND ["Diet***[tiab]**" **OR** "Dietary Approach**[tiab]**" **OR** "Dietary Restriction**[tiab]**" **OR** "Nutrition***[tiab]**"
2. **PKU**	["PKU" **OR** "Phenylketonuria" **OR** "Folling's Disease" **OR** "phenylalanine hydroxylase deficiency disease" OR "Folling Disease" **OR** "Maternal PKU" **OR** "MPKU"] **AND** ["Diet***[tiab]**" **OR** "Dietary Approach**[tiab]**" **OR** "Dietary Restriction**[tiab]**" **OR** "Nutrition***[tiab]**"
3. **Tyrosinemia**	["tyrosinemia" **OR** "Hereditary Tyrosinemia" **OR** "Hepatorenal tyrosinemia" **OR** "Fumarylacetoacetase deficiency" **OR** "FAH deficiency" **OR** "oculocutaneous tyrosinemia" **OR** "Richner–Hanhart syndrome" **OR** "4-Hydroxyphenylpyruvate Dioxygenase Deficiency" **OR** "Tyrosinemia, Type iii" **OR** "Tyrosinemia, Type ii" **OR** "Tyrosinemia, Type i" **OR** "Maternal Tyrosinemia"] **AND** ["Diet***[tiab]**" **OR** "Dietary Approach**[tiab]**" **OR** "Dietary Restriction**[tiab]**" **OR** "Nutrition***[tiab]**"
4. **£MSUD**	["Maple syrup urine disease" **OR** "MSUD" **OR** "Branched chain ketoaciduria" **OR** "Keto acid decarboxylase deficient*" **OR** "Maternal MSUD"] **AND** ["Diet***[tiab]**" **OR** "Dietary Approach**[tiab]**" **OR** "Dietary Restriction**[tiab]**" **OR** "Nutrition***[tiab]**"
5. **Homocystinuria**	["Homocystinuria" **OR** "HCU" **OR** "Hypermethioninemia" **OR** "Maternal Homocystinuria"] **AND** ["Diet***[tiab]**" **OR** "Dietary Approach**[tiab]**" **OR** "Dietary Restriction**[tiab]**" **OR** "Nutrition***[tiab]**"

FIGURE 1: SCHEMATIC OF A METABOLIC PATHWAY.



Substrate A is normally converted by sequential enzymatic reactions (blue arrows) into product D. If one of the enzymes is faulty, causing a metabolic block, the substrate of the reaction (A, in this case) will accumulate, and the product (D) will be lacking, further the substrate A may enter an alternate pathway (through E) resulting in the accumulation of by-products (F).

FIGURE 2: TANDEM MASS SPECTROMETRY.



The specimen is injected into the machine and undergoes electrospray ionization. The first quadrupole uses an electrogenic field to sort and select the ions of interest. These ions undergo a fast-ion onrush to break large ions into smaller ones. The fractured ions then enter the second quadrupole for arrangement and assembly, and quantification is done by the detector. This figure is adopted from Lee and Scaglia (2015).

P137 - Retrospective Review of a 100% Fish Oil-Based Intravenous Lipid Emulsion Use in a Pediatric Hospital

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[1]Nemours / Alfred I. duPont Hospital for Children, Lincoln University, Pennsylvania; [2]Nemours/Alfred I. duPont Hospital for Children, Wilmington, Delaware

Purpose: Studies have identified a link between soybean oil-based lipid emulsions (SOLE) dosed greater than 1 g/kg/day and cholestasis in pediatric patients requiring long-term parenteral nutrition1. Possible contributing factors include oxidative stress, high ω-6 polyunsaturated fatty acid (PUFA) and phytosterol content, and low α-tocopherol levels. Lipids that contain fish oil have anti-inflammatory benefits and increased concentrations of the ω-3 PUFAs eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)1. A 100% fish oil-based lipid emulsion (FOLE), was approved by the Food and Drug Administration (FDA) in 2018 as a source of calories and fatty acids for pediatric patients as a rescue therapy for parenteral nutrition-associated cholestasis (PNAC)2. Although long-term studies are needed, research to date has shown that it can halt the progression and reverse the biochemical manifestations of PNAC3. We present this retrospective review of FOLE use in our freestanding pediatric hospital.

Methods: A retrospective chart review was conducted from July 2019 through July 2020 as a quality improvement initiative to evaluate the use of FOLE (Omegaven ®). Data collection included patient age, diagnosis, prior ILE use/dose, indication and duration of FOLE, and lab data (Fig 1). Institutional Review Board approval was not required for this quality improvement project. Prior to July 2019 there were two injectable lipid emulsions (ILEs) on our hospital formulary: Intralipid® (SOLE) and Smoflipid ®, a mixed oil-based lipid emulsion (MOLE) containing soy, MCT, olive, and fish oil. At the July 2019 Pharmacy and Therapeutics (P&T) Committee Meeting, FOLE was added to formulary as a rescue therapy for PNAC. Nutrition Support Team (NST) approval was required for all provider-placed orders. An ILE Decision Process Algorithm (Fig 2) and Dosing Guideline (Fig 3) were developed by the NST to assist providers with dosing, initiation, and titration of ILE.

Results: Seven patients were prescribed FOLE from July 2019 through July 2020 (Fig 1). Patients' ages ranged from less than 40 weeks corrected age, up to 21 years of age. The most common indication for prescribing FOLE (86%) was conjugated bilirubin greater than a level of 2.0 mg/dL due to failure of MOLE and/or SOLE. One patient was on FOLE secondary to a soy allergy. Duration on FOLE ranged from 10 to 65 days. Reversal of PNAC, determined by conjugated bilirubin levels less than 2.0 mg/dL, was found in 3 out of 7 patients (43%). The other 4/7 patients (57%) either reached full feeds or were found to have another etiology of conjugated hyperbilirubinemia. No adverse events due to FOLE, such as bleeding or coagulopathy, were noted in our patients.

Conclusion: FOLE was added to our hospital's formulary as a rescue therapy for PNAC secondary to the failure of MOLE and/or SOLE. Our experience with FOLE shows its benefit for the reversal of PNAC. Moving forward we will continue to trend pre- and post-conjugated bilirubin levels to evaluate FOLE, as the majority of our patients in the past year either transitioned to full feeds before resolution of PNAC or were experiencing another underlying etiology of their conjugated hyperbilirubinemia. We will continue to monitor indication, efficacy, and adverse events with this

injectable lipid emulsion in our pediatric population. Goulet OJ, Cai W, Seo J-M. Lipid emulsion use in pediatric patients requiring long-term parenteral nutrition. JPEN . February 2020;44(1):S55-S67. Omegaven [Package Insert]. Graz, Austria: Fresenius Kabi, 2018. Herrera, OR, Caviness, LA, Helms RA. Emergence of New injectable lipid emulsions in the USA: Guidance for pediatric clinicians. Food Nutr Sci. 2019;10: 823–833.

Financial Support: n/a

Data Collection

Data Collection								
Patient	Age	Gender	Diagnosis	Indication for FOLE	Duration of FOLE	Direct bilirubin pre-FOLE (mg/dL)	Direct bilirubin post-FOLE (mg/dL)	Peak direct bilirubin while on FOLE (mg/dL)
A	21 years old	M	Bone marrow transplant	Soy allergy	10 days	0.0	0.0	0.0
B	Neonate (<40 weeks)	F	Necrotizing enterocolitis	Evidence of PNAC/failure of SOLE/MOLE	22 days	6.0	3.3	6.0
C	13 years old	M	Multiple laparotomies	Evidence of PNAC/failure of SOLE/MOLE	15 days	3.8	1.4	8.6
D*	9 years old	F	Bone marrow transplant	Evidence of PNAC/failure of SOLE/MOLE	21 days	4.5	4.5	10.9
E	Neonate (<40 weeks)	M	Congenital heart disease	Evidence of PNAC/failure of SOLE/MOLE	65 days	3.0	3.5	12.6
F*	Neonate (<40 weeks)	F	Congenital heart disease	Evidence of PNAC/failure of SOLE/MOLE	55 days	2.8	8.9	15.7
G	Neonate (<40 weeks)	M	Necrotizing enterocolitis	Evidence of PNAC/failure of SOLE/MOLE	63 days	9.7	2.0	15.5
*Indicates deceased patient.								

Injectable Lipid Emulsion Dosing Guideline

Injectable Lipid Emulsion Dosing Guideline			
	Soybean Oil-Based Lipid Emulsion Dosing (SOLE)		
	Initial Dose *(g/kg/day)*	**Titration** *(g/kg/day)*	**Goal** *(g/kg/day)*
Neonates, Infants	0.5-1	0.5-1	2.5-3 *(max lipid infusion rate 0.15 g/kg/hr)*
Children	1-2	0.5-1	2-2.5 *(max lipid infusion rate 0.11 g/kg/hr)*
Adolescents	1	1	1-2 *(max lipid infusion rate g/kg/hr)*
**Dose of 0.5-1 g/kg/day may be enough prevent essential fatty acid deficiency (EFAD); follow labs.*			
	Mixed Oil-Based Lipid Emulsion Dosing (MOLE)		
	Initial Dose *(g/kg/day)*	**Titration** *(g/kg/day)*	**Goal** *(g/kg/day)*
Neonates, Infants	0.5-1	0.5-1	2.5-3 *(max lipid infusion rate 0.125 g/kg/hr)*
Children	1-2	0.5-1	2-2.5 *(max lipid infusion rate 0.15 g/kg/hr)*
Adolescents	1	1	1-2 *(max lipid infusion rate 0.125-0.15 g/kg/hr)*
**30% of total calories much be provided to prevent EFAD; follow labs.*			
	Fish Oil-Based Lipid Emulsion Dosing (FOLE)		
	Initial Dose *(g/kg/day)*	**Goal** *(g/kg/day)*	
Neonates, Infants, Children	0.5	1 *(max lipid infusion rate 0.15 g/kg/hr)*	
Adolescents	1	1 *(max lipid infusion rate 0.15 g/kg/hr)*	
**Once direct bilirubin <2.0 and if patient continues on parenteral nutrition, discontinue FOLE and restart MOLE.*			

Injectable Lipid Emulsion Decision Algorithm

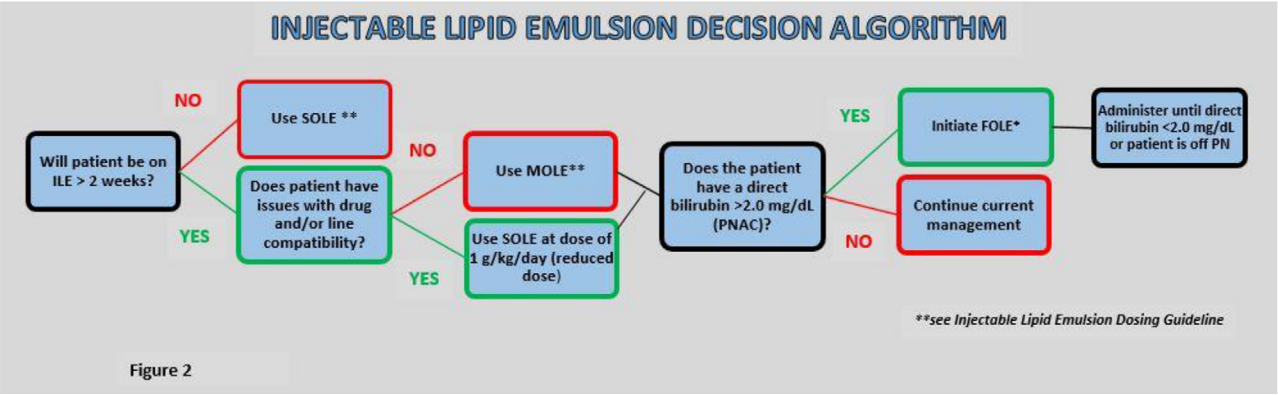

Figure 2

ENCORE

Publication: Lopez B, Guerrero B, Zamudio J, Peza G. S86 - Level of knowledge on folic acid supplementation among nursing students on a Mexican University (abstract). Supporting Information. ASPEN Nutrition Science & Practice Conference: March 28–31, 2020, JPEN J Parenter Enteral Nutr. 2020 Feb;44(2):177.

P138 - Level of knowledge on folic acid supplementation among nursing students on a Mexican University

Balkis López, Physician, Master on Clinical Nutrition[1]; Brisa Guerrero Ramírez[1]; Julio Zamudio Montalvo[1]; Gabriela Peza Cruz[1]
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Purpose: Folic acid is a B complex vitamin found in everyday food as folate. On its synthetic form is found as pteroylglutamic acid, which has a major bioavailability. It has been shown that folic acid reduces Neural tube defects (NTD) up to 75% and it may reduce other congenital defects. Nurses are first contact health providers, regarding pregnant women, therefore, their intervention is essential in promoting and distributing folic acid, so they can contribute to preventing congenital defects and anemia. In 2014 WHO reported that Nursing staff training level was low in many countries, this might be the cause of patient's lacking knowledge on preventing diseases. Although NTD and anemia have decreased their incidence, worldwide the prevalence of anemia is 40% among pregnant women and in Latin America, 50 of each 1000 newborns have congenital defects, mostly NTD. This

is an area of opportunity for the Department of Health and Human Services and for public universities to create health care programs designed to encourage folic acid supplementation promotion. OBJECTIVE: Evaluate the level of knowledge on folic acid supplementation in nursing students on a Public University in Queretaro, Mexico (UAQ).

Methods: A quantitative descriptive cross-sectional trial was carried out on 93 nursing students at UAQ using a stratified sampling randomized controlled trial. Saxena, et.al 2016 question survey named "Folic acid supplementation survey questionnaire-health provider", was used on the purpose of this investigation. SSPS 23 was used to analyze data. Research approved by College's research and bioethics committee.

Results: 86% of all students in this research were female aged between 17 and 25 years old, 68.9% of which promote folic acid supplementation, it is important to note that these students were senior students. 63.4% know that folic acid should be taken before pregnancy; however, only 17.2% know that women planning to become pregnant are a particular group of people who need to make sure they are getting the right amount of folate or folic acid; 31.2% know folic acid prevents NTD, spina bifida and anemia. 59.1% know which types of foods and drinks are naturally good sources of folate and 28% intake folic acid supplement, but only 18.3% know the right amount of folic acid that should be prescribed. The overall result was that 50.5% of the whole population has low folic acid supplementation knowledge.

Conclusion: Although the majority of nursery students promote folic acid supplementation, most of them are not aware of the diseases prevented by it and they don't know when and the amount that should be taken. This is important since most of them would have the opportunity to prescribe folic acid, particularly to women who are planning to become pregnant. To reduce NTD and anemia incidence, health care training programs should attempt their students to have adequate knowledge about folic acid supplementation so that women of childbearing age get the exact information and may have a healthy pregnancy.

Financial Support: n/a

P139 - Review of Current Practices in Paediatric Home Parenteral Nutrition in Australia

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[1]Monash Children's Hospital, Keysborough, Victoria; [2]Monash Children's Hospital, Clayton, Victoria

Purpose: Home Parenteral Nutrition (HPN) has revolutionised the care of paediatric patients, allowing for improved medical outcomes and quality of life. However, Parenteral Nutrition is costly and associated with potential risks, therefore it is important to establish appropriate practices to enhance safety and compliance. Paediatric Gastroenterology centres run HPN programs across Australia, however there is no standardised approach in Australia. Our study aimed to review current practices across Australia, and investigate for potential variations amongst the centres.

Methods: All major paediatric hospitals in Australia that had an existing HPN program in 2019 were surveyed. We contacted clinical leads at each centre, and sent standardised surveys of ten questions. We examined practices at each of these HPN programs, including multidisciplinary team input, education, and line care; to gain a better understanding of current local practices.

Results: Surveys were sent and received from 7 major paediatric HPN centres. There were a total of 69 current paediatric patients receiving HPN from 2019–2020, with the most common indication being for Short Gut (47). Other indications included Motility Disorders (14), Enteropathy (4), and Other (3), (See Figure 1). Each HPN program involved a multidisciplinary team, however the team members varied from centre to centre. Most HPN programs involved a primary gastroenterologist and nurse, however the level of allied health input varied between centres (See Figure 2). Most centres used a combination of interventional radiologists and paediatric surgeons to insert and replace lines. Each of the hospitals provided a structured education program to families prior to transition to HPN, and all hospitals had a clinical guideline for line sepsis management. Parents were taught to use similar equipment to access the central venous access device (CVAD), with all centres using a tunnelled cuffed line for access, and the majority using taurolidine-based line locks. Line repairs were generally attempted prior to line replacement.

Conclusion: We reviewed HPN across 7 paediatric hospitals in Australia, and examined the similarities and differences in current local practices. Short gut is the most common indication for HPN, which is consistent with previous studies in Paediatric parenteral nutrition. All HPN programs involved a gastroenterologist and nurse, however other members of the multidisciplinary team varied from centre to centre. Almost all centres have moved towards using taurolidine-based line locks, which literature has shown to have decreased line infections. Overall, it was demonstrated that HPN programs across Australia had many similarities in terms of their approach to multidisciplinary team input, education for families, and line care equipment.

Financial Support: n/a

Figure 1. Primary Diagnosis

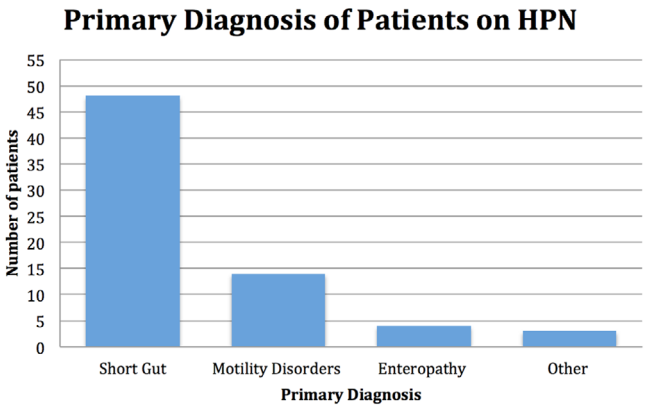
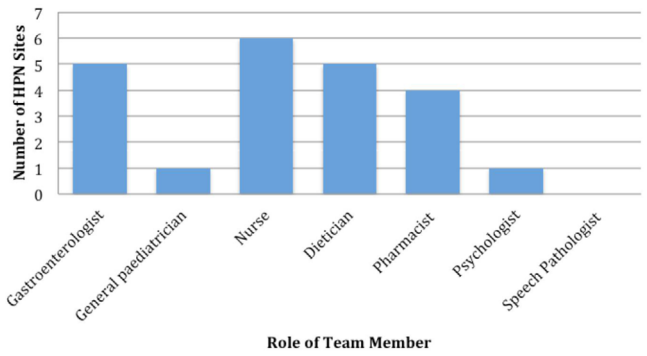


Figure 2. Members of Multidisciplinary Team



P140 - Transient Exocrine Pancreatic Insufficiency in a Preterm Neonate: The Role of Copper

Sweetman Michael, MD[1]; Allison Rohrer, RD[1]; Toby Cox, Pharm D[1]; Nagraj Kasi, MD[1]; Candi Jump, DO, MSEd[1]

[1]Medical University of South Carolina, Charleston, South Carolina

Purpose: Copper (Cu) is an essential trace element and an important enzyme co-factor. Hypocupremia in preterm infants has been described in the setting of long term parenteral (PN) usage or enteral disease without adequate supplementation. The more common manifestations of Cu deficiency in this population are: metabolic bone disease, neutropenia, and anemia. Animal studies have shown that rats fed copper deficient diets develop progressive atrophy of the pancreatic acinar tissue and Cu deficiency has been implicated in the etiology of Schwachman Diamond Syndrome (SDS) for which exocrine pancreatic insufficiency (EPI) is a manifestation. Here we present a case of neonatal Cu deficiency followed by transient EPI that improved with normalization of serum Cu levels. Pediatric gastroenterology was consulted for low serum Cu levels and poor growth in a 4 month old female, born at 31 weeks gestational age, with Trisomy 21, congenital hypothyroidism, adrenal insufficiency, and tetralogy of Fallot (ToF). The patient was previously known to our service for a history of cholestasis which had resolved. Workup at that time, including a genetic cholestasis panel, was negative. A Cu level was drawn because of increasing alkaline phosphatase (alk phos) levels with concern for ongoing metabolic bone disease despite adequate calcium and phosphorous supplementation. In addition, the patients previous growth (10d growth velocity of 56 g/day) had stopped and she had lost a total of 3g in the 10 d prior to consultation. Workup for low Cu included serum ceruloplasmin (low), serum zinc (high), and a request for further genetic testing given her complex problem list. Cu supplementation was initiated with cupric chloride at 1mg of elemental Cu twice per day enterally via NGT. In addition, a fat soluble vitamin preparation with additional zinc (Zn) was discontinued given resolved cholestasis and potential that Zn excess contributed to low Cu. A repeat Cu and level was sent after two weeks of enteral Cu supplementation and was normal. Ceruloplasmin levels increased during supplementation, normalized two weeks later, and remains normal 2.5 months after supplementation was discontinued. Our patient had ToF repair prior to initiation of Cu supplementation with no post-operative improvement in growth velocity. Given the presence of loose stools and poor growth, a fecal elastase (FE) was sent and was < 200 mcg/g, consistent with EPI. The infant was started on pancreatic enzyme replacement therapy (PERT) and demonstrated a 10 day weight gain velocity of 23.5 g/day. After two months of PERT, FE was repeated and had normalized. Our patient's Cu level remained undetectable despite receiving copper in PN for 25 days, prior to onset of cholestasis. Another potential etiology for deficiency is Zn induced Cu deficiency (ZICD) from administration of fat soluble vitamin supplement. However, our patient did not receive Zn in significant excess of doses that had previously been deemed safe in term infants.

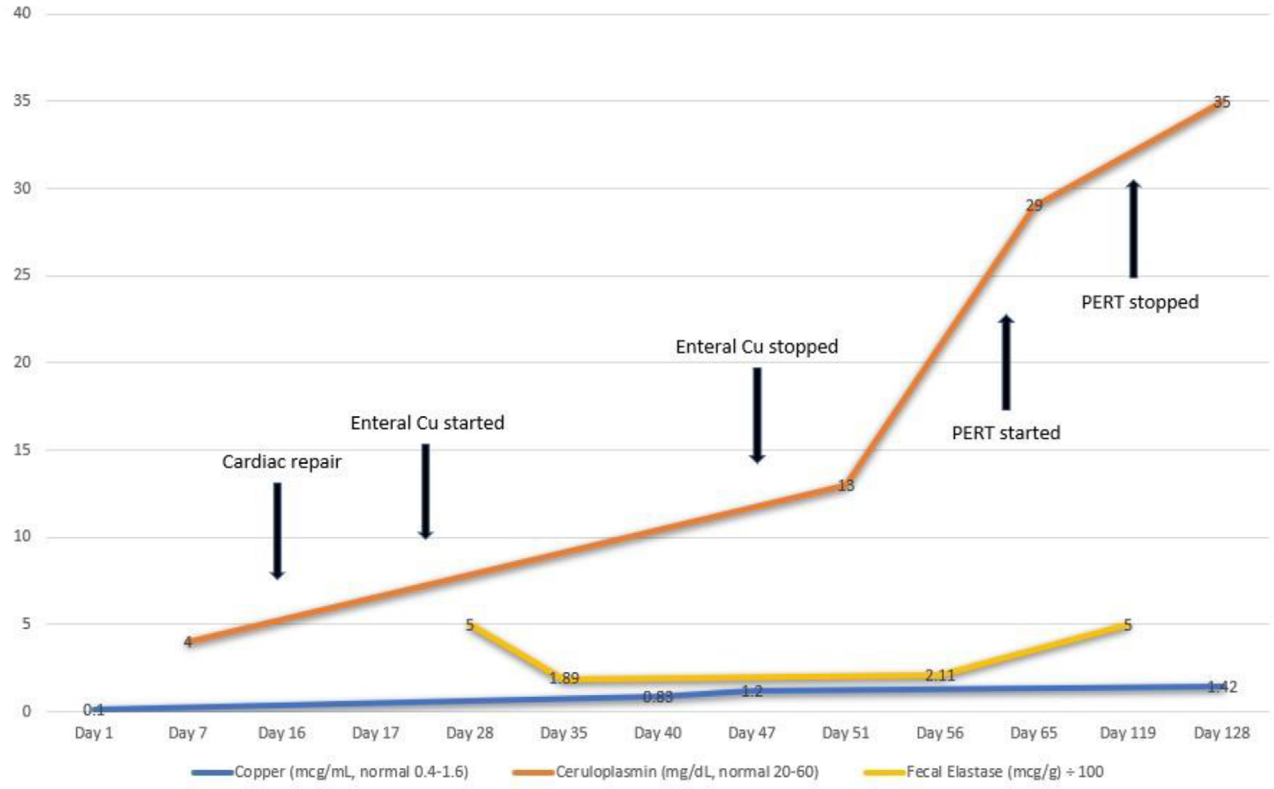
Methods: n/a

Results: n/a

Conclusion: n/a

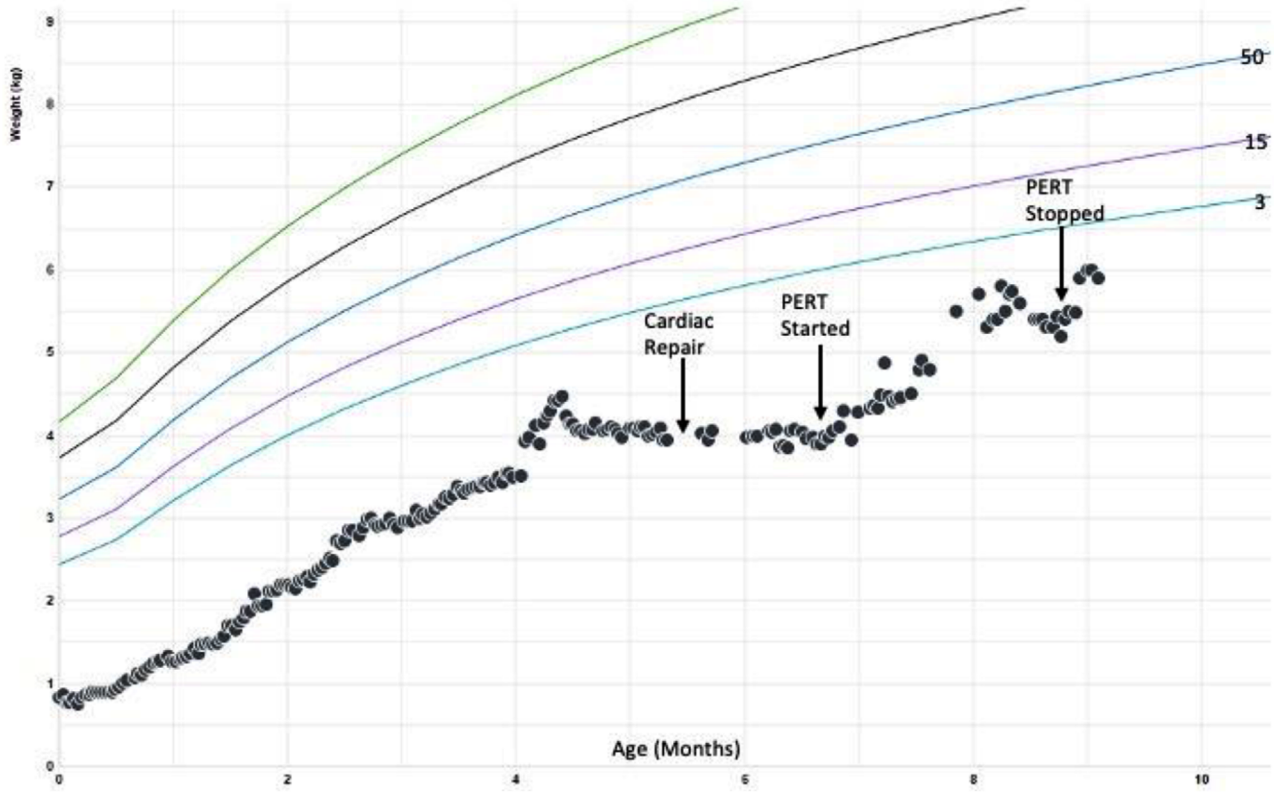
Financial Support: n/a

Figure 1. Laboratory Data and Interventions



Day 1 represents date Cu deficiency identified and corresponds to patient age of 4 months 26 days.
Growth Chart and PERT Intervention

Growth Chart and PERT Intervention



Growth Chart and PERT Interventions plotted on WHO Weight-for-age Percentiles (Girls, birth to 2 years). Data points are not corrected for gestational age.

P141 - Evaluation of ketogenic parenteral nutrition utilization in hospitalized children: A retrospective case series

Ashley Prusakov, PharmD[1]

[1]Nationwide Children's Hospital, Grandview Heights, Ohio

Purpose: Ketogenic parenteral nutrition (PN) accounts for a very small fraction of overall PN utilization. Most institutions have limited or no experience with prescribing ketogenic PN, therefore the purpose of this study was to evaluate the safety and efficacy of initiating this therapy in patients admitted to a large, free-standing pediatric hospital.

Methods: This single-center, retrospective evaluation was approved by the Institutional Review Board. Patients < 19 years of age who received at least 24 hours of ketogenic PN between January 1, 2019 and September 1, 2020 were included. Pertinent demographic data, underlying seizure etiology, fluid and calorie goals, PN duration, macronutrient distribution, concomitant anti-epileptic medications, as well as interpretation of electroencephalograms (EEGs) were gathered. Additionally, all serum beta-hydroxybutyric acid, glucose and triglyceride levels obtained during PN administration were collected. Descriptive statistics were used to summarize the results.

Results: A total of four patients, ranging from 10 months to 12 years of age, were included in the evaluation. Seizure etiology was different in each case and was attributed to a mitochondrial disorder, herpes simplex encephalitis, autoimmune encephalitis and medulloblastoma. Three patients were not on a ketogenic diet prior to starting PN therapy. Patients received PN for a median of four days prior to resuming enteral nutrition. Taking glycerol into consideration, PN formulations ranged from a 1.8:1 to 2.8:1 ratio of grams of fat to grams of protein plus carbohydrate. PN provided a median of 58% of goal calories and 57% of maintenance fluid (Figure 1). Two patients demonstrated a rise in serum beta-hydroxybutyric acid levels. The patient who was on a 3:1 ratio enteral ketogenic formula at baseline had a decrease in beta-hydroxybutyric acid levels once a 1.8:1 ratio PN was initiated (Figure 2). Blood glucose levels were variable between patients during PN administration (Figure 3). One patient demonstrated a 3-fold reduction in their glucose levels between initiation and discontinuation of PN, requiring four dextrose boluses for hypoglycemia. Triglycerides were checked in two patients and resulted at 171 and 521 mg/dL, 30 and 138 hours into PN administration, respectively. In addition to the ketogenic diet, twelve different anti-epileptic medications were collectively administered. EEGs were available for three individuals and remained abnormal throughout the duration of PN therapy.

Conclusion: Ketogenic PN may help maintain or develop ketosis in children. Blood sugar and triglycerides should be closely monitored due to variability in tolerance of the low carbohydrate, high fat diet. Due to parenteral dosing limitations, ketogenic PN cannot provide optimal calories or fluid. Alternative sources of nutrients and hydration must be considered as soon as clinically appropriate to avoid sequelae of malnutrition, particularly in critically-ill pediatric patients.

Financial Support: n/a

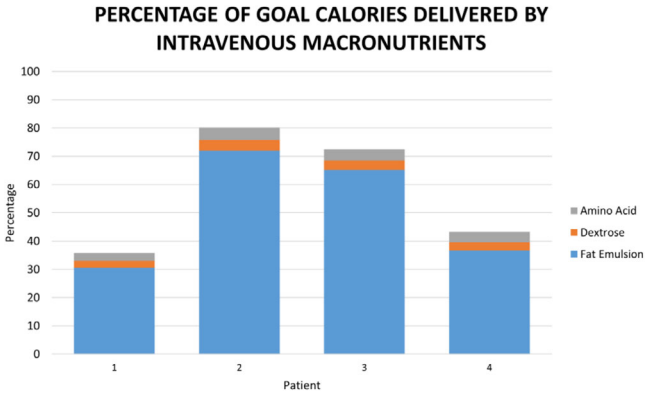
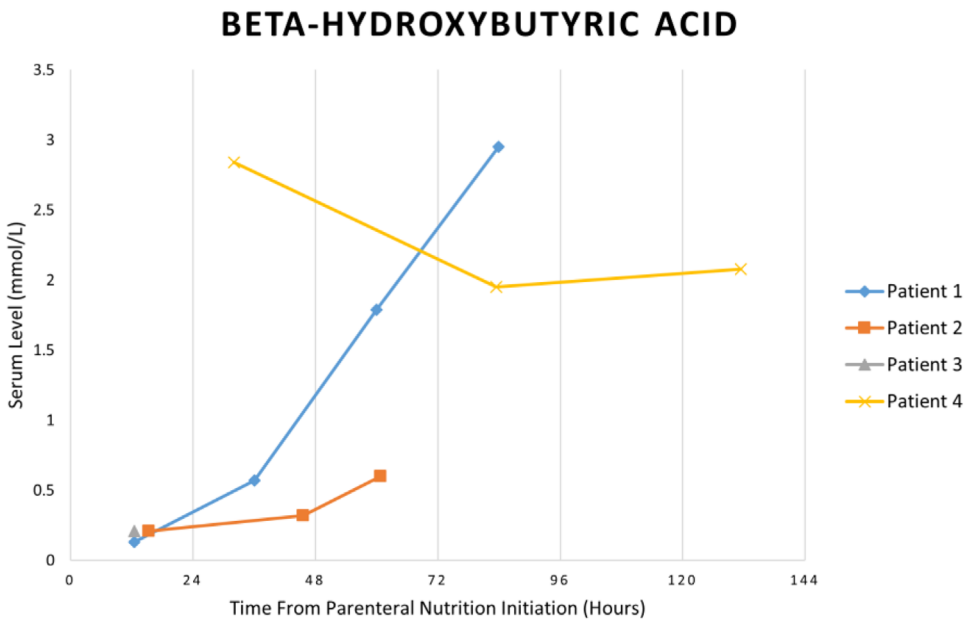


Figure 1. Macronutrient Delivery of Ketogenic Parenteral Nutrition



International Poster of Distinction

P142 - The morbidity associated with gastrojejunal feeding tube use in infants

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Purpose: Purpose: The approach to managing significant reflux in infants is variable. Fundoplication and gastrojejunal tube (GJT) insertion are two common interventions, both with potential risks, particularly in small infants. At our center there is a preference for GJT use, however little is known about the long-term morbidity. The aim of this study is to review outcomes associated with GJT feeding in infants.

Methods: Methods: Following ethics approval (H19-02625) a retrospective review of infants with gastroesophageal reflux, who required conversion of a gastrostomy tube to a GJT (2011-2018) was performed. Baseline characteristics including weight and age at the time of GJT placement, the number of tube changes required, and any tube-related complications were collected. Tube changes and complications were reported per 1000 tube days to normalize variable tube use duration. Kruskal-Wallis test was used to compare variables with P values < 0.05 considered significant.

Results: Results: Of 34 infants with gastroesophageal reflux, 1 (3%) underwent fundoplication and 33 (97%) had GJT placement. 53% of infants with a GJT were male. The median number of comorbidities per patient was 2.5 (IQR, 2–4), with neurologic impairment being most common (n = 27, 79%). The median age at the time of GJT placement was 169 days (IQR,112-240) and median weight was 5.1 kilograms (IQR,4428-6425). All babies received a 16 French tube, and the median tube length was 22 cm (IQR,22-30). Infants used GJTs for a median of 680 days (IQR,174-1257). GJT exchanges were very common with thirty-two infants (94%) requiring at least 1, 18 (53%) requiring ≥5, 10 (29%) requiring >10 and 5 (15%) requiring ≥15 tube changes. Four infants (12%) had intestinal intussusception after tube placement and 26 (77%) experienced at least 1 minor complication (dislodgement, damage or blockage) requiring urgent management. There were no differences in complication rates for infants <6 months or <5 kg at the time of GJT placement (Table 1).

Conclusion: Conclusion: A GJT is a reasonable management strategy for reflux. However, most infants experience minor complications and multiple visits for tube exchange. This should be considered when discussing management options.

Financial Support: n/a

Comparison of gastrojejunal tube use in infants based on weight

Table 1. Comparison of gastrojejunal tube use in infants based on weight

	≤ 5kg (n=16)	> 5kg (n=18)	p value
Gender	M = 9 (56%) F = 7 (44%)	M = 9 (50%) F = 9 (50%)	0.716
GA, weeks	36.0 (32.0-39.0)	36.5 (30.0-39.5)	0.945
Birthweight, kg	2.40 (1.32-3.51)	2.41 (0.93-3.37)	0.704
Total comorbidities	2.5 (2.0-4.0)	2.5 (1.0-3.8)	0.458
Age at GJT insertion, days	98 (82-152)	239 (191-367)	<0.001
Weight at GJT insertion, kg	4.40 (4.00-4.74)	6.42 (5.39-7.14)	<0.001
GJT diameter, Fr	16 (16-16)	16 (16-16)	-
GJT length, cm	22 (22-22)	26 (22-30)	0.043
Total tube days	847 (343-1509)	510 (128-874)	0.317
Tube changes for minor complications /1000 tube days	1.9 (0.0-3.8)	3.5 (1.5-5.9)	0.131
Total tube changes/1000 tube days	8.1 (7.4-11.1)	8.7 (6.9-11.2)	0.849
# patients with tube related intussusception (n, %)	2 (12.5%)	2 (11%)	0.904

Values reported as median (IQR)

P143 - Energy- and Protein-Enriched Formula Improves Weight Gain in Infants with Poor Growth

Praveen Goday, MBBS, CNSC[1]; Jeffery Lewis, MD[2]; Charlie Sang, MD[3]; Donald George, MD[4]; Katherine McGoogan, MD[4]; Anca Safta, MD[5]; Anand Seth, PhD[6]; Caitlin Krekel, MSPH, RD[7]

[1]Pediatric Gastroenterology and Nutrition, Medical College of Wisconsin, Milwaukee, Wisconsin; [2]Children's Center for Digestive Health Care, LLC, Atlanta, Georgia; [3]Pediatric Cardiology, East Carolina Heart Institute, East Carolina University, Greenville, North Carolina; [4]Division of Pediatric Gastroenterology and Nutrition, Nemours Children's Specialty Care, Jacksonville, Florida; [5]Division of Pediatric Gastroenterology, Hepatology, and Nutrition, Department of Pediatrics, Wake Forest University School of Medicine, Winston-Salem, North Carolina; [6]SK Patent Associates, LLC, Dublin, Ohio; [7]Nutricia North America, Rockville, Maryland

Purpose: We aimed to assess safety, tolerability, and improved weight gain with an energy- and protein-enriched formula (EPEF) in infants with poor growth.

Methods: In this open-label, single-arm prospective study, 30 infants aged 1–8 months with poor growth (defined as: weight-for-length (WFL) ≤ -1.0 z-score or weight gain ≤ -2.0 z-score over the previous 4–8 weeks) were enrolled to receive EPEF (1kcal/ 1ml, 2.6g protein/100kcal) for up to 16 weeks. The primary study objective was improvement in weight as measured by change in weight-for-age (WFA) z-score and weight gain velocity (g/day) ≥ median weight gain velocity for age. Secondary study objectives included improvements in WFL, length-for-age (LFA), head circumference (HC)-for-age, and mid-upper-arm-circumference (MUAC)-for-age z-scores, and tolerance to the formula. Repeated measures generalized linear model controlling for site, sex, and type of growth failure was used to test statistical significance.

Results: 26 subjects completed the study per protocol. The primary cause of poor growth was congenital heart disease in 15 subjects, other organic causes in 9 subjects, and non-organic causes in 2 subjects. Mean calorie intake ranged from 120 (± 27) – 129 (± 39) kcal/kg body weight/day over the 16 weeks with >90% of calories coming from study formula at all time points. Weight gain velocity exceeded the WHO median at ≥1 time point for 77% (20/26) of infants and for the overall study period for 62% (16/26) of infants. Mean ± SD WFA z-score improved from -2.92 ± 1.04 at baseline

(n = 26) to -2.01 ± 1.12 at 16 weeks (n = 18, p = 0.0001). Mean ± SD z-scores at baseline and 16-weeks were: -2.06 ± 1.31 and -1.73 ± 1.53 for LFA, -2.02 ± 0.75 and -1.30 ± 0.55 for WFL, -1.50 ± 1.23 and -0.85 ± 1.37 for HC-for-age, and -1.94 ± 1.42 and -0.50 ± 1.09 for MUAC-for-age. Improvements in z-scores were significant at 16 weeks for WFL, HC and MUAC (p = 0.0001) as well as for LFA z-score (p = 0.003). There were no significant differences from baseline in vomiting, fussiness, or number of stools per day. Stool consistency was significantly different from baseline at 2,4, and 16 weeks ($p < 0.05$).Compared to baseline, frequency of spit-up was lower from week 4 to week 16 ($p < 0.04$), flatulence decreased at 16 weeks (p = 0.05), crying decreased at 2 and 16 weeks ($p < 0.02$), and gassiness decreased at 12 and 16 weeks ($p < 0.02$).

Conclusion: This study demonstrates that an EPEF is safe, well-tolerated, and improves weight gain in infants with poor growth.

Financial Support: This study was funded by Nutricia North America, Rockville, Maryland, USA

P144 - Evaluating and improving the turnaround time between indirect calorimetry ordering and obtaining results for patients admitted to the pediatric intensive care unit at Nationwide Children's Hospital.

Theresa Miller, BA, RRT, RCP, AE-C, CPFT[1]

[1]Nationwide Childrens Hospital, Sunbury, Ohio

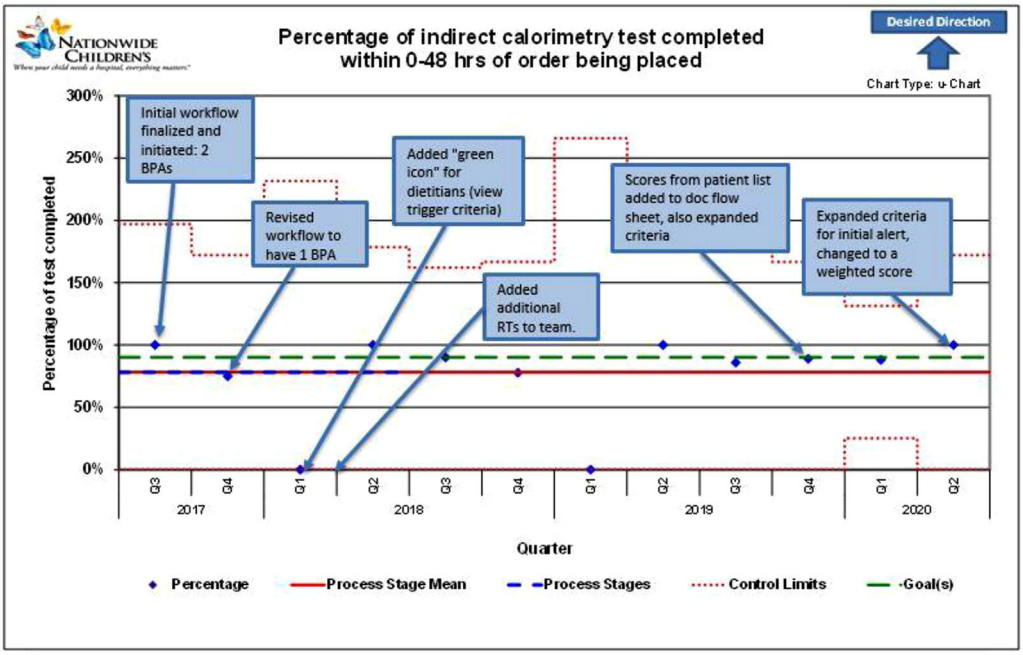
Purpose: In 2016, Nationwide Children's Hospital (NCH) began the process of implementing indirect calorimetry (IC) within the pediatric intensive care unit (PICU). The team consists of Physicians (MD), Dietitians (RD), Respiratory Therapists (RT) and an Epic Systems specialist. Critical illness (burns, sepsis, trauma, etc.) can significantly affect metabolism, an accurate measurement of the resting energy expenditure (REE) can help determine the energy requirements in critically ill patients. IC obtains a precise estimation of REE, which the dietitian uses to determine the initial caloric goal specific to each patient. Overfeeding or underfeeding a critically ill patient can lead to negative outcomes. Underfeeding can lead to muscle loss and poor healing, while overfeeding can compromise ventilator weaning efforts. Our goal within the PICU is to have the REE obtained within 48 hours of an order placed.

Methods: The first step of this quality improvement (QI) project was to submit a data request to the Data Resource Center at NCH. The request included turnaround time (TAT) between indirect calorimetry ordering and obtaining results. After the data was obtained, the date and time that the order was placed was then compared to the date and time the results were uploaded into the NCH electronic charting system. All data was then placed into a traditional QI control chart via an excel sheet. From the control chart we were able to create a p-chart, which was then verified by a member of the NCH QI team.

Results: Initial results showed downward TAT trend for Q4-2017 and Q1-2018. During Q3 and Q4-2017, the team revised the workflow to have only one best practice alert (BPA) to the ordering practitioner. Initially there were two, one that the patient fulfilled criteria and a nutrition consult for a metabolic cart should be ordered and then the second, to order the metabolic cart, if the dietitian approved. In addition, the ordering was changed to alert the dietitians based on admission location, weight and diagnosis criteria and have the dietitians decide if the test should be ordered instead of the practitioner. During Q1 2018, the workflow was again revised to allow the RD to see what criteria the patient met to qualify for a test. The RD was able to see the exact triggers via hovering over a green icon. Also during Q1-2018, three additional RT were added to the team. No workflow changes were made during 2019. During Q1 and Q2-2020 we expanded patient criteria, and our TAT trend remained upward and the criteria was changed to a weighted score. We have been limited in obtaining results due to patient size of < 10kg and by the COVID-19 pandemic.

Conclusion: Working as a multidisciplinary team and providing IC education is essential to meeting and sustaining our TAT goal. Another key component to improvement is continuously reviewing the TAT. In doing this, we are alerted early to any downward trends and intervene as necessary.

Financial Support: n/a



Tests completed	5	6	0	7	9	7	0	3	6	8	22	8
Tests ordered	5	8	3	7	10	9	2	3	7	9	25	8

Project Title: Improving the turnaround time between indirect calorimetry ordering and obtaining results.

Project Leader: Ada Lin MD, Theresa Miller RRT, Teresa Capello RD

Aim

Decrease the number of days between indirect calorimetry order being placed and results obtained, for patients admitted to PICU, from 75% completed in < 48hrs to 90% or greater in < 48hrs, by December 31, 2019 and sustain for 6 months.

Improve timeliness of indirect calorimetry ordering for patients admitted to the PICU.

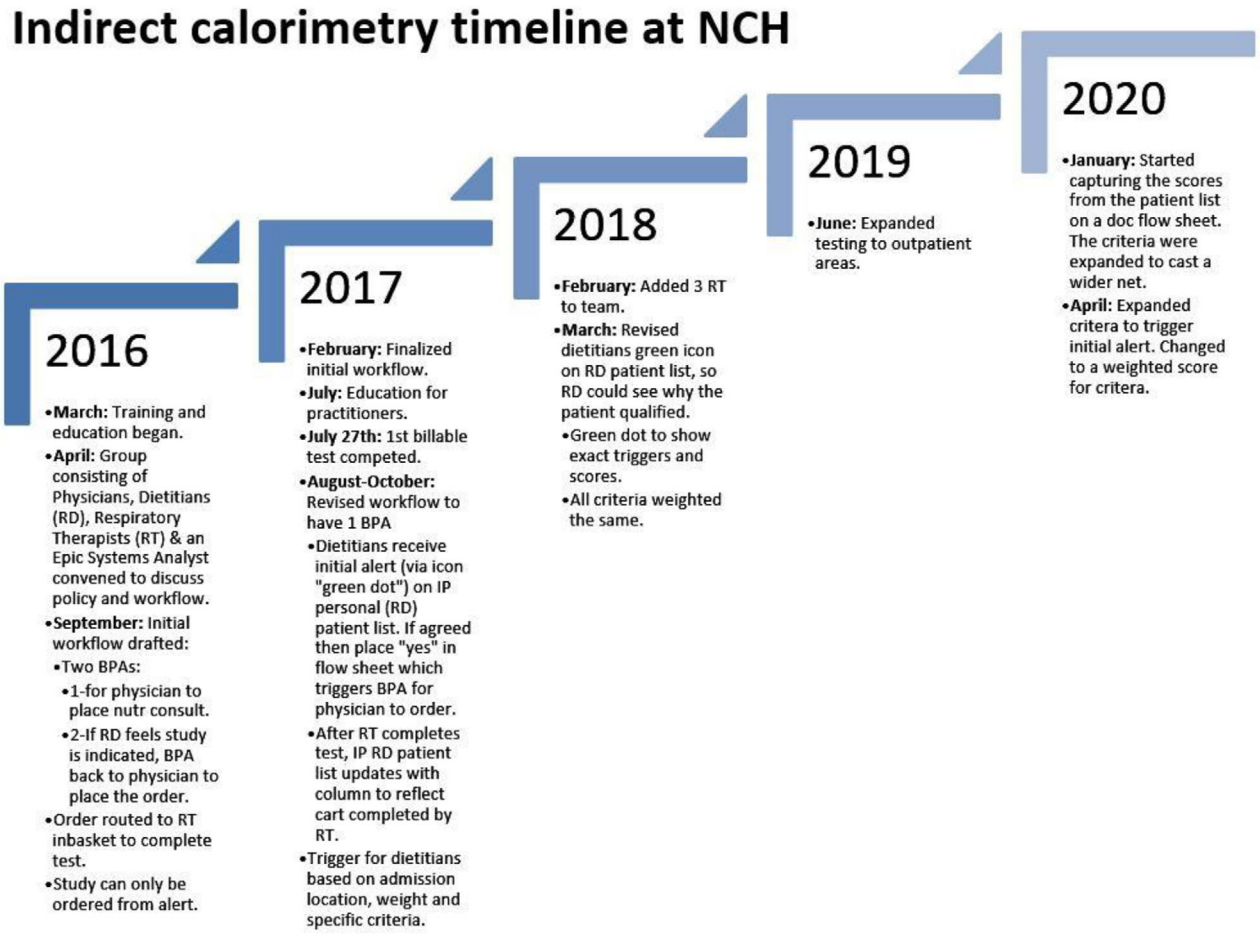
Key Drivers

- Staff Education & Knowledge
- Team Coordination
- System Optimization
- Optimal Patient Care

Interventions

- Enhancement of staff knowledge of process (physicians, RTs, RNs, RDs)
- Schedule lectures/case study presentations for attending physicians and fellows
- Collaborate with admitting team (ED, ICU) to improve timeliness of order
- Collaborate with EPIC team to improve BPA
- Add all data to one Excell (Nutr and RT) – all access.
- Indirect calorimetry report/metric optimization (track data, compare expected vs actual LOS)
- Quiet testing environment
- No patient stimulation during test
- Adequate staff to perform test
- Appropriate supplies available

Key:
Intervention completed
Intervention in progress
Intervention not started



P145 - Assessment and Usage of Pediatric Peptide-based Diets in US Hospitals

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Purpose: Pediatric enteral tube feeding (ETF) is used to help meet nutritional requirements in hospitalized children who otherwise cannot or will not achieve adequate intake. Choice of ETF formula provided to patients may reflect availability at hospital, patient characteristics, medical diagnoses, and product attributes. Pediatric ETF formula options include standard whole protein and peptide-based formulas. Pediatric peptide-based formulas typically contain a hydrolyzed protein source and medium chain triglycerides. The aim of this study was to compare characteristics of pediatric patients receiving a peptide-based (P-ETF) formula with patients receiving standard enteral formula (S-ETF) using real-world evidence.

Methods: This observational, retrospective study using the Premier Healthcare Database examined pediatric patients (age 1–17 years) from October 2015 to October 2019. Patients receiving P-ETF (Peptamen Junior®) or S-ETF for at least 3 days were included. Patients with more than one type of ETF product billed during the same inpatient stay were excluded. Medians (25th and 75th percentiles) were reported for the continuous variables, and percentages were reported for categorical variables. Differences between groups were compared via Wilcoxon rank sum and Chi-square tests, respectively.

Results: A total of 559 patients (173 P-ETF, 386 S-ETF) were included. Overall, median age was 6 years old, with 70% of patients aged 1–13 and 30% aged 14–17. Patients receiving P-ETF and S-ETF differed in composition of race ($p = 0.030$), ethnicity ($p < 0.001$), and type of healthcare coverage ($p = 0.032$). Patients receiving P-ETF were more likely to be female (54%) than patients receiving S-ETF (42%, $p = 0.008$). ETF formula was examined at a total of 21 hospitals (8 P-ETF, 19 S-ETF), with 6 hospitals offering both product types. Most patients (97%) were treated at teaching hospitals, located in urban areas (83%), with greater than 500 patient beds (67%). Overall, admissions were mainly emergency/urgent (84%), although the admission type of patients receiving P-ETF were less likely to be elective (6%) and more likely to be admitted from a trauma center (8%) than S-ETF (12% and 4%, respectively, overall $p = 0.025$). Patients receiving P-ETF were admitted from home (64%) or transfers (36%), and patients receiving S-ETF were 70% from home and 30% transfers ($p = .195$). Across groups, 3M™ All Patient Refined Diagnosis Related Groups severity of illness and

risk of mortality were similar with 30% and 12% of patients, respectively, categorized as extreme. The Charlson Comorbidity index was low with a median of 0 (25th, 75th percentiles: 0,1). Diagnosis of failure to thrive was not statistically different at 17% for patients receiving P-ETF and 22% for S-ETF ($p = 0.154$). Patients receiving P-ETF were less likely to have pneumonia (16%) and more likely to have received treatment for any malignancy (10%) than patients receiving S-ETF (31% and 4%, respectively, Table 1). Malnutrition was listed as a discharge diagnosis in 18% of patients receiving P-ETF and 21% of S-ETF ($p = 0.484$). More mechanically ventilated children received P-ETF (38%) than S-ETF (29%, $p = 0.044$). Overall, patients were largely discharged home (72%) or with home healthcare (10%).

Conclusion: Real-world evidence shows that hospitalized pediatric patients receiving ETF differ in demographic and clinical presentation. In our study, patients receiving P-ETF were more likely to be mechanically ventilated and less likely to have pneumonia; non-statistically significant differences were found in failure to thrive and prevalence of malnutrition. Comparisons of ETF outcomes like costs and length of stay need to consider differences in clinical presentation of patients.

Financial Support: Nestlé Health Science

Table 1. Clinical Characteristics of Patients Receiving P-ETF and S-ETF

Discharge diagnosis or procedure	P-ETF	S-ETF	P-value
Pneumonia	15.6%	30.8%	<0.001
Any malignancy	10.4%	3.9%	0.003
Mechanical ventilation	37.6%	29.0%	0.044
Septicemia	13.9%	7.5%	0.018
Moderate or severe renal disease	3.5%	0.5%	0.007
Congenital malformations of the intestine	1.2%	0.0%	0.034

P146 - Essential Fatty Acid Deficiency in Pediatric Patients with Parenteral Nutrition-Associated Liver Disease Treated with a Fish Oil-based Intravenous Lipid Emulsion as Therapy

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Purpose: Children on prolonged parenteral nutrition (PN) are at risk for developing parenteral nutrition associated liver disease (PNALD). Parenteral fish oil-based lipid emulsion (FOLE) used as monotherapy at a dose of 1 g/kg/day is reported to be safe and efficacious in reversing PNALD and normalizing essential fatty acid deficiency (EFAD). EFAD is typically defined as an elevated triene: tetraene ratio (T: T ratio) based on the laboratory used and reference values provided. Our primary objective is to determine the presence of EFAD in children with PNALD treated with fish oil monotherapy.

Methods: This is a single center retrospective study conducted at the Children's Hospital of Philadelphia (CHOP) from September 2010 to September 2020. Inclusion criteria are as follows: children from birth to 21 years of age, on exclusive PN and FOLE for at least 30 days, PNALD as defined by two conjugated bilirubin levels ≥ 2 mg/dL at least one week apart and had at least one EFA panel obtained during treatment. Patients who did not receive FOLE therapy for at least 30 days or who did not have at least 1 EFA panel performed during treatment were excluded from data review.

Results: Fifty-four patients met inclusion criteria. EFAD was defined as an elevated T: T ratio and/or low linoleic (LA), low alpha-linolenic acid (ALA) or high mead acid (MA) (Table 2). Data review was completed on 29 patients. All patients were dosed at 1 gram/kilogram/day (g/kg/d) of FOLE except for one who was dosed at 1.5g/kg/d. Of this group, 86% initiated FOLE before 1 year of age and 72% had a history of being early preterm (< 33 6/7 weeks of gestation). Treatment duration ranged from 31 days to 3117 days, with some patients currently remaining on treatment. Fourteen percent of our patients had an elevated T: T ratio. Of those with an elevated T: T, 50% were on FOLE with soybean oil fat emulsion (SOFE), 25% were on FOLE alone and had SOFE added, and 25% on FOLE alone without further intervention. Of those with elevated T: T, 100% had normal LA and 25% had elevated MA. One hundred percent of those with elevated T:T during FOLE therapy were born early preterm, 75% extremely low birth weight, 25% very low birth weight with 75% appropriate for gestational age (AGA) and 25% small for gestational age. Initiation of therapy for those with elevated T: T ranged from 66 to 172 days of life, 75% weighed < 5 kg and 25% just over 5 kg with duration of treatment from 55 to 133 days. Sixty-nine percent of all patients had a low LA. Of those with low LA, 21% also had low ALA. Forty-five percent of these patients were given supplemental SOFE to correct what was interpreted as EFAD. (Figure 1)

Conclusion: Parenteral fish oil-based lipid emulsion used as monotherapy at a dose of 1 g/kg/d has been previously reported to be safe and efficacious in normalizing essential fatty acid deficiency. Despite this up to 14% of our population was found to have EFAD diagnosed by an elevated T: T ratio. If other parameters are to be evaluated this was as high as 21% based on a low LA and ALA and up to 69% if considering low levels of LA

alone, although this can arguably be seen in use of FOLE. Our findings highlight the importance of close monitoring of EFA status of infants receiving FOLE. In our cohort, those with identified deficiency were primarily infants with a history of early prematurity, extremely low birth weight and interestingly AGA. This may help us better delineate the subpopulation on which to focus further testing, evaluation and alternative lipid strategy. In addition to T: T ratio, evaluation of entire EFA profile may provide additional useful information for making an earlier diagnosis of EFAD.

Financial Support: n/a

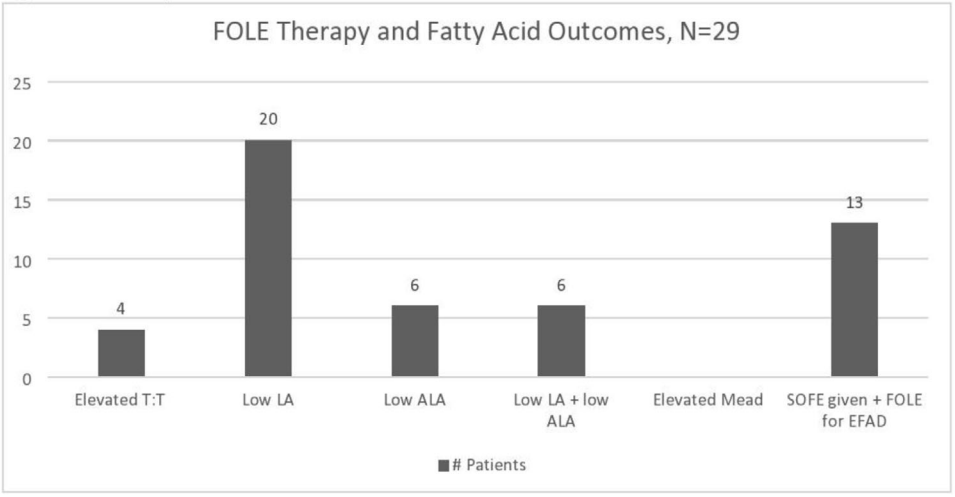
Table 1. Fat Emulsion Compositions

	Intralipid 20%	Omegaven 10%
Calories per mL	2	1.1
Soybean oil	100%	0%
Fish Oil	0%	100%
Linoleic Acid	44-62%	1.5%
Linolenic Acid	4-11%	1.1%
Phytosterols	343 mg/L	0
Vitamin E activity, mg/1000 mL	24	150-300

Table 2. ARUP Laboratories Values Used by CHOP

	Triene-to-Tetraene	Linoleic Acid	Alpha-Linolenic Acid	Mead Acid
1 month- 1 year Chronological age	0.002- 0.046	1240-3890 nmol/mL	20-200 nmol/mL	1-32 nmol/mL
>= 1 year Chronological age	0.004-0.051	1,210-4,300 nmol/mL	20-200 nmol/mL	1-35 nmol/mL

Figure 1. Summary of Results



P147 - Opiate-Induced Constipation in the PICU

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Purpose: Opiate-induced Constipation (OIC) is a well-known and well-documented phenomenon in patients with chronic opiate requirements. However, it is not as well understood in the pediatric intensive care unit (PICU) setting with significant variation in reported incidence, ranging 15–83%. Currently, literature regarding constipation in critically ill children is limited. No literature specifically evaluates the incidence of OIC for children admitted to the PICU. The primary aim of this study was to determine the incidence of OIC in the PICU and to determine whether it is associated with a higher rate of morbidities or prolonged length of stay.

Methods: We conducted a single center retrospective chart review from July 1, 2014 to June 30, 2015. We included patients younger than 18 years of age with a PICU stay of at least 96 hours who received any opioids or opiates (hereafter collectively referred to as opiates) during their PICU stay. We collected dose, route, and duration of all opiates administered during the PICU stay from the electronic medical record. We reviewed

the electronic medical record to determine the presence of constipation. Constipation was defined as the inability of the bowel to pass stool due to impaired peristalsis or paralysis with clinical signs including absence of stool for twenty-four or more consecutive hours without mechanical obstruction. We obtained demographic and clinical data from Virtual PICU Systems (VPS) including age, weight, race, gender, admitting diagnosis, PICU length of stay (LOS), and severity of illness measures. VPS is an international registry that supports a collaborative community of pediatric critical care colleagues dedicated to standardized data sharing for research, improved patient care, and benchmarking among pediatric ICUs.
To assess for differences between the constipation and non-constipation groups, we analyzed categorical data using the chi-square test of proportions and non-normally distributed continuous data using the Mann-Whitney U test. We performed multivariable logistic regression analysis to adjust for confounding factors.

Results: We identified 94 patients who met the study inclusion criteria. Of these, 37 (39.4%) developed constipation during their PICU stay. Patients with constipation tended to be older ($p = 0.06$) and were noted to weigh more ($p = 0.03$). Constipation rates did not differ by gender, race, or severity of illness. We found that there was no significant difference in the total dose, daily dose, duration of opioid treatment, or mode of administration (enteral vs. parenteral) between the group with constipation and the group without constipation. We noted a higher incidence of constipation in the patients who were admitted for neurological issues, or after trauma or abdominal surgery than other admitting diagnostic categories ($p = 0.002$). Patients with constipation had longer LOS than patients without constipation [11.5 (5.9-17.9) vs. 7.8 (5.7-13.2) days, reported as median (Interquartile Range)], but the difference was not statistically significant.

Conclusion: These results indicate that opiate use alone is not a sole risk factor for constipation in the PICU setting. Further research is needed to determine additional risk factors especially in the subgroup populations listed above.

Financial Support: n/a

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Publication: Pauline ML, Nation PN, Wizzard PR, Hinchliffe T, Wu T, Dimitriadou V, Turner JM, Wales PW. Comparing the Intestinotrophic Effects of 2 Glucagon-Like Peptide-2 Analogues in the Treatment of Short-Bowel Syndrome in Neonatal Piglets. JPEN J Parenter Enteral Nutr. 2020 May. https://doi.org/10.1002/jpen.1853

P148 - Comparing the pharmacokinetic profiles and intestinotrophic effects of two glucagon like peptide-2 analogues in the treatment of short bowel syndrome studied in neonatal piglets

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[1]University of Alberta, St. Albert, Alberta; [2]University of Alberta, Edmonton, Alberta; [3]Shanghai Medical College, Fudan, Shanghai; [4]Vectivbio, Montreal, Quebec; [5]Sick Kids/ University of Toronto, Toronto, Ontario

Purpose: Background: A priority goal in treating short bowel syndrome (SBS), is autonomy from parenteral nutrition (PN). This relies upon intestinal adaptation, which can be augmented by glucagon like peptide-2 (GLP-2) analogues. In neonatal piglets with SBS, we compared intestinal adaptation following treatment with two GLP-2 analogues: teduglutide (TED) and apraglutide (APRA).

Methods: Methods: Following 75% distal small intestinal resection, neonatal piglets receiving 20% EN were allocated to four treatments by subcutaneous injection: daily saline (CON: $n = 8$), twice weekly APRA (5mg/kg/dose; $n = 8$) and teduglutide once daily (TED, 0.05mg/kg/dose; $n = 8$) or twice daily (TEDBID, 0.05mg/kg/dose; $n = 7$). Pharmacokinetic studies were undertaken and on day 7, small intestinal length and weight were measured and jejunal tissue collected for histology.

Results: Results: Pharmacokinetic profiles were different between the two analogues. To achieve a comparable exposure to apraglutide, teduglutide requires twice daily injection (TEDBID). Compared to saline, APRA and TEDBID increased small bowel length (cm) [CON: 141, APRA: 166, TED: 153, TEDBID: 165; $p = 0.004$], while APRA increased small bowel weight (g) [CON: 26, APRA: 33, TED: 28, TEDBID: 31; $p = 0.007$] and villus height (mm) [CON: 0.59, APRA: 0.90, TED: 0.58, TEDBID: 0.74; $p < 0.001$].

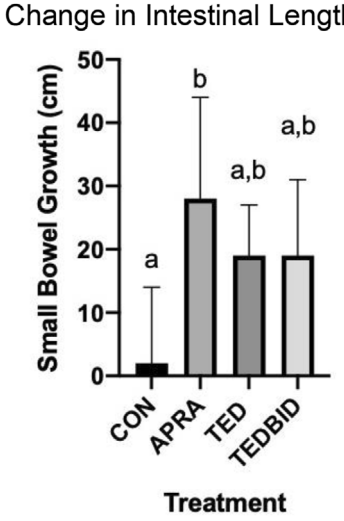
Conclusion: Conclusion: Apraglutide injected only twice during the 7 consecutive days demonstrated a superior intestinotrophic effect compared to teduglutide injected once daily. Even at more comparable drug exposure, when teduglutide was injected twice a day, apraglutide showed superior trophic activity at the mucosal level. This is highly relevant for the treatment of pediatric SBS given the markedly lower dose frequency by subcutaneous injection of apraglutide.

Financial Support: VectivBio AG

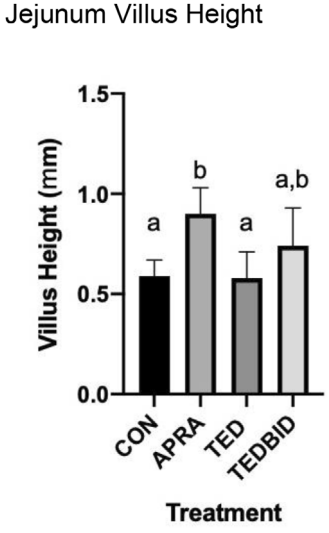
Table 1. Structural Adaptation

	CON n=8	APRA n=8	TED n=8	TEDBID n=7	ANOVA p value
Baseline SBL (cm)	559(40)	553(54)	520(68)	588(26)	0.097
Remnant SBL (cm)	139(10)	138(14)	134(13)	147(6)	0.209
End SBL	141(15)[a]	166(14)[b]	153(13)[a,b]	165(13)[b]	0.004
SB weight (g)	26(3)[a]	33(6)[b]	28(3)[a,b]	31(2)[a,b]	0.007
SB weight (g/kg)	11.0(1.2)[a]	14.8(2.4)[b]	12.6(1.3)[a]	12.8(0.6)[a,b]	0.001
Jej weight(g/cm)	0.10(0.02)[a]	0.13(0.03)[b]	0.11(0.03)[a,b]	0.11(0.01)[a,b]	0.030
Villus height (mm)	0.59(0.08)[a]	0.90(0.13)[b]	0.58(0.13)[a]	0.74(0.19)[a,b]	0.000
Crypt depth (mm)	0.16(0.34)	0.15(0.14)	0.16(0.19)	0.14(0.17)	0.421

Data is the mean and (standard deviation). CON: saline; APRA: 5mg/kg apraglutide twice weekly; TED: 0.05 mg/kg daily teduglutide; TEDBID: 0.05 mg/kg teduglutide twice daily. Superscripts denote post hoc tukey significant differences. Jej, jejunum; SB, small bowel; SBL, small bowel length.
Change in Intestinal Length



The linear growth of the small bowel (cm) between GLP-2 analogue treatment groups are presented. CON: saline; APRA: 5mg/kg apraglutide twice weekly; TED: 0.05 mg/kg daily teduglutide; TEDBID: 0.05 mg/kg teduglutide twice daily. A and B superscripts denote post hoc tukey significant differences.
Jejunum Villus Height



The mean villus height of jejunum (mm) between GLP-2 analogue treatment groups are presented. CON: saline; APRA: 5mg/kg apraglutide twice weekly; TED: 0.05 mg/kg daily teduglutide; TEDBID: 0.05 mg/kg teduglutide twice daily. A and B superscripts denote post hoc Tukey significant differences.

P149 - Essential Fatty Acid Deficiency in Infants Receiving a Composite Lipid Emulsion at Recommended Dosing

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[1]Children's Hospital of Philadelphia, Philadelphia, Pennsylvania

Purpose: Use of a soy, MCT, olive, and fish oil-based composite lipid emulsion (CLE) remains a relatively novel therapy in the US, especially in pediatric patients where it is not yet FDA approved. Prevalence of essential fatty acid deficiency (EFAD) with use of CLE is unknown, but prior reports have shown that, if present, EFAD is often secondary to inadequate dosing and most often resolves when the dose of CLE is increased to provide the minimum published requirements for linoleic acid (LA) and alpha-linolenic acid (ALA) (2-3g/kg/day of CLE for both term and preterm infants). EFAD is classically defined as an elevated Triene:Tetraene (T:T) ratio with the exact reference range varying by the method of extraction. However, evaluation of an essential fatty acid (EFA) panel including T:T ratio, LA, ALA, and mead acid (MA) may lead to the identification of early trends and guide care of individual patients. Addressing nutritional deficits, such as EFAD, is fundamental for pediatric patients to support growth and decrease morbidity and mortality. The primary aim of this study was to identify if EFAD occurred in critically ill infants despite the provision of CLE at recommended doses. Secondarily, we aimed to better define EFAD and identify early signs of or trends toward EFAD.

Methods: This is a single-center retrospective chart review conducted at the Children's Hospital of Philadelphia (CHOP). Inclusion criteria were as follows: infants admitted to CHOP from January 2020 to August 2020, who received parenteral nutrition (PN) and CLE SMOFlipid® for at least 30 days and had at least one EFA panel drawn while on the CLE. EFAD was defined as an elevated T:T ratio and/or low LA, low ALA, or elevated MA. Patients who did not receive CLE therapy for at least 30 days, were receiving CLE and an adjunct or who did not have at least one EFA panel performed during treatment were excluded.

Results: Of the 152 inpatients that received CLE during the time frame, 27 patients ranging in age from 1 day to 10 months met inclusion criteria and were reviewed. These patients are characterized in Table 1. Twelve patients (44%) had an abnormal EFA panel. Of these 12 patients, 67% (8/12) had abnormal EFA panels despite receiving greater or equal to 2.5g/kg/d of CLE for at least 2 weeks before the lab draw. Of those subjects with abnormal EFA panels, 75% (9/12) had received CLE for a minimum of 2 weeks without any enteral feeds. These subjects and the context of the EFA deficiency are characterized further in Table 2. Interestingly, 67% (6/9) had elevated T:T ratios, but low LA was seen in all 9 subjects. All infants who had abnormal EFA panels were born prematurely (24 5/7 -33 4/7 weeks gestational age) and were low birth weight (LBW) with the majority of birthweights less than 1500g.

Conclusion: EFAD was noted in infants on PN with CLE, including those who received the recommended dosing. Prematurity, critical illness, and other clinical factors may increase the EFA requirements in infants, particularly in those with very low birth weight (VLBW). Our findings highlight the importance of close monitoring of the EFA status of infants receiving CLE, even when recommended dosing is provided. Additionally in our cohort, those with identified deficiency were LBW premature infants, highlighting the need for further research to define optimal dosing of CLE in preterm infants. Knowing this may help delineate the subpopulation which needs further testing and evaluation. Furthermore, in addition to T:T ratio, obtaining a full EFA profile may provide additional useful information for making an earlier.

Financial Support: n/a

Table 1

Characteristic	Mean	Min	Max	n	%
Sex Male Female				 16 11	 59 41
Gestational age at birth	34 weeks 6/7 days	24 weeks 1/7 days	37 weeks 2/7 days		
Birth weight	1.78 kg	0.625 kg	4.09 kg		
Age at time of CLE initiation	2.1 months of age	Day of life 1	10.1 months of age		
Weight at time of CLE initiation	3.12 kg	0.76 kg	9 kg		
Maximum CLE Dosage	2.6g/kg	1g/kg	3.3g/kg		

Table 1: Comparison of Characteristics of Patients <1 Year of Age Receiving CLE at the Children's Hospital of Philadelphia from January 2020 to August 2020 with EFA Panel Results

Comparison of Characteristics of Patients <1 Year of Age Receiving CLE at the Children's Hospital of Philadelphia from January 2020 to August 2020 with EFA Panel Results

Table 2

	Sex	Gestational age at birth	Birth weight	Primary Diagnoses	Dosing Weight at time of CLE Initiation	Abnormal EFA Panel Timing	T:T Ratio *Reference Range for 1 month-1 year (chronological age): 0.002- 0.046*[1]	Linoleic Acid Level (nmol/mL) *Reference Range for 1 month-1 year (chronological age): 1240-3890 nmol/mL*[1]	Alpha-linolenic Acid Level (nmol/mL) *Reference Range for 1 month-1 year (chronological age): 20-200nmol/mL*[1]	Mead Acid Level (nmol/mL) *Reference Range for 1 month-1 year (chronological age): 1-32nmol/mL*[1]	Was Patient Receiving Minimum Recommended CLE Dose?	Was CLE Dosage Adjusted in Response to abnormal EFA Panel?	Was a Repeat EFA Panel Obtained While Still Receiving CLE?
1	Male	33 weeks 1/7 days	1.45kg	Congenital diapragmatic hernia (CDH)	1.5kg	Day 16 of 3g/kg of CLE	0.023	999 (L)	32	7	Yes	No	No
2	Female	31 weeks 4/7 days	1.332kg	Volvulus	2.4kg	Day 25 of 2g/kg of CLE	0.053 (H)	925 (L)	25	19	Yes	Yes	No
3	Female	27 weeks 2/7 days	1.24kg	Congenital tracheoesophageal fistula, esophageal atresia and stenosis	1.2kg	Day 33 of 3g/kg of CLE	0.112 (H)	820 (L)	30	21	Yes	Yes	No
4	Female	25 weeks 3/7 days	0.76kg	Patent ductas arteriosus (PDA), prematurity	0.76kg	Day 45 of 3g/kg of CLE	0.089 (H)	843 (L)	38	24	Yes	No	No
5	Male	26 weeks 2/7 days	1.205kg	Glucose-6-phosphate dehydrogenase (G6PD) deficiency, malrotation, Prune Belly syndrome	1kg	Day 30 of 3g/kg of CLE	0.067 (H)	1114 (L)	29	22	Yes	Yes	Yes; T:T ratio normalized and linoleic acid remained low, but improved
6	Male	24 weeks 5/7 days	0.79kg	Spontaneous intestinal perforation	0.79kg	Day 27 of 3g/kg of CLE	0.06 (H)	1095 (L)	53	14	Yes	No	No
7	Male	32 weeks 1/7 days	1.2kg	Perforation of colon status-post end ileostomy, mucous fistula, and Hartmann's pouch	1.2kg	Day 26 of 2g/kg of CLE	0.069 (H)	1040 (L)	45	16	Yes	Yes	No
8	Male	33 weeks 4/7 days	2.29kg	In-utero volvulus	2.3kg	Day 34 of 2.5g/kg of CLE	0.018	991 (L)	32	4	Yes	No	Yes; linoleic acid level normalized
9	Male	25 weeks 3/7 days	0.673kg	Septic shock due to presumed necrotizing enterocolisitis (NEC) with perforation	0.8kg	Day 33 of 3g/kg of CLE	0.038	1048 (L)	39	8	Yes	Yes	No

Table 2: Characterization of Patients <1 Year of Age Receiving CLE for a Minimum of 2 Weeks, Without Enteral Feeds, and With an Abnormal EFA Panel at the Children's Hospital of Philadelphia from January 2020 to August 2020

1. Fatty Acids Profile, Essential Serum or Plasma. ARUP Laboratories. https://ltd.aruplab.com/Tests/Pub/2013518. Published 2020. Accessed September 30, 2020.

Characterization of Patients <1 Year of Age Receiving CLE for a Minimum of 2 Weeks, Without Enteral Feeds, and With an Abnormal EFA Panel at the Children's Hospital of Philadelphia from January 2020 to August 2020

P150 - Growth of Preterm Infants Fed New Bovine-Based Human Milk Fortifier

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Purpose: All human milk should be fortified with protein and minerals to ensure optimal nutrition for preterm infants. Several human milk fortifiers (HMFs) exist with neonatal intensive care units (NICUs) using products to achieve extra-uterine growth. Preterm neonates often experience poor linear growth and protein modulars are necessary. The primary objective of this retrospective, observational study was to assess weight, length, and blood urea nitrogen (BUN) trends in NICU patients receiving human milk fortified with a concentrated liquid fortifier (CL-HMF) compared to those receiving a hydrolyzed protein concentrated liquid fortifier (HPCL-HMF) with increased protein. The secondary objective was to investigate if the provision of a protein modular decreased with the transition to HPCL-HMF.

Methods: A convenience sample of 155 patients admitted to a level III NICU was utilized. Eligible infants were identified from the electronic medical records (EMRs) of all preterm neonates born less than 1500 grams or 33 weeks gestation admitted between January 2017 and January 2018 and March 2018 and March 2019. Infants in the first group received CL-HMF as standard practice, while the second group received HPCL-HMF as

standard of care. Study day 1 was defined as the first day of full fortification with a primary study period between study days 1–14, though study days 15–28 were examined. Anthropometrics, BUN, mean calorie and protein intake, and modular use were assessed during the 28-day study period.

Results: A total of 155 patients were included with 85 infants in the CL-HMF group and 70 infants in the HPCL-HMF group. No significant differences in sex, size at birth, or type of feeding (Maternal or donor breast milk) were noted; however, infants in the HPCL-HMF group had lower Olsen weight percentiles (47th vs 58th, $p = 0.04$) and length percentiles (43rd vs 53rd, $p = 0.02$) at birth. There were no differences in mean enteral volume, calorie, or protein from fortified milk intake. The HPCL-HMF group had higher Olsen length percentiles at study day 1 (30th vs 0, $p< 0.001$), 15 (20th vs 10th, $p = 0.001$), 22 (17th vs 1st, $p = 0.01$), and 29 (12th vs 10th, $p = 0.02$) and higher BUN levels at study day 1 (17.7 vs 13.1, $p = 0.003$), 15 (13.5 vs 9.7, $p = 0.02$), 22 (11.5 vs 9.0, $p = 0.03$), and 29 (11.8 vs 8.2, $p = 0.003$). No difference in linear growth velocity was noted. Infants in the HPCL-HMF group were less likely to receive liquid protein (17% vs 76%, $p< 0.001$) and received the modular for fewer days (12.8 vs 18.7, $p = -0.006$)) and at smaller daily volumes (6.6 vs 8.3 mL/day, $p< 0.01$).

Conclusion: No consensus exists for which HMF best supports infant growth. While the HPCL-HMF group had higher Olsen length percentiles at study days 1, 15, 22, and 29, no differences in linear growth velocity were identified. The higher length percentiles in the HPCL-HMF group are encouraging as this group was smaller at birth. Furthermore, use of the protein modular decreased in the HPCL-HMF group and these infants continued to plot higher on the Olsen growth curve with regard to length. The transition in fortifier type may have hospital formulary and cost-savings implications.

Financial Support: n/a

P151 - Use of the Pediatric Nutrition Screening Tool in Clinical Practice at Boston Children's Hospital.

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Purpose: Hospitalized pediatric patients are at high risk of undernutrition. Screening for presence of or risk for undernutrition on admission can help identify patients who would benefit from early nutrition intervention. In the spring of 2018, Boston Children's Hospital (BCH) replaced an institutional-specific screening tool with a validated nutrition screening tool, the Pediatric Nutrition Screening Tool (PNST), to improve quality of nutrition screening on admission. In May 2019, completion of the PNST became a mandatory requirement to successfully complete the nursing admission assessment. The aim of this quality improvement project was to determine the effect of this requirement on PNST completion rates and association of PNST score with undernutrition in clinical practice.

Methods: The initial period of observation was January 22 to May 27, 2019, while May 28, 2019 to February 6, 2020 reflected the PNST mandatory requirement. We identified three 3 pilot inpatient services (Cardiology, Surgical Services, and Gastroenterology) with high rates of undernutrition. We excluded term infants < 30 days old, preterm infants < 1 month of corrected age, and PNST results completed > 24 hours after admission. Data were obtained through BCH's electronic database warehouse. PNST score was calculated as the number of "yes" responses to each of the four questions. PNST score of ≥ 2 was considered a positive screen for undernutrition. For those with PNST score ≥ 2, diagnosis and degree of undernutrition were obtained by chart review from the registered dietitian initial consultation per routine clinical practice. Chi-square, Kruskal-Wallis, and multiple logistic regression were used as appropriate.

Results: A total of 4362 admissions representing 3444 unique patients occurred in the 3 pilot services (Cardiology 26%, Surgical Services 64%, and Gastroenterology 10%). PNST completion rate was 47% during the initial period and increased to 98% during the mandatory period ($P< 0.0001$). For those with PNST completed, the percent of patients with positive PNST increased modestly from 5.4% in the initial period to 7.8% in the mandatory period ($P = 0.04$). The percent of patients with positive PNST out of total admissions increased by 5.2%, identifying 165 more patients out of 3177 admissions during the mandatory period than would have been predicted by extrapolating initial rates. Among all patients with PNST score ≥ 2, mean weight for length z-score for those < 2 years old was -1.28 ± 1.16, body mass index (BMI) z-score for those 2–18 years was -0.84 ± 1.75, and BMI for those > 18 years was 21.3 ± 6.5 kg/m2. Patients with positive PNST were admitted 2 days longer than those not at risk [3.7 (1.8, 7.0) vs. 1.7 (1.2, 3.3) days, $P< 0.001$]. During the PNST mandatory period, a patient who was at risk by PNST was 6.6 times more likely to be diagnosed by a registered dietitian with moderate to severe undernutrition than without undernutrition ($P< 0.001$). Among those with positive PNST, a higher PNST score was associated with worsening severity of undernutrition (Figure 1; $P = 0.03$ for trend). For example, 47% of those with a score of 4 were severely malnourished compared to only 20% with score of 2. Severity of undernutrition did not differ based on which question was answered affirmatively (Figure 2, $P = 0.47$).

Conclusion: Implementing mandatory use of PNST significantly increased rates of nutrition screening, and thereby substantially increased the number of total admissions identified as at risk for malnutrition. Within the pilot floors at our institution, positive PNST was predictive of the diagnosis of malnutrition, and increasing PNST score was associated with worsening severity of malnutrition.

Financial Support: Support was provider by the Payor-Provider Quality Initiative at Boston Children's Hospital.

Figure 1: Severity of Undernutrition Diagnosis Based on PNST Risk Score, in Those with Score ≥ 2

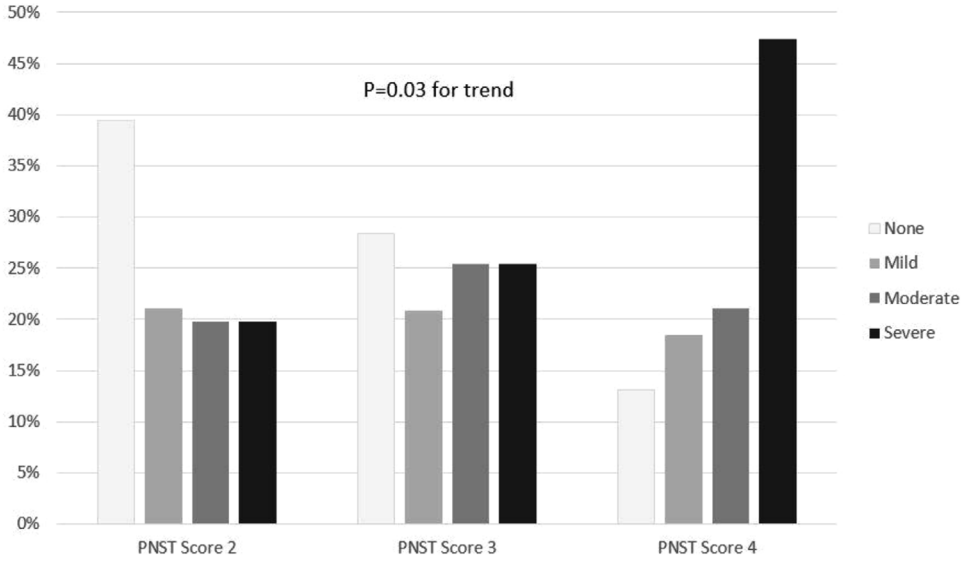
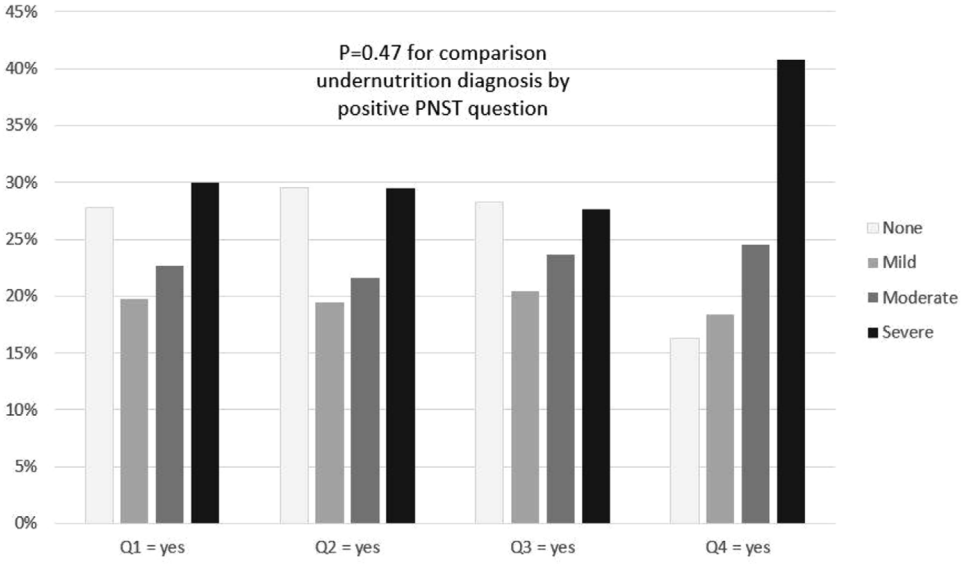


Figure 2: Severity of Undernutrition Diagnosis Based on PNST Risk Question, in those with Score ≥ 2



P152 - Catheter salvage from catheter related blood stream infections in pediatric intestinal failure

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Purpose: Intestinal failure (IF) patients require central venous access to provide life-preserving parenteral nutrition . Central venous access is associated with a high infection risk with a wide range of organisms implicated in catheter related blood stream infections (CRBSIs). Interventions to address CRBSIs include central line removal and replacement versus catheter salvage from infection. Literature is scare about factors predicting catheter salvage attempts and their outcomes in this population.

Methods: This was a retrospective cohort study from 2012–2020 in 2 pediatric tertiary medical centers with intestinal rehabilitation (IR) teams. Primary outcome measures were factors predicting catheter salvage attempts. Secondary outcomes included consequences of salvage attempts.

Results: A total of 45 patients were reviewed and 67 CRBSI were observed over the study period. Patients had mostly neonatal surgical conditions (gastroschisis, atresia, necrotizing enterocolitis). The cohort had 1.9 CRBSI per 1000 catheter days with about 50% patients experiencing no CRBSI. The majority of CRBSIs occurred in the ambulatory setting. The most utilized delivery device was a tunneled single lumen silicone catheter.

Catheter salvage from infection was significantly more likely to be attempted if the IR team was the primary admitting service (80% vs 20%, p = 0.01). Infectious disease consult did not predict whether a salvage would be attempted. No difference between groups (successful salvage, failed salvage and no salvage attempt) was noted in the 30-day repeat infection, hospital readmission or mortality rates. A significantly shorter length of hospital stay was noted with successful salvage attempts. Successful salvage was achieved in 88% of all attempts (91% single bacterial infections, 67% yeast infections, and 67% polymicrobial infections).

Conclusion: The direct involvement of IR teams in managing CRBSIs in IF patients was associated with higher rate of salvage attempts from infection. High success salvage rates were achieved across different microbial groups with highest success in single bacterial CRBSIs. Salvage attempts were not associated with increased rates of repeat infection, hospital readmission or mortality within 30 days of the initial CRBSI. These findings support direct participation of IR teams in decision making regarding catheter salvage in IF patients with hope of preserving central venous access.

Financial Support: n/a

P153 - Association between admission body mass index and outcomes in critically ill children: A systematic review and meta-analysis

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Purpose: The impact of nutritional status on admission to the pediatric intensive care unit (PICU) on clinical outcomes remains unclear. We conducted a systematic review with the aim to summarize the overall impact of PICU admission body mass index (BMI) on outcomes of critically ill children.

Methods: We searched the following medical databases from inception through May 2020: PubMed, Excerpta Medica database (Embase), Cumulative Index of Nursing and Allied Health Literature (CINAHL), Cochrane Library, and Web of Science. Studies on patients ≤18 years old admitted to a PICU that investigated the effect of BMI on mortality, PICU or hospital length of stay (LOS), or duration of mechanical ventilation (MV) were included. Underweight, overweight, and obese groups were defined based on each study's criteria.

Results: There was a total of 21558 patients from 20 included studies. 12936 (60.0%), 2965 (13.8%), 2182 (10.1%), 3348 (15.5%) were normal weight, underweight, overweight, and obese patients, respectively. There were 14 studies with mixed PICU patient cohorts, three studies with specialized surgical cohorts (congenital heart disease and liver transplantation), and three studies with specialized medical cohorts (burns, extracorporeal membrane oxygenation, oncology patients). Pooling from all studies, mortality odds were not increased in underweight [Odds ratio (OR) 1.32, 95% confidence interval (CI) 0.89-1.98; p = 0.171)] and overweight/obese patients (OR 1.10, 95% CI 0.86-1.42; p = 0.446), relative to normal weight patients. There was no difference in duration of MV, PICU and hospital LOS between all three weight categories. Sensitivity analysis including only studies that applied BMI z-scores in nutritional classification (n = 5) revealed that underweight patients had higher mortality odds compared to normal weight patients (OR 1.61, 95% CI 1.35-1.92; p < 0.001), while studies applying BMI percentiles instead did not show any differences in mortality between the weight groups. Limiting to 1681 patients across studies comprised of mixed PICU cohorts, excluding specialized cohorts (e.g., congenital heart surgeries, burns) (n = 6), underweight patients had an increased odds of mortality compared to normal weight patients (OR 1.33, 95% CI 1.06-1.67; p = 0.012).

Conclusion: Our systematic review did not reveal any association between PICU admission BMI status and outcomes in critically ill children. Given the heterogeneity of studies (i.e., variations in BMI definitions and patient cohorts across included studies), further investigation with standardized nutritional status classification on admission, stratified by patient subgroups, will be needed to clarify the association between nutritional status and clinical outcomes of PICU patients.

Financial Support: This research was supported by the AM-ETHOS Duke-NUS Medical Student Fellowship Award grant from Singhealth (am-ethos01/fy2020/04-a04).

P154 - Linear Growth as a Predictor of Successful Respiratory Support Weaning in Infants with Bronchopulmonary Dysplasia

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Purpose: Postnatal linear growth failure is common among very low birth weight (VLBW) infants and infants with bronchopulmonary dysplasia (BPD). Clinical researchers have previously noted a correlation between linear growth and lung development. Weaning respiratory support too early can lead to consequences such as atelectasis and further lung injury in attempts to recruit the lung. Delaying weaning can potentially lead to further lung injury and adversely affect neurodevelopment. Our institution does not have sophisticated pulmonary function testing that would allow for BPD phenotyping and guidance for respiratory weaning. Thus, we needed to identify economical and more common approaches to identifying factors and tools that lead to great weaning success. The purpose of this study was to identify a growth marker that would help predict the

ability to wean infants with BPD from their respiratory support. We tested the hypothesis that an improvement in linear growth in infants with BPD would herald improvement in lung growth, and therefore predict an ability to wean respiratory support.

Methods: A single center retrospective chart review was completed of VLBW infants with BPD from 2016–2020. BPD was diagnosed in infants who required supplemental oxygen at a postmenstrual age of thirty-six weeks. Exclusion criteria consisted of deceased and transferred infants. There were sixty-six infants included in the study. Charts were reviewed for length Z score each week, direction of length Z score change (sustained, increased, or decreased), and for failure to wean respiratory support. Failure to wean support was defined as the requirement to return to the previous baseline level of support. Clinical management of respiratory and nutritional care varied by physician during the time of this review. Pearson correlation analyses were used to assess associations among continuous variables at baseline. Several variables were developed to examine changes over time, including total Z score change across assessments, direction of change, and total fails.

Results: Of the sixty-six infants, the number of weaning failures ranged from zero to five times. The mean number of wean fails was one. The birth length Z scores ranged from -5.6 to 2.8, with a mean of -0.64. The birth gestational age mean was 26.5 weeks. As the birth gestational age was greater, the total number of fails was less ($p < .01$). As the direction of the length Z score over time was positive, the cumulative Z score change over time was less ($p < .05$). As direction of length Z score change over time was positive, the total number of weaning fails was fewer ($p < .01$).

Conclusion: Aggressive respiratory weaning prior to sufficient linear growth may lead to respiratory weaning failure in patients with BPD. Monitoring for improved linear growth provides a practical tool for triggering a trial of respiratory weaning in an institution where pulmonary function testing for phenotyping is not available. This practice also provides a focus for nutritional improvement when linear growth is not adequate.

Financial Support: n/a

P155 - Cost-effectiveness analysis of ethanol lock prophylaxis in the prevention of central line-associated bloodstream infections in children with intestinal failure in the United States

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Purpose: Central line-associated bloodstream infections (CLABSIs) lead to significant morbidity and mortality in children with intestinal failure. Ethanol lock prophylaxis greatly reduces CLABSI frequency with minimal reported side effects. However, a recently approved orphan drug designation for dehydrated alcohol has greatly increased the cost of 70% ethanol from an estimated $10/day to $1000/day. We examined the cost-effectiveness of ethanol lock prophylaxis in relation to these significant changes.

Methods: A previously developed Markov model of intestinal failure was simulated over 1 year. Costs were measured in 2020 US dollars and effectiveness in quality-adjusted life-years (QALYs). The primary outcome was incremental cost-effectiveness ratio (ICER) between treatments. Secondary outcomes include CLABSI frequency. Model parameters were based on the previously published model. CLABSI rate with and without ethanol lock prophylaxis was estimated from the largest available comparative observational study in the literature. Sensitivity analyses on all model parameters were performed. Discounting was applied at 3% per year for costs and QALYs.

Results: In the base model, children with intestinal failure not using ethanol lock therapy accumulated $131,815 in costs and 0.32 QALYs per patient. Using ethanol locks cost $437,884 and accumulated 0.33 QALYs per patient, or nearly $18 million/QALY gained compared to no locks. Ethanol locks resulted in a 40% reduction in CLABSI frequency. Ethanol lock prophylaxis became cost-effective at $68/day and cost-saving at $63/day. Sensitivity analysis identified no plausible variation of other parameters to reach the benchmark of $100,000/QALY gained. On probabilistic sensitivity analysis, 90% of iterations favored no ethanol locks at $100,000/QALY.

Conclusion: At the current price, ethanol lock therapy is not cost-effective for CLABSI prevention in children with intestinal failure. However, its cost prior to the recent orphan drug designation made it an economically reasonable choice. This study highlights the critical need for the approval of an affordable lock therapy option to prevent CLABSIs in these children.

Financial Support: n/a

P156 - Comparison of growth in neonates following intestinal surgery using either a liberal or gradual enteral feeding protocol.

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Purpose: Neonates undergoing intestinal surgery frequently struggle with growth in the early post-operative period. This may be due in part to intestinal damage and altered function. Parenteral nutrition (PN) is critical to providing adequate nutrition but is associated with significant morbidity. In order to minimize prolonged PN exposure there is a push to advance enteral feeds as quickly as possible, sometimes at the expense of

adequate weight gain. The ideal nutritional strategy for this population has yet to be determined. This study compares two feeding protocols with regard to growth in the post-operative period

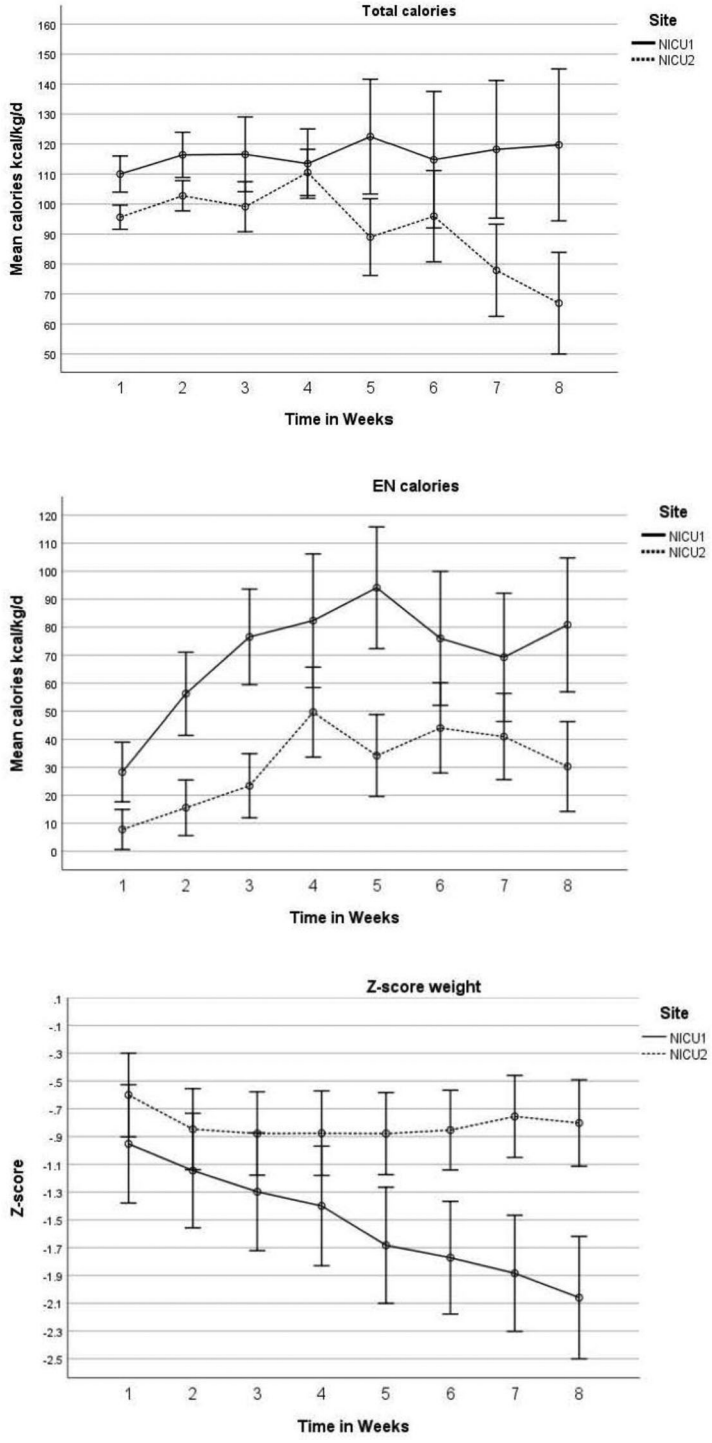
Methods: A retrospective review of infants who underwent intestinal surgery at two neonatal intensive care units (NICU1 and NICU2) between 2013–2018 was performed. Clinical characteristics were compared between groups as well as detailed nutritional intake and anthropometrics for the first 8 weeks following initiation of feeds. At NICU1, infants were managed with a more liberal protocol once feeds were initiated (advancement of 20–30 ml/kg/d) compared to NICU2 where a more gradual approach was used (10-15 ml/kg/d). Both sites had similar parameters for holding feed advancements and resuming progression. Demographic and other clinically relevant information are summarized with percentages, means, and standard deviations. Continuous variables are compared using T-test or Mann-Whitney U-test. Categorical data are compared with a Chi-square test of Fisher exact test. Repeated measured ANOVA and General linear models were used to compare variables over time.

Results: A total of 102 infants were included (61 NICU1 and 41 NICU2). Infants had a mean gestational age of 32 weeks, and a mean birthweight of 1.98kg. The most common diagnoses included necrotizing enterocolitis (26.7%), intestinal atresia (30.2%), and gastroschisis (25.5%). There was no significant difference between groups with regard to intestinal length remaining or the presence of a small bowel stoma. The majority of babies at both sites received a combination of PN and breast milk during the study period. Babies at both sites received similar total calories from PN on a weekly basis, but infants at NICU1 received less intravenous lipid on average than NICU 2 (1.5 g/kg/d vs. 2.5 g/kg/d). Despite receiving significantly more enteral macronutrients and total calories at all time points (measured weekly) at NICU1, Z-scores for weight between the two groups did not differ significantly and PN was not able to be weaned more quickly at NICU 1 (Figure 1).

Conclusion: For infants requiring intestinal surgery, additional enteral calories may not improve growth in the early post-operative period and PN is crucial for maintaining appropriate growth until intestinal function and absorption improves.

Financial Support: n/a

Figure 1. Caloric Intake and Growth Over 8 Weeks



P157 - Patterns of Enteral and Parenteral Nutrition Usage Among Critical Ill Patients Admitted Both in Neonatal and Pediatric Intensive Care Units of a Tertiary Hospital

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Purpose: To determine the profile of critically ill children admitted in a tertiary hospital intensive care unit and the current nutrition support practices.

Methods: A descriptive study design involving critically ill pediatric patients ages from birth to 18 years, admitted in the PICU and NICU of SLMC-QC from 2016 to 2017. The patient's age, anthropometric data, and nutrition data documented in the chart were gathered. The nutrient intake per day will be determined and then compared with the nutrient goals calculated from Schofield (WH) equation.

Results: Eighty patients were included with more male patients. There were 57.5% from PICU, mostly under 5 years old while 42.5% from NICU with mostly premature newborns. The 32.6% patients in the PICU were malnourished while 23.6% of the newborns in NICU were small for gestational age. The 53.8% patients were on mechanical ventilation and 39.5% of them were extubated within 72 hours. The study had 6 mortality cases (11.3%). In the PICU, 54.4% of patients stayed for less than 7 days while 85.3% patients in the NICU stayed for more than 7 days. Overall, 32.5% patients was placed on NPO but started feeding after 24 hours. Mixed feeding (both parenteral and enteral) were started with more than half of the patients in NICU (55.9%) and also more than half the patients in the PICU (54.4%) were started on enteral nutrition. Inadequate delivery of calories and proteins where observed in more than half of the study population, 67.5% in PICU and 52.5% in NICU. The mean calorie intake were 596.9±434 (76%) kcal/day and only 17.9±17 (66%) grams of protein/day in PICU while 93.3±52 (49%) kcal/day and 5.3±2.8 (70%) grams of protein/day in NICU. All patients who died in PICU were placed on NPO for 3 to 12 days and all of them had inadequate protein intake.

Conclusion: The occurrence of inadequate nutrition in this study is similar with the results of previous studies done 10 years ago and also with the results described in adults. There is a need to formulate a nutrition protocol and encourage more research on pediatric nutrition provision in our country, especially those critically ill under five years old.

Financial Support: n/a