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ABSTRACTS

Nutrition and Metabolism Research Oral Paper Session Abstracts

Presentation Topic:	Presentation Date:	Presentation Time:
Parenteral Nutrition Therapy (SA24)	Saturday, February 14, 2026	2:30 PM – 4:00 PM PT
Enteral Nutrition Therapy (M34)	Monday, February 16, 2026	2:00 PM – 3:30 PM PT
Malnutrition and Nutrition Assessment (SU34)	Sunday, February 15, 2026	2:00 PM – 3:30 PM PT
Critical Care and Critical Health Issues (M44)	Monday, February 16, 2026	3:45 PM – 5:15 PM PT
GI, Obesity, Metabolic, and Other Nutrition-Related Concepts (T23)	Tuesday, February 17, 2026	9:15 AM – 10:45 AM PT
Pediatric, Neonatal, Pregnancy, and Lactation (M24)	Monday, February 16, 2026	10:15 AM – 11:45 AM PT

Parenteral Nutrition Therapy

2185737 - Financial and Clinical Impacts of Reimbursement on Home Parenteral Nutrition: Insights From a Provider Survey

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Background: Providing home parenteral nutrition (HPN) therapy has become increasingly challenging. The National Home Infusion Association reported HPN costs rose 75.4% from 2016 to 2024 while monthly payments decreased by 5.47%. Additionally, between 2022 to 2024, the number of pharmacies that submitted claims for HPN decreased by almost 16%. This study aims to gain insights into the impact of reimbursement on the continuity of care and clinical management of HPN patients.

Methods: A survey of home infusion providers assessed HPN service experiences and challenges. Distributed via direct contact and social media, it assessed patient volume, ingredient costs, insurance impacts, and declined referrals due to reimbursement. Conducted over five weeks (September-October 2024), a total of 29 surveys were completed. Respondents were mainly dietitians (90%).

Results: Over half (52-55%) of the responding providers report they declined HPN referrals based on the payor's reimbursement rate (Figures 1 AND 2). During the survey period, 45% of providers transferred patients to other service providers within the prior three months due to poor reimbursement. Most providers (90%) feel PN ingredient costs have become more problematic in recent years, and 38% agreed this affects formulation decisions. One-third (35%) of providers agree that reimbursement affects the clinical management of patients. A smaller portion (13%) reported spending more time managing and adjusting HPN formulas when rates are low (Figure 2). Providers frequently restrict or remove PN components due to cost, with 54% doing so at least monthly and 12% as often as weekly. Many providers (87%) reported modifying or limiting certain PN ingredients due to cost or reimbursement, including switching to oral alternatives (if available), reducing the dose or frequency of ingredients, or removing the ingredient entirely from the HPN formulation. Vitamin C and selenium were the most affected – 65% and 52% of providers, respectively, reported removing or limiting their use. Specialty lipid and amino acid formulations, L-cysteine, and levocarnitine were not converted to oral due to lack of oral options or patient tolerability (Figure 3). With over half of the responding providers declining HPN referrals due to reimbursement rates, the results of this study uncover a barrier to the continuity of care for PN patients. Delays in transitioning patients from hospital to home may extend hospital stays and increase the utilization of more costly healthcare resources. Poor reimbursement coupled with rising PN ingredient costs may lead to unintended clinical decisions, compromising individualized care with suboptimal HPN formulations. Factors influencing HPN formulation management that were not addressed in this survey could include shortages and limited market availability for certain components. These results may also be limited by the small population of participants and potential non-participation from industry competitors. National organizations supporting the practice and clinical management of HPN therapy may be better poised to collect large-scale data on this issue.

Conclusion: The findings of this survey highlight the financial pressures on HPN providers and the impact of reimbursement on operational and clinical decision-making. The rising costs of PN ingredients are a critical issue, affecting the ability to provide optimal, individualized care. With the need for a large-scale, national study, this small survey underscores the need for better reimbursement policies to match the rising costs of ingredients, ensuring patients can receive necessary nutrition support without delaying access or compromising the quality of care.

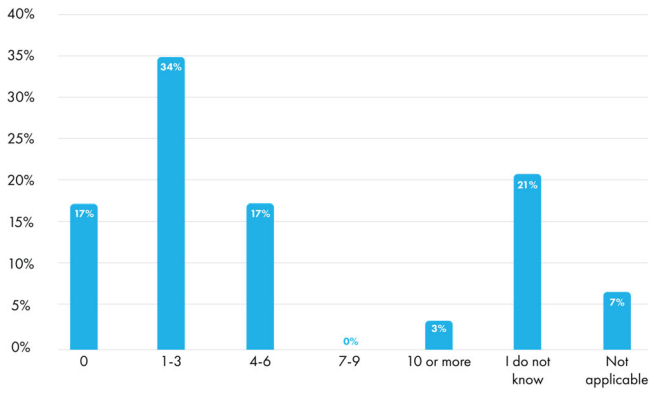

Figure 1. Number of HPN referrals declined by home infusion service providers each month due to low reimbursement

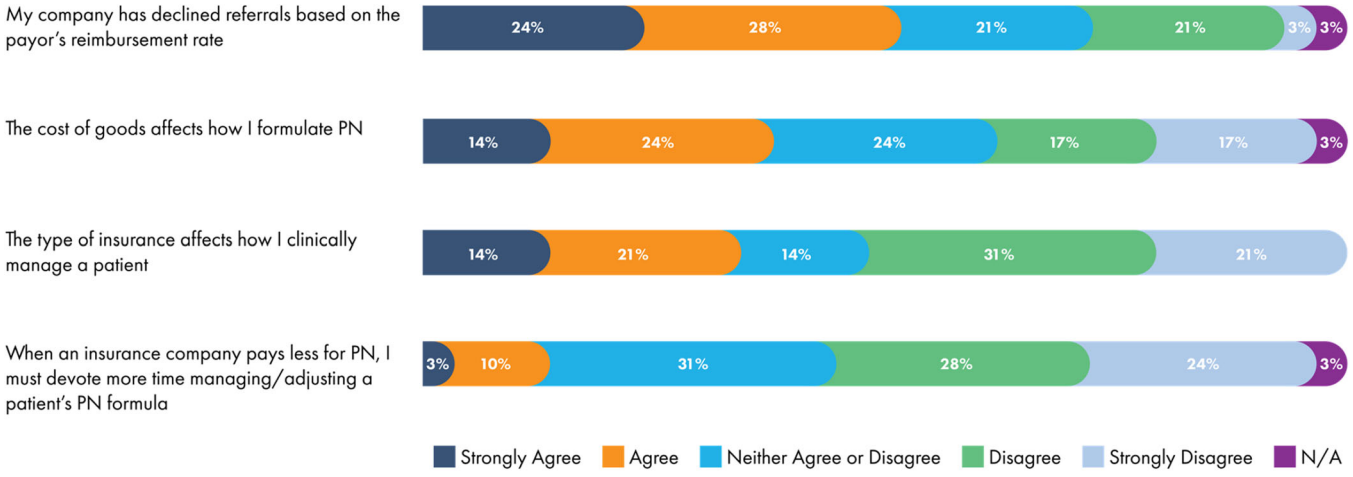

Figure 2. Impact of reimbursement rates on operational and clinical practice decisions of HPN providers

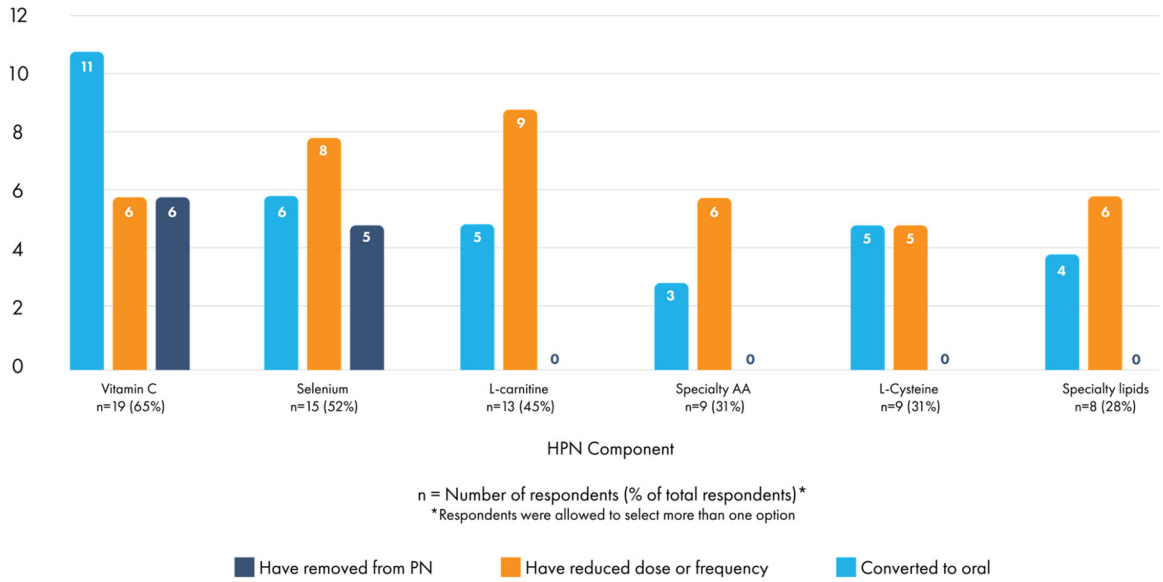

Figure 3. Adjustments to HPN components in the previous year due to cost

AA: amino acids.

2202863 - Insights on Disease Burden and Quality of Life for SBS Patients With Intestinal Failure From the Glepaglutide EASE SBS-1 Trial

David Mercer, MD, PhD, FRCS(C), FACS[1]; Bitten Kloster, MSc[2]; Mark Berner Hansen, MD[2]; Bruno Gallo Santacruz, PharmD[2]; Chandra Slusser, RD, LD, CDCES[2]; Constance Mubekapi-Musadaidzwa, MSc[3]; Anna Ryden, MSc[3]; Palle Bekker Jeppesen, MD, PhD[4]

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Financial Support: Zealand Pharma A/S.

Background: Short bowel syndrome (SBS) has a substantial impact on life expectancy and quality of life (QoL). Patients with chronic SBS-associated intestinal failure (SBS-IF) require long-term parenteral support (PS). EASE SBS-1 was a Phase 3, international, multicenter, randomized, double-blind, placebo-controlled trial designed to evaluate the efficacy and safety of the long-acting glucagon-like peptide-2 analogue glepaglutide for 24 weeks in patients with SBS-IF [Jeppesen P et al, Gastroenterology 168:701–713, 2025]. At the end of the trial, patient exit interviews were conducted to gain insights on their experiences of living with SBS-IF and its impact on Quality of Life (QoL), as well as perspectives on changes following their participation in the trial.

Methods: A representative subset of 30 patients from the EASE SBS-1 trial, or approximately one third of the main trial population, were sampled to participate in qualitative exit interviews. Within seven days of each patient's end-of-treatment visit, telephone interviews were conducted with patients from the United States, United Kingdom, Denmark, and Germany by appropriately trained and experienced interviewers, each a native speaker in the relevant language. Data was collected using a semi-structured interview manual, and interviews were recorded and transcribed verbatim for analysis. The interview manual included a self-rated 7-point Likert scale to assess the perceived changes in a patient's condition, as well as the SBS-Impact Scale (SBS-I), a disease-specific patient reported outcomes (PRO) questionnaire.

Results: The demographic and disease characteristics of the 30 patients that consented to the exit interviews were comparable to the overall participants of the EASE SBS-1 trial (n = 106). There was, however, an over-representation of US and UK participants in the exit interviews substudy. Patients highlighted the impact of SBS-IF on their lives before the trial, where they reported burdens related to the loss of freedom, social anxiety, disrupted sleep, restricted physical activity, and SBS-related pain. Patients reported that glepaglutide had improved their well-being across multiple domains, with 73% of patients receiving glepaglutide reporting positive changes in daily life, compared to 25% of those on placebo. These changes in daily life involved physical health (e.g increased energy and appetite), social life improvements and, for some, better mental and emotional well-being. Among the 70% of patients who experienced a reduction in PS volume and improved overall health status, most patients receiving glepaglutide (94%) found the PS volume reduction was meaningful, compared to 67% of those receiving placebo. Of the total 30 patients, 43% (mainly glepaglutide-treated) reported a meaningful improvement in their sleep. [Figure 1].

Conclusion: Patient exit interviews yielded insights into the physical and psychosocial challenges and limitations of living with chronic SBS-IF prior to enrolling on the EASE SBS-1 trial and subsequently provided important qualitative findings to support results from the main trial. Most patients receiving glepaglutide reported improvements in well-being across multiple domains. They noted meaningful reductions in PS volume compared to placebo, and for some an improvement in their sleep, sense of freedom or increased energy. Consistent with clinical outcomes of the trial, these findings provide qualitative insights to underpin glepaglutide's positive impact on the QoL of SBS-IF patients.

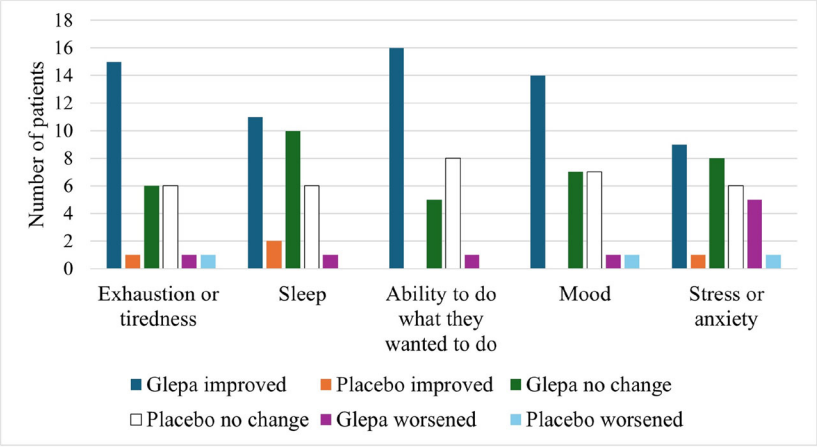

Figure 1. Patient-reported changes on selected categories (N = 30)

Abstract of Distinction Award

2179135 - Time-Adaptive Models for Estimating TPN Component Needs

Shanti Narasimhan, MD[1]; Trevor Winger, PhD[1]; Jeffrey Boogren, PhamD[1]; Laura Gearman, MS, RD, LD, CNSC[1]; Catherine Larson-Nath, MD, CNSC[1]; Jaideep Srivastava, PhD[1]

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Financial Support: None Reported.

Background: Total parenteral nutrition (TPN) is suited to machine learning (ML) as dosing requirements are patient-specific and time-varying. Current practice relies on fixed, population-based formulas. Static calculations ignore heterogeneity in metabolic demand and clinical trajectories in longitudinal records. ML approaches show superior performance over static methods by integrating multi-dimensional patient data and temporal variations. Individual metabolic profiles exhibit adaptive demand patterns on habitual intake and physiological responses, representing a fundamental challenge in nutrition therapy. Time-adaptive regression models address limitations by incorporating longitudinal data to continuously refine prescriptions on observed responses and evolving clinical parameters.

Methods: Time-adaptive regression model was developed to predict individual patient TPN requirements using historical order data, including dextrose, potassium, and sodium concentrations in 1,275 pediatric patients. Patient nutritional trajectories were constructed from EMR by tracking TPN orders chronologically, with missing values forward-filled on the clinical assumption that nutritional parameters remain stable until explicitly modified by providers. The model employed polynomial regression with ridge regularization to capture nonlinear relationships between patient characteristics and nutritional needs. Passive-aggressive regressor enabled real-time model updates, remaining stable when predictions were accurate but rapidly adjusting when patient responses deviated from expectations, allowing personalized adaptation to changing metabolic requirements without forgetting established patterns. Cross-validation was used to optimize model parameters, with separate predictive models developed for each nutritional component to account for individual variability in TPN response patterns.

Results: The time-adaptive regression model demonstrated high predictive accuracy for dextrose requirements over a 15-day treatment period, in Figure 1. Model performance showed an R^2 of approximately 0.9 during the initial treatment phase (days 0-7), indicating excellent prediction of individual patient dextrose needs. Mean squared error remained low and stable throughout treatment course, with values consistently below 25 units, mean absolute error stabilized around three units after initial adjustment. Performance metrics showed a decline after day 12, with R^2 dropping to approximately 0.7, potentially reflecting increased patient variability or treatment complexity in later stages. The model exhibited rapid adaptation during the first 2-3 days, with error metrics decreasing substantially as patient-specific patterns were learned. These results demonstrate the model's ability to capture individual metabolic requirements and adapt to changing nutritional needs over time. Similar patterns are observed for potassium and sodium components.

Conclusion: This study demonstrates the feasibility of time-adaptive regression modeling for personalized TPN, achieving excellent predictive accuracy ($R^2 = 0.9$) for individual dextrose requirements with rapid adaptation to patient-specific patterns within 2-3 days. Passive-aggressive learning algorithm successfully balanced stability and adaptability, though performance declined after day 12, suggesting a need for enhanced modeling of late-stage treatment variability. ML approaches to address limitations in current population-based TPN management incorporating individual metabolic profiles and temporal adaptation. The framework provides a foundation for precision nutrition therapy that could improve patient outcomes through personalized, data-driven nutritional support, with future validation needed across all TPN components and diverse patient populations.

Table 1. Baseline characteristics of study

Value	Measurement
Patients	Count: 1,275
Age at Treatment	Average: 4.91 [SD: 5.95]
Age Range (years)	0.01-20.74
Sex (Female, Male, Other)	Counts: 579, 694, 2
Height	Average: 34.85 [SD: 16.36]
Weight	Average: 43.67 [SD: 48.06]
BMI	Average: 16.72 [SD: 4.79]
BMI-for-Age Z-scores	-1.41 [SD: 3.90]
BMI-for-Age Percentiles	Median 36.3 [IQR: 0.7-81.5]
Body Surface Area	Average: 0.67 [SD: 0.53]

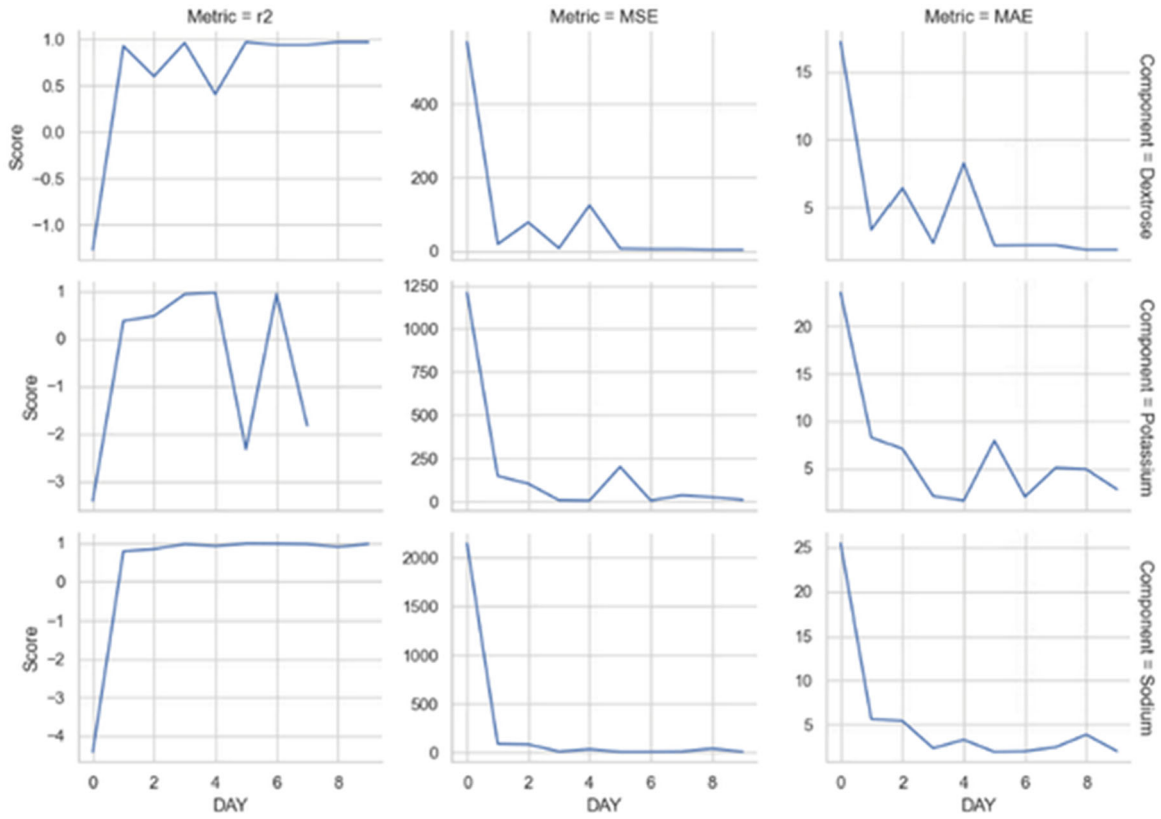

Figure 1. Performance results over time for dextrose, potassium, and sodium

Best of ASPEN Award-Parenteral Nutrition Therapy
Abstract of Distinction Award
2205840 - A Causal and Agentic AI Model for Optimized TPN

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[1]Stanford University, Stanford, California; [2]Stanford University, Palo Alto, California

Financial Support: None Reported.

Background: Total parenteral nutrition (TPN) is essential across diverse patient populations, from newborns in neonatal intensive care units (NICUs) to adult patients with short bowel syndromes or during surgery recovery, each presenting unique nutritional requirements and complications. In our prior work (Phongpreecha et al., Nature Medicine, 2025), we demonstrated that AI models can effectively imitate physicians' TPN prescribing patterns in NICU patients, validated them against human experts, and generalized them to an independent hospital. In this study, we further validate this framework to work in adult Hematopoietic Stem Cell Transplantation in Thalassemia (HSCT) recipients. We also used the TPN mimicking model alongside two additional causal AI systems to discover improved TPN strategies.

Methods: In the adult population study, we used a retrospective analysis of a bone-marrow-transplantation registry (2008-2025), encompassing 1,404 adults who received TPN across 27,447 patient-days. We investigated the capability of models based on variational auto-encoder with iterative clustering and a sequence-to-sequence transformer model that concatenates latent embeddings with previous TPN prescriptions to predict next doses for mimicking experts' prescriptions. To develop the system for discovery of new TPN treatment plans, we first developed the method for NICU patients, who are vulnerable to numerous complications, including cholestasis. Our system consists of: 1) a causal model predicting disease outcomes from labs and TPN components, 2) a causal model predicting laboratory values and weight z-scores, 3) our previous prescription-mimicking model, and 4) a reinforcement learning (RL) AI agent that incorporates the all these models to learn optimal TPN adjustments while balancing disease prevention, growth maintenance, and similarity to expert prescriptions. In short, the causal models isolate the true effects of TPN components on outcomes by separating treatment influences from patient characteristics,

allowing them to inform the AI agent which TPN modifications genuinely improve outcomes rather than just correlating (or rather confounded) with the healthier patients.

Results: We developed a pipeline that generates standardized recipes of 25-component TPN formulations with both variational autoencoder and transformer achieving high average Pearson's correlation performance (0.721 and 0.711, respectively; Figure 1). The outcome prediction model accurately identified cholestasis risk (AUROC: 0.92, AUPRC: 0.62, Dataset Prevalence: 0.06), with risk scores suggesting a predictable pattern since 20 days before the diagnosis (Figure 2). Our AI agent discovered a TPN plan that reduced cholestasis probability by 34% with an average change of 35% from standard prescriptions (Figure 3). The key modifications included reduction in lipid dose and potassium. More importantly, the agent recommended soy, MCT, olive, fish oil-based ILE (SO,MCT,OO, FO-ILE) over soy oil-based ILE 150% more frequently, despite a weak (non-causal) correlation of the SO,MCT,OO, FO-ILE to cholestasis status to be only −0.01 (*P*-value = 0.13). This recommendation aligns well with recent trials showing SO,MCT,OO, FO-ILE reduces cholestasis risk and established practice using fish oil-based ILE for cholestasis treatment. Note that the model could not possibly prescribe fish oil-based ILE as it was not used pre-diagnosis in our dataset.

Conclusion: Our results indicate that the expert-mimicking model can be extended from neonatal to adult patients. They also suggest that the system of agentic AI models can uncover causal patterns from observational data, enabling the system to propose alternative TPN strategies that are more likely to succeed when tested in RCTs and real-world clinical settings.

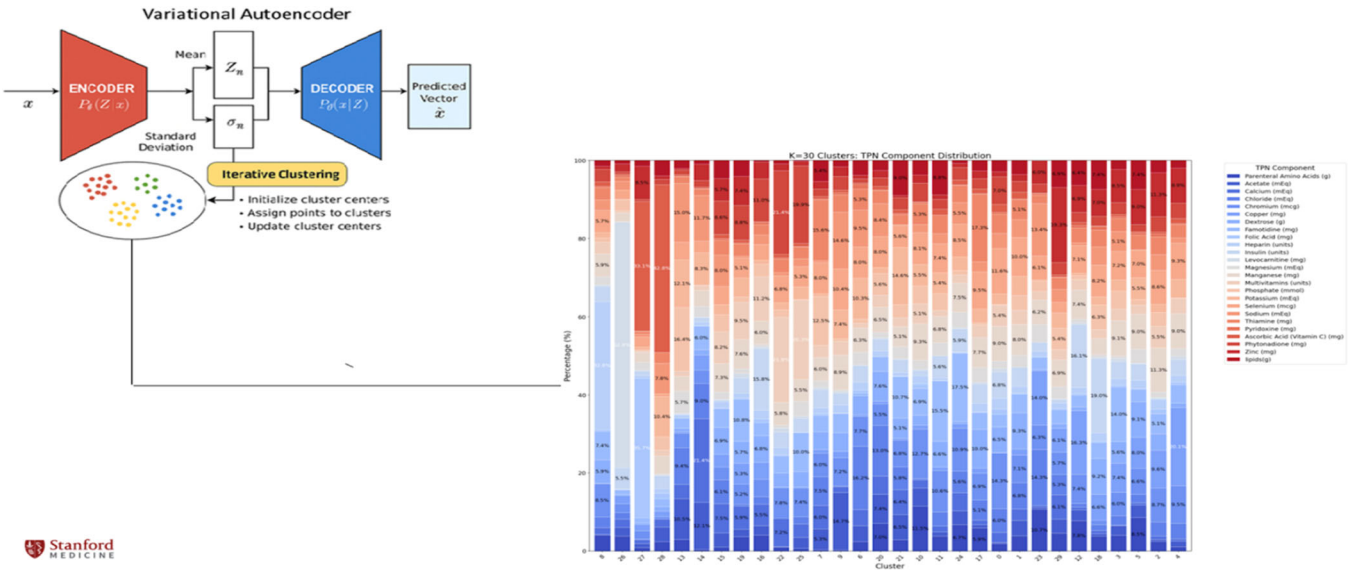

Figure 1. Variational autoencoder with iterative clustering

Latent representations of TPN bags after convergence to K = 30 clusters.

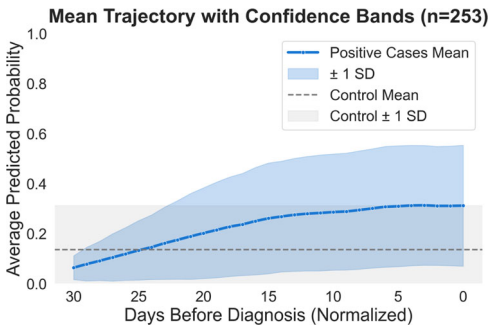

Figure 2. Mean predicted probability of cholestasis shows increasing trends in case patients as they approach the diagnosis date

The blue line represents the trajectory of predicted risks from the causal model up to 30 days before diagnosis. The gray line indicates mean probability from all timepoints of the control group. The mean predicted risk of the case group exceeds that of the control group around 20 days prior to diagnosis.

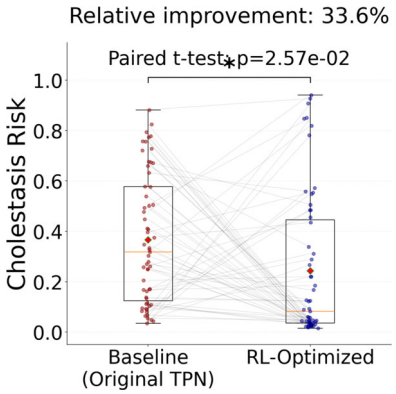

Figure 3. Reduction in causal model–predicted risks after TPN optimization

The boxplot compares predicted risks for patients later diagnosed with cholestasis, using pre-diagnosis data from actual prescriptions (red) versus AI agent-recommended TPN regimens.

International Abstract of Distinction Award

2199047 - Catheter-Related Bloodstream Infections With Infective Endocarditis and Osteomyelitis in Patients Receiving Home Parenteral Nutrition: A Five-Year Retrospective Cohort Study

Selma Maria Boltz-Jensen[1]; Jakob Møller Vandbæk[1]; Sofie Kibsgaard Dall[1]; Abina Mohanaraj[1]; Henrik Højgaard Rasmussen, MD, PhD[2]; Lars Vinter-Jensen, MD, PhD, Dsci[3]; Christian Lodberg Hvas, MD, PhD[4]; Janne Fassov, MD, PhD[5]; Charlotte Lock Rud, RD, PhD[5]; Jakob Lykke Poulsen, MD, PhD[6]
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Financial Support: None Reported.

Background: Patients with intestinal failure (IF) receive parenteral nutrition through centrally placed catheters. A frequent complication is catheter-related bloodstream infection (CRBSI) which can develop into infective endocarditis (IE) and osteomyelitis (OM). We aimed to investigate the incidences of CRBSI, IE and OM.

Methods: This was a retrospective cohort study, conducted in a Danish referral IF center based in two university hospitals. All data on CRBSI, IE, and OM were retrieved from medical records on patients receiving home parenteral nutrition (HPN) through Hickman catheters or peripherally inserted central catheters (PICCs) from January 2019 to December 2023.

Results: A total of 323 patients (209 females) were included, totaling 913 catheters equaling 293,650 catheter days (Table 1). Median time to infection was longer in Hickman catheters as compared to PICCs (161 days vs 63.5 days; $p < 0.001$) (Figure 1).The CRBSI incidence was 0.930/1000 catheter days (95% CI: 0.82 - 1.03) over the five-year period, with a significantly higher incidence for Hickman catheters than for PICCs (1.103 (95% CI: 0.95–1.26) vs. 0.664 (95% CI: 0.52–0.81) per 1000 catheter days, respectively). Coagulase-negative staphylococci were the most common pathogen causing CRBSI, accounting for 24% of all cases, followed by polymicrobial infections (21%) and Staphylococcus aureus (17%). Thirteen cases of IE were identified (0.044/1000 catheter days, 95% CI: 0.020–0.068) and ten cases of OM were identified (0.034/1000, 95% CI: 0.012–0.055) (Figure 2).

Conclusion: We found a CRBSI incidence within the acceptable range recommended by BIFA guidelines. Hickman catheters and PICCs offer different benefits, and our data does not support recommending one over the other. We observed a high incidence of IE and low incidence of OM compared to other similar studies. Due to variation in existing data and our findings, further studies are needed before clinical recommendations can be made.

Table 1.

Demographics	Hickman catheters (n =134)	PICCs (n = 189)	P value	Study cohort in total (n = 323)
			Mann-Whitney U test	
Age (Median, Range)	61 (17–92)	71 (20–94)	**<0.001**	66 (17-94)
			Pearson's chi-squared test	
Gender (No, %)				
Female	97 (72%)	112 (60%)	**0.023**	209 (65%)
Cause of IF (No, %)*				
Cured cancer	21 (16%)	27 (14%)	0.671	48 (15%)
Active/terminal oncological disease	25 (19%)	49 (26%)	0.111	74 (23%)
Inflammatory bowel disease	31 (23%)	21 (11%)	**0.004**	52 (16%)
Bowel obstruction	27 (20%)	56 (30%)	**0.047**	83 (26%)
Bowel ischemia	14 (10%)	49 (26%)	**<0.001**	63 (20%)
Radiation enteritis	5 (4%)	9 (5%)	0.637	14 (4%)
Surgical complication	18 (13%)	34 (18%)	0.243	52 (16%)
Trauma	1 (1%)	1 (1%)	0.813	2 (1%)
Others	41 (30%)	61 (32%)	0.692	102 (32%)
Comorbidities (No, %)*				
Immunodeficiency	1 (1%)	3 (2%)	0.493	4 (1%)
Cancer	55 (41%)	84 (45%)	0.481	139 (43%)
Diabetes	18 (13%)	35 (19%)	0.206	53 (16%)
COPD	19 (14%)	33 (18%)	0.401	52 (16%)
Hepatic disease	12 (9%)	10 (5%)	0.209	22 (7%)
Osteoporosis	39 (29%)	59 (31%)	0.631	98 (30%)
Other	105 (78%)	152 (81%)	0.439	257 (80%)
None	0 (0%)	1 (1%)	0.396	1 (<1%)

Abbreviations: COPD = chronic obstructive pulmonary disease; IF = intestinal failure; NO = number.

Demographics of the study cohort at baseline reported as median with range and quantity with percentage. Statistically significant results are bolded.

*Note there could be multiple causes of IF in a single patient as well as more than one comorbidity.

Table 2.

Infection characteristics	Hickman catheters (n = 439)	PICCs (n = 474)	P value
			Mann-Whitney U test
Median dwell time (pr. catheter)	244 (4-3867)	96.5 (0-1728)	**<0.001**
Median time to infection, Days.	161 (5-2446)	63.5 (7-687)	**<0.001**
			Pearson's chi-squared test
CRBSI events, No.*			
CRBSI	196	77	**<0.001**

Abbreviations: CRBSI = catheter-related bloodstream infection.

Infection characteristics of the study cohort reported as median with range and quantity with percentage. Statistically significant results are bolded.
*Note that a single catheter could have multiple CRBSI events.

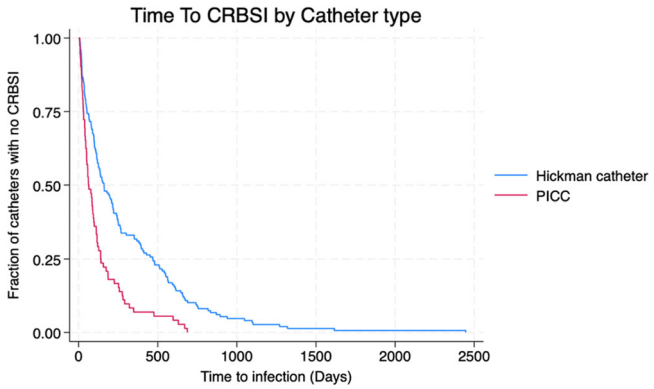

Figure 1. Kaplan–Meier survival curves illustrating time to first infection in Hickman catheters (blue) and PICCs (red)

Abbreviations: CRBSI = catheter-related bloodstream infection; PICC = peripherally inserted central catheter.

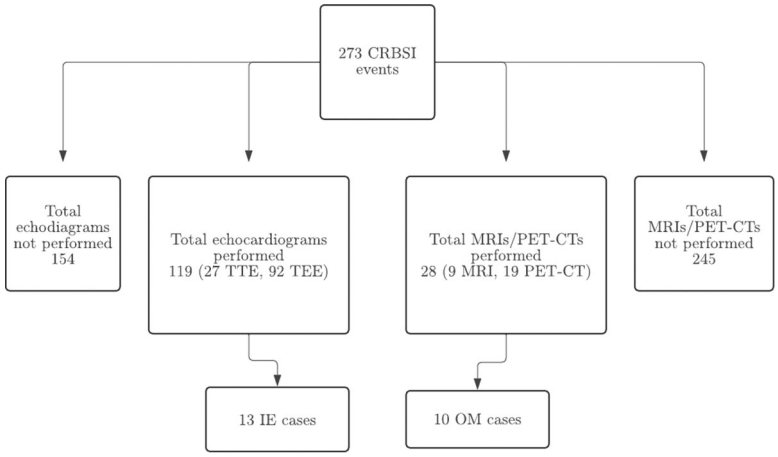

Figure 2. Flowchart illustrating CRBSI cases, diagnostic modality and diagnosis

Abbreviations: CRBSI = catheter-related bloodstream infection; IE = infective endocarditis; MRI = magnetic resonance imaging; OM = osteomyelitis; PET-CT = positron emission tomography scan; TEE = transesophageal echocardiogram; TTE = transthoracic echocardiogram.

Trainee Award

Abstract of Distinction Award

2164931 - Comparing ChatGPT With Healthcare Provider Responses to Home Parenteral Nutrition Questions

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[1]Brigham and Women's Hospital, Boston, Massachusetts; [2]American Society for Parenteral and Enteral Nutrition, Austin, Texas; [3]Hospital of the University of Pennsylvania, Ewing, New Jersey; [4]TPN Support Group, The Oley Foundation, Elk Grove, California; [5]Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts; [6]Rhode Island Hospital, Providence, Rhode Island; [7]Mass General Hospital, Boston, Massachusetts

Financial Support: The study was supported by the National Institute of Health [grant number R00HL153795} to Hassan S. Dashti.

Background: Patients on home parenteral nutrition (HPN) increasingly seek online support, including the use of artificial intelligence (AI) platforms like ChatGPT. However, generative AI was not designed for healthcare use, and its role in addressing patient questions remains unstudied. This survey study aimed to evaluate ChatGPT's accuracy, appropriateness, and empathy in responding to common HPN patient questions, compared to expert clinicians.

Methods: Twenty questions spanning multiple pertinent HPN domains were selected from public online forums and support websites. Each question was answered by an experienced HPN registered dietitian or registered nurse clinician and ChatGPT-4. U.S.-based clinicians with at least one year of HPN experience and currently caring for at least five HPN patients were invited to evaluate the anonymized set of responses via REDCap. Participants rated each response on a 5-point scale (1 = Excellent, 5 = Very Poor) for accuracy (alignment with existing medical recommendations), appropriateness (suitability for the patient and the absence of risky information), and empathy (degree of emotional support). Participants also selected a preferred response and optionally explained their choice. Undecidable ratings were recorded as missing. Ratings were compared using a paired t-test, with statistical significance set at $p < 0.05$ (using R software).

Results: Among 23 participants (73.9% registered dietitians; mean HPN experience: 14.0 years, SD: 9.5), ChatGPT's responses were rated significantly better for accuracy (1.89 ± 0.56 vs. 2.10 ± 0.47, p = .003), appropriateness (1.94 ± 0.55 vs. 2.15 ± 0.48, p = .013), and empathy (2.15 ± 0.74 vs. 2.37 ± 0.57, p = .007). ChatGPT responses were preferred 48.5% of the time, clinician's 33.9%, with 17.6% reporting no preference. ChatGPT outperformed in "Best practices, care, and safety of HPN use/Infection risk" and scored more favorably for empathy in "Symptoms" and for accuracy and appropriateness in "Lifestyle stressors." Clinicians scored better for appropriateness in "Biochemical test concerns" (Table 1). Regarding preferred response, ChatGPT stood out for emphasizing communication with infusion companies and providers, providing clear guidance (e.g., how to recognize and respond to an occlusion), offering actionable troubleshooting steps, and explaining underlying causes (e.g., differentiating an infection from a blood clot). However, concerns with the ChatGPT responses included unsafe or impractical suggestions (e.g., storing extra PN bags beyond safe limits or advising patients to clamp the line themselves), and assumptions of advanced patient knowledge, posing risks for those less experienced. Additionally, an overemphasis on self-assessment was seen as potentially delaying contact with providers.

Conclusion: ChatGPT may support HPN care and patient education, particularly for broad medical and lifestyle topics. However, complex clinical issues still require medical expertise. Further research is needed to ensure safe AI integration into clinical practice.

Table 1. Comparative evaluation of the responses provided by HPN clinicians and ChatGPT, overall and stratified by question themes (n = 23) - part 1

	ChatGPT	HPN Clinician	Difference	
	Mean ± SD	Mean ± SD	Mean ± SD	*p*-value
Overall (all 20 questions)				
Accuracy	1.89 ± 0.56	2.10 ± 0.47	-0.21 ± 0.28	.003
Appropriateness	1.94 ± 0.55	2.15 ± 0.48	-0.21 ± 0.32	.013
Empathy	2.15 ± 0.74	2.37 ± 0.57	-0.22 ± 0.41	.007
Theme: Best practices, care, and safety of HPN use / Infection risk (8 questions)				
Accuracy	1.74 ± 0.62	2.12 ± 0.52	-0.38 ± 0.43	.001
Appropriateness	1.78 ± 0.61	2.17 ± 0.53	-0.39 ± 0.48	.002
Empathy	2.08 ± 0.78	2.58 ± 0.59	-0.50 ± 0.62	.002
Theme: Symptoms (5 questions)				
Accuracy	2.07 ± 0.61	2.17 ± 0.61	-0.10 ± 0.42	.276
Appropriateness	2.16 ± 0.61	2.25 ± 0.65	-0.10 ± 0.48	.353
Empathy	2.18 ± 0.91	2.44 ± 0.78	-0.27 ± 0.47	.028
Theme: Biochemical test concerns (2 questions)				
Accuracy	2.00 ± 0.77	1.74 ± 0.64	0.26 ± 0.62	.067
Appropriateness	2.07 ± 0.80	1.80 ± 0.60	0.26 ± 0.52	.029
Empathy	2.21 ± 0.70	2.00 ± 0.78	0.26 ± 0.64	.091
Theme: Lifestyle stressors (3 questions)				
Accuracy	1.93 ± 0.58	2.28 ± 0.61	-0.35 ± 0.70	.027

Difference = ChatGPT - HPN Clinician. Scores ranged from 1 to 5: 1 = Excellent; 2 = Good; 3 = Fair; 4 = Poor; 5 = Very Poor.

Abbreviations: HPN = home parenteral nutrition; SD = standard deviation. *P*-value of < 0.05 was considered statistically significant.

Table 1. Comparative evaluation of the responses provided by HPN clinicians and ChatGPT, overall and stratified by question themes (n = 23) - part 2

Appropriateness	2.01 ± 0.63	2.30 ± 0.59	-0.30 ± 0.69	.030
Empathy	2.16 ± 0.67	2.23 ± 0.63	-0.07 ± 0.52	.313
Theme: Medication and hydration (2 questions)				
Accuracy	1.85 ± 0.66	1.87 ± 0.59	-0.02 ± 0.49	.903
Appropriateness	1.85 ± 0.59	1.93 ± 0.51	-0.09 ± 0.49	.495
Empathy	2.26 ± 0.95	2.07 ± 0.70	0.20 ± 0.86	.321

Difference = ChatGPT - HPN Clinician. Scores ranged from 1 to 5: 1 = Excellent; 2 = Good; 3 = Fair; 4 = Poor; 5 = Very Poor.

Abbreviations: HPN = home parenteral nutrition; SD = standard deviation. *P*-value of <0.05 was considered statistically significant.

Enteral Nutrition Therapy

International Abstract of Distinction Award

2205208 - Cost-Effectiveness of Complete Preoperative Immunonutrition in Oncology Patients Undergoing Major Abdominal Surgery in a Middle-Income Country

Ricardo Merchán-Chaverra[1]; Jorge Medina Parra[1]; Lina López Basto[2]; Mauricio Chona[2]
[1]Keralty, Bogotá, Cundinamarca; [2]Keralty, Bogotá, Cundinamarca

Financial Support: Megalabs.

Background: Malnutrition is highly prevalent among patients with gastrointestinal cancer, affecting up to two-thirds of those undergoing major abdominal surgery and contributing to increased morbidity and prolonged hospitalization. Perioperative immunonutrition has demonstrated benefits in randomized trials and meta-analyses, including reductions in postoperative infections and length of stay. Nevertheless, its effectiveness in real-world practice may be limited by incomplete adherence, and the economic implications of implementing complete immunonutrition in middle-income countries remain poorly studied. Therefore, the objective of this study was to evaluate the cost-effectiveness of complete preoperative immunonutrition compared with an incomplete or absent immunonutrition scheme in oncology patients undergoing major abdominal surgery at a referral hospital in a middle-income country, from a hospital perspective.

Methods: A decision-tree model (Figure 1) was constructed to compare two strategies: complete preoperative immunonutrition (Inmunex®) administered for ≥5 days before surgery versus incomplete or no immunonutrition. Model probabilities of postoperative infection and surgical complication were derived from a retrospective cohort of adult oncology patients admitted between 2021 and 2023. To control for confounding, a 1:1 propensity score matching was performed, accounting for cancer stage, comorbidities, and surgical technique. Effectiveness was defined as the probability of avoiding both infection and surgical complication during the index hospitalization. Costs were estimated from the hospital perspective, expressed in 2025 US dollars (1 USD = 4,200 COP), and reflected total hospitalization expenses extracted from official itemized hospital invoices. For the deterministic analysis, uncertainty was addressed using exact binomial confidence intervals (Clopper–Pearson method) for categorical variables and bootstrapped confidence intervals for continuous variables. This was complemented by a probabilistic sensitivity analysis with 10,000 Monte Carlo simulations, conducted within a net monetary benefit (NMB) framework.

Results: After propensity score matching, 366 patients were included in the analysis (median age 63 years, 57% female) Complete immunonutrition resulted in lower costs (USD 5,730.53) and higher effectiveness (0.72) compared with incomplete immunonutrition (USD 6,517.77; effectiveness 0.70) (Figure 2), indicating dominance. Tornado analysis identified hospitalization costs related to infection and costs in patients without complete immunonutrition as the most influential drivers of the net monetary benefit (NMB), followed by infection probabilities in both groups (Figure 3). Probabilistic sensitivity analysis confirmed robustness: 62% of simulations fell in the southeast quadrant of the cost-effectiveness plane (less costly and more effective), while only 8% suggested higher cost with reduced effectiveness (Figure 4).

Conclusion: Evidence from real-world data indicates that complete preoperative immunonutrition is cost-saving and slightly more effective than incomplete immunonutrition in oncology patients undergoing major abdominal surgery. These findings support its implementation in comparable hospital settings, with a high probability of cost-effectiveness under conventional willingness-to-pay thresholds in middle-income countries.

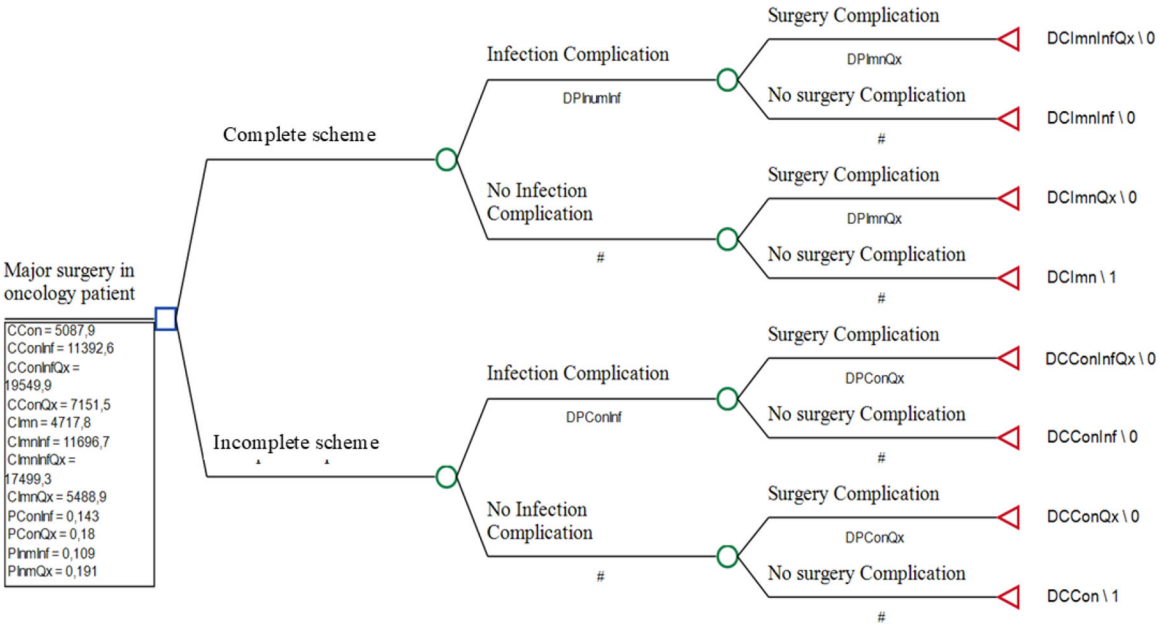

Figure 1. Decision tree immunonutrition, complete vs incomplete scheme

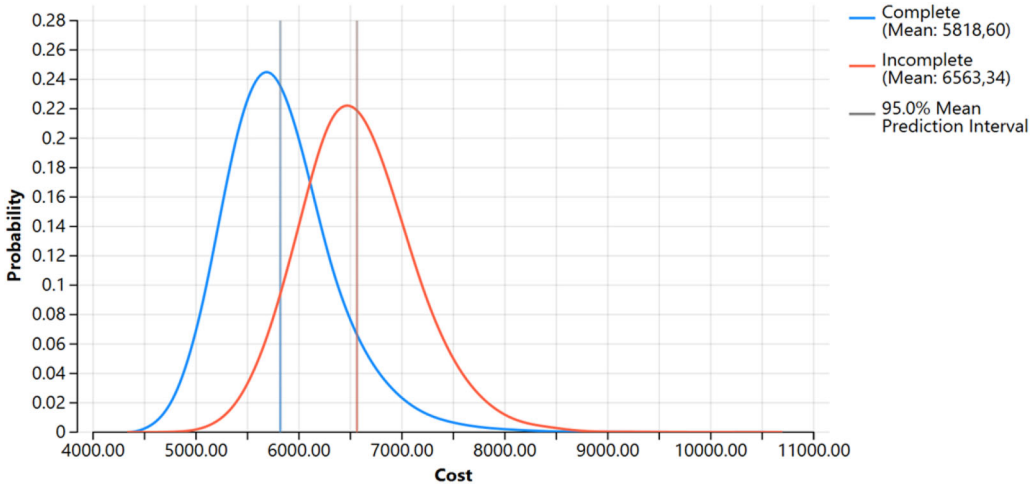

Figure 2. Probability distributions of cost: immunonutrition, complete vs incomplete scheme

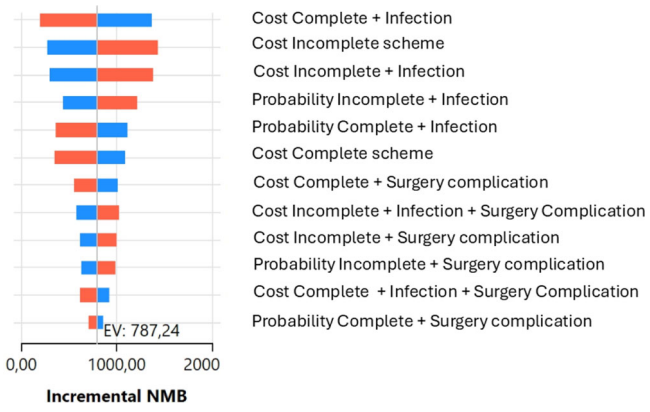

Figure 3. Tornado diagram: incremental NMB, complete vs incomplete scheme

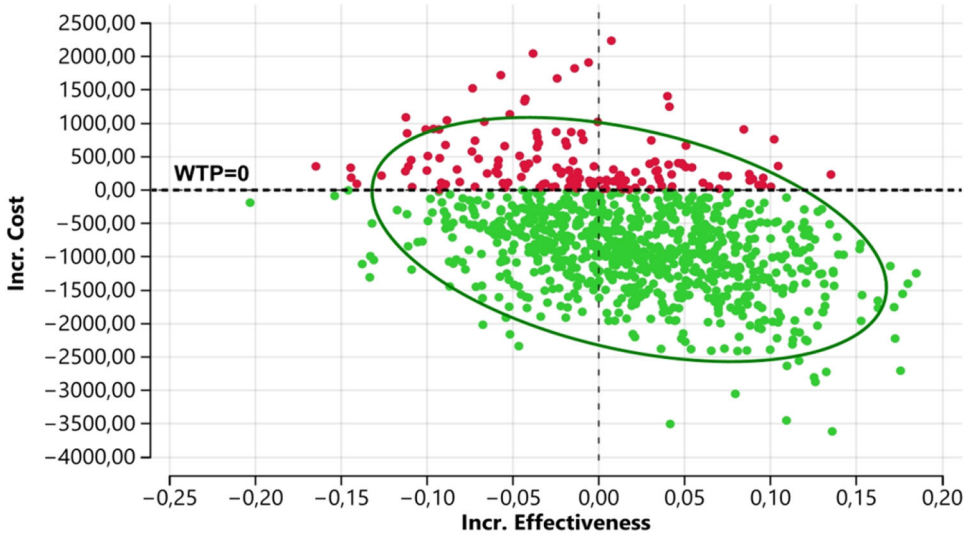

Figure 4. ICE scatterplot: immunonutrition, complete vs incomplete scheme

Best of ASPEN Award-Enteral Nutrition Therapy

Abstract of Distinction Award

2178617 - Day + 1 Enteral Nutrition to Reduce Acute GvHD Risk in Allo-SCT: A Protocol-Based Approach

Nikki Spurgeon, MS, RD[1]; Mariah Jackson, PhD, RD[2]; Corri Hanson, PhD, RD[3]; Michael Haddadin, MD[3]; Vijaya Raj Bhatt, MBBS, MS[3]; Chris Wichman, PhD[3]; Md Saif Uddin Rashed[3]; Peyton Hainline, MMN, RD[1]; Emily Thompson, MMN, RD[4]; Jacque Schwartz, MHA, RD[1]; Jana Ponce, PhD, RD[2]

[1]Nebraska Medicine, Omaha, Nebraska; [2]University of Nebraska Medical Center, Omaha, Nebraska; [3]University of Nebraska Medical Center, Omaha, Nebraska; [4]Sanford Children's, Sioux Falls, South Dakota

Financial Support: None Reported.

Background: Patients undergoing allogeneic stem cell transplantation (Allo-SCT) are at high risk for graft-versus-host disease (GvHD). Early initiation of enteral nutrition (EN) may help preserve gut integrity and support immune function, potentially reducing incidence of GvHD. Despite this, studies assessing standardized protocols for early implementation of EN in this population remain limited. To fill this gap, this study evaluates the impact of the implementation of a standardized Day+1 EN protocol on outcomes in Allo-SCT patients.

Methods: This retrospective cohort study evaluated the impact of implementing a Day +1 EN protocol on the incidence of acute (a)GvHD by Day +100 post–Allo-SCT. Per protocol, a nasogastric (NG) feeding tube was placed on Day +1 following the Allo-SCT and EN was initiated using a high protein, immune modulating, 1.5 kcal/mL formula at 25 mL/hr with feeds advanced as per discretion of the registered dietitian nutritionist (RDN). Demographic and clinical electronic health record (EHR) data was collected from patients who received an Allo-SCT following protocol implementation (6/6/2023-4/30/2024) and from patients who received a transplant prior to the protocol implementation (5/3/2022 – 6/5/2023) who served as retrospective controls. Protocol and clinical outcomes among the pre- and post-protocol groups were assessed using a Welch's two sample t-test for continuous variables and Fisher's Exact test for categorical variables with a *P*-value of ≤ 0.05 considered statistically significant. Due to small sample size in the lower GI aGvHD outcome, exploratory backward regression was completed with the final model adjusting for GvHD prophylaxis. Study outcomes included initiation of Day +1 EN (yes/no), GI complications (no GI symptoms, constipation, diarrhea, vomiting, or more than 1 symptom), reason for NG removal (planned removal, removed per patient request, patient removed, accidental removal or removal due to adverse event) and incidence of lower GI and overall aGvHD, by Day +100 post-transplant, classified using the Modified Glucksberg Criteria.

Results: The final cohort included 108 patients, 41 in the post-protocol group and 67 in the pre-protocol group (Table 1). Following implementation of the Day +1 EN protocol, initiation of Day +1 EN was successful in 95.1% (n = 39) patients in the post-protocol group compared to 4.5% (n = 3) of pre-protocol ($p < 0.001$). There were no significant differences in GI complications or reason for NG removal between groups (Table 2). The number of patients who developed lower GI GvHD was significantly lower in the post-protocol group (n = 5; 12.2%) than in the pre-protocol group (n = 19; 28.4%) by day +100 following Allo-SCT (p = 0.05). Following adjustment for GvHD prophylaxis, results were somewhat attenuated with an odds ratio of 0.41 (95% CI: 0.13, 1.3).

Conclusion: Enacting a Day +1 EN feeding protocol was feasible and well tolerated, not increasing GI complications. These findings signal a potential protective role of early EN in mitigating lower GI GvHD. Given the extremely small sample size of people who developed GvHD, results are promising and further investigation is warranted.

Table 1. Baseline characteristics among pre-protocol and post-protocol groups

	Pre-Protocol (n = 67)	Post-Protocol (n = 41)	p-value[a]
Age			
At Admission	55.3 (15.9)	52.7 (14.4)	0.40
BMI			
At Admission	29.6 (5.4)	29.9 (8.6)	0.80
Day +100	27.7 (5.4)	27.5 (7.9)	0.90
Length of Stay			
	24.3 (4.5)	24.4 (6.6)	0.90
Sex			
Male	43 (64.2%)	21 (51.2%)	0.23
Female	24 (35.8%)	20 (48.8%)	
Diagnosis			
AML	30 (44.8%)	27 (65.9%)	0.12
MDS	11 (16.4%)	2 (4.9%)	
Lymphoma	18 (26.9%)	7 (17.1%)	
Other	8 (11.9%)	5 (12.2%)	
Malnutrition			
Malnutrition	7 (10.4%)	6 (14.6%)	0.55
No Malnutrition	60 (89.6%)	35 (85.4%)	
GvHD Prophylaxis Regimen			
FK+MTX	7 (10.4%)	14 (34.1%)	0.003
FK+MMF+Cy	9 (13.4%)	9 (22%)	
FK+MTX+ATG	48 (71.6%)	16 (39%)	
Other	3 (4.5%)	2 (4.9%)	
Donor Type			
Haplo	7 (10.4%)	3 (7.3%)	0.70
Matched Sibling	13 (19.4%)	9 (22%)	
Matched Unrelated	45 (67.2%)	26 (63.4%)	
Mismatched Unrelated	2 (3%)	3 (7.3%)	
Conditioning Regimen			
Busulfan Fludarabine ww/o low TBI	37 (55.2%)	17 (41.5%)	0.12
Myeloablative	18 (26.9%)	19 (46.3%)	
Other	12 (17.9%)	5 (12.2%)	
Stem Cell Source			
Bone Marrow	2 (3.0%)	1 (2.4%)	1.00
Peripheral Blood	65 (97.0%)	40 (97.6%)	

[a]Statistics presented: mean (standard deviation) and count (percent)
[b]Statistical tests performed: Welch's two sample t-test and Fisher's Exact test
FK: tacrolimus; MTX: methotrexate; MMF: mycophenolate mofetil; Cy: post-transplant cyclophosphamide; Other: other regimens, including sirolimus, corticosteroids, or alternative combinations

Table 2. Protocol and clinical outcomes

Protocol and Clinical Outcomes	Pre-Protocol (n = 67)	Post-Protocol (n = 41)	p-value
Day + 1 EN			<0.001
Yes	3 (4.5)	39 (95.1%)	
No	64 (95.5%)	2 (4.9%)	
GI Complications			0.78
No GI Symptoms	7 (10.4%)	5 (12.2%)	
Constipation	3 (4.5%)	0 (0.0%)	
Diarrhea	23 (34.3%)	14 (34.1%)	
Vomiting	3 (4.5%)	3 (7.3%)	
More than one symptom	31 (46.3%)	19 (46.3%)	
NGT Removal Reason			>0.5
Planned	6 (60%)	30 (75.0%)	
Patient Requested	1 (1.5%)	3 (7.5%)	
Patient Removed	0 (0.0%)	1 (2.5%)	
Accidental	3 (30.0%)	5 (12.5%)	
Removed due to adverse event	0 (0.0%)	0 (0.0%)	
Lower GI aGVHD by day +100			0.05
Yes	19 (28.4%)	5 (12.2%)	
No	48 (71.6%)	36 (87.8%)	
Overall aGvHD by day +100			0.3
Yes	63 (94.0%)	36 (87.8%)	
No	4 (6.0%)	5 (12.2%)	

[a]Statistics presented: mean (standard deviation) and count (percent)
[b]Statistical tests performed: Welch's two sample t-test and Fisher's Exact test

2199091 - Multidisciplinary Strategies for Long-Term Enteral Access in Critically Ill Post-Bariatric Surgery Patients: A Case Series and Algorithmic Approach

Katrina Swedberg-Hall, DO[1]; Emily McCoy, DO[2]; Sanjiv Gray, MD, FACS, FASMBS, DABOM, DABS-FPMBS[1]
[1]Lakeland Regional Health, Lakeland, Florida; [2]Lakeland Regional Health, Plant City, Florida

Financial Support: None Reported.

Background: Critically ill patients with a history of bariatric surgery are at high risk for malnutrition due to altered gastrointestinal anatomy and limited safe options for long-term enteral access. Blind placement of nasoenteric tubes carries a high risk of perforation, while operative reports often fail to reflect the true anatomy. The growing number of patients with Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy necessitates a structured, multidisciplinary approach to feeding access. There is limited data on long term feeding access in the post bariatric surgery patient especially after sleeve gastrectomy.

Methods: We present a case series of five critically ill patients with prior bariatric surgery who required enteral access for nutritional support.

Results: Case 1: A 75 year old woman with a malignant right MCA stroke and prior gastric bypass was deemed ineligible for PEG due to a small excluded stomach on fluoroscopy. She underwent successful CT-guided percutaneous access to the remnant stomach, followed by fluoroscopy-guided gastro-jejunostomy placement. Case 2: A 32 year old woman post-cardiac arrest with a history of RYGB underwent minimally invasive robotic-assisted gastrostomy using a purse-string and circumferential pexy of the remnant stomach to the anterior abdominal wall. Case 3: A 70 year old critically ill woman with RYGB and a midline laparotomy scar underwent robotic-assisted gastrostomy with similar pexy technique resulting in successful feeding access. Case 4: 50 year old male patient with sleeve gastrectomy had preserved antral anatomy. A percutaneous endoscopic gastrostomy (PEG) was successfully placed via a medial transillumination point and tolerated without complication. Case 5: A 76 year old woman with a prior gastric bypass, CT guided gastrostomy, and challenging access presented to the hospital with a dislodged gastrostomy. She underwent CT-guided guidewire placement into the remnant stomach, followed by staged fluoroscopic dilatation, and successful gastrostomy placement with gastropexy. All five patients achieved timely nutritional access without major complications. Procedures were guided by imaging, endoscopy, and intraoperative findings. Where possible, gastropexy was performed to allow for future tube replacement and reduce dislodgement risk.

Conclusion: This series highlights the importance of an algorithmic, anatomy-driven approach to enteral access in post-bariatric surgery patients. Preprocedural imaging and endoscopy are critical to determine feasibility and strategy. Image guided access can be effective in patients with favorable anatomy, while minimally invasive surgical techniques, particularly laparoscopic or robotic-assisted gastrostomy, offer direct visualization and correction of anatomical challenges. Gastropexy with T fasteners can be used with image guided placements. Early multidisciplinary collaboration between bariatric surgeons, acute care surgeons, gastroenterologists, and interventional radiologists is essential to reduce delays in nutrition and avoid complications related to malnutrition.

Abstract of Distinction Award

2194124 - Feeding the Injured Brain: Early Enteral Nutrition is Associated With Improved Outcomes in Neurocritical Care

Eloisa Garcia Velasquez, MD[1]; Poojitha Balamurugan, MS[2]; Tetsu Ohnuma, MD, MPH[3]; Karthik Raghunathan, MD[3]; Vijay Krishnamoorthy, MD, PHD[3]; Paul Wischmeyer, MD, EDIC, FCCM, FASPEN[3]; Krista L. Haines, DO, MD[3]

[1]Kennedy Hospital Group, Guayaquil, Guayas; [2]Duke University, Durham, North Carolina; [3]Duke University School of Medicine, Durham, North Carolina

Financial Support: This research was supported by the Duke University Nutrition Research Fellowship. Duke has received a grant from Abbott Industries to fund the Duke University Nutrition Research Fellowship.

Background: Patients with traumatic brain injuries (TBI) experience profound metabolic alterations that evolve with illness severity and stage of recovery, necessitating tailored nutrition interventions. Early enteral nutrition (EN) has been associated with improved outcomes in general critical care populations, including reductions in hospital and ICU length of stay (LOS), mechanical ventilation (MV) duration, and healthcare costs. However, evidence remains limited regarding the impact of early EN specifically in neurocritical care patients. We hypothesized that early EN, defined as initiation within three days of intubation, would be associated with improved clinical and economic outcomes in critically ill patients with TBI.

Methods: We conducted a retrospective cohort study using the Premier Healthcare Database (2016–2020) to identify adult mechanically ventilated patients admitted to critical care units with a primary diagnosis of TBI who received EN. Patients who received early EN (within 3 days after intubation) were compared to patients who started EN after 3 days (late EN). Outcomes of interest included hospital and ICU LOS, MV days, and total cost. A multivariable Cox proportional-hazards model was used to analyze time-to-event outcomes (hospital LOS, ICU LOS, MV days), and multivariable linear regression was used to evaluate cost, adjusting for relevant covariates.

Results: Among 4,697 eligible patients, 3355 (71.42%) received early EN. Compared to those who received late EN, early EN was associated with shorter hospital LOS (hazard ratio [HR] 1.35; 95% CI, 1.25–1.46), shorter ICU LOS (HR 1.37; 95% CI, 1.19–1.58), and fewer MV days (HR 1.26; 95% CI, 1.17–1.37). Early EN was also associated with reduced total hospital cost (mean difference: –$13,050; 95% CI, –$31,414 to –$5,313). All findings were statistically significant ($p < 0.05$).

Conclusion: In this national cohort of critically ill patients with TBI, Early EN within 3 days of intubation was associated with improved clinical and economic outcomes. Specifically, early EN was linked to shorter hospital and ICU stays, fewer days on mechanical ventilation, and lower overall hospitalization costs. These findings support the early integration of EN in neurocritical care as a potentially modifiable factor associated with improved resource utilization and recovery trajectories. Further prospective studies are needed to determine causal relationships and to define optimal timing and delivery strategies in this population.

Table 1. Outcomes: early EN vs late EN

Outcomes	Early EN	Late EN	p-values
LOS, d, median (IQR)	16 (11 - 25)	22 (15 - 33)	<0.001
ICU LOS, d, median (IQR)	10 (6 - 15)	13 (8 - 19)	<0.001
Mechanical ventilation, d, median (IQR)	8 (4 - 13)	10 (5 - 16)	<0.001
Total cost, mean ± SD	$84,979 ± 269,446	$99,789 ± 73,311	0,16

Compared to those who received late EN, early EN was associated with shorter hospital LOS (hazard ratio [HR] 1.35; 95% CI, 1.25–1.46), shorter ICU LOS (HR 1.37; 95% CI, 1.19–1.58), and fewer MV days (HR 1.26; 95% CI, 1.17–1.37). Early EN was also associated with reduced total hospital cost (mean difference: –$13,050; 95% CI, –$31,414 to –$5,313). All findings were statistically significant ($p < 0.05$).

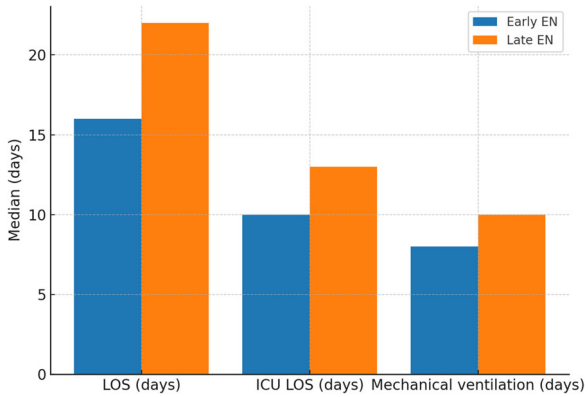

Figure 1. Clinical outcomes: early EN vs late EN

Early EN was associated with shorter hospital LOS (hazard ratio [HR] 1.35; 95% CI, 1.25–1.46), shorter ICU LOS (HR 1.37; 95% CI, 1.19–1.58), and fewer MV days (HR 1.26; 95% CI, 1.17–1.37).

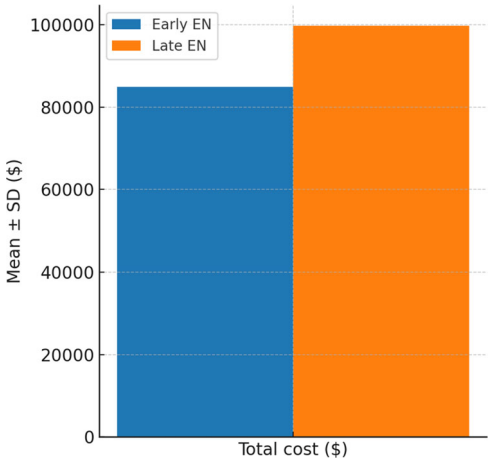

Figure 2. Total cost: early EN vs late EN

Early EN was also associated with reduced total hospital cost (mean difference: –$13,050; 95% CI, –$31,414 to –$5,313).

2205483 - Intestinal Rehabilitation in Microvillus Inclusion Disease

Kayla Hope, MPH, RD, CNSC[1]; Lissette Jimenez, MD, MPH[1]; Jay Thiagarajah, MD, PhD[1]
[1]Boston Children's Hospital, Boston, Massachusetts

Financial Support: None Reported.

Background: Introduction: Microvillus inclusion disease (MVID) is a rare autosomal recessive congenital enteropathy (CoDE) resulting in intestinal failure with lifelong parenteral nutrition (PN) dependence or intestinal transplantation. MVID is characterized by copious watery diarrhea resulting in malabsorption, dehydration, and electrolyte losses. The most common causative gene of MVID is MYO5B but additional genes have also been identified including UNC45A, STXBP2 and STX3. Intestinal disease caused by STX3 mutations has been reported as less severe in the literature, though all patients have still required lifelong PN support. Case Report: A 7-year-old male with confirmed STX3 mutations presented for a second opinion and transfer to our program following recommendation for multi-visceral transplant. He had been supported on PN since birth with a small volume of oral intake for comfort. He had a gastrostomy tube (GT) that was used for medications with the last enteral trial attempted at 2 months of age that was abandoned due to high stool output. Our initial evaluation revealed stable electrolytes, mildly elevated transaminase levels, and less than expected stool output leading to initiation of enteral feeds via GT. He was started on a low osmolarity peptide-based formula at 10 mL two times per day via syringe bolus and over the next 9 months he was able to progressively advance enteral feeds up to a maximum of 210 mL three times per day before having signs of intolerance characterized as gagging and looser stools. He transitioned to an enteral feeding pump, running feeds over 2-3 hours, with improved tolerance. After initiation of enteral feeds PN support was weaned every 1-2 months as enteral calorie intake increased. After 8 months enteral intake was sufficient to decrease days of PN support, replacing with custom IV fluids on PN off days. Ultimately, 15 months after starting feeds, PN was discontinued with transition to daily dextrose containing IV fluid support containing acetate. Currently, he is having 2 to 4 stools per day characterized as mushy and small in volume with stable electrolytes and weight gain along the 75thpercentile (Figure 2). As PN was weaned he started on an enteral multivitamin product that contained water miscible fat-soluble vitamins due to the risk of malabsorption. The product did not contain copper. Biochemical data collected 1-2 months after stopping PN showed normal serum vitamin levels (A, D, E, INR as a marker for vitamin K, and B12), fatty acid profile, zinc, selenium, and carnitine levels. He developed a critical copper deficiency that was treated with intravenous copper repletion with normal copper after intervention followed by maintenance dosing of enteral copper glycinate supplementation. Conclusion: CoDEs, and especially those that are secretory in nature, require close management of fluid, electrolyte, and nutrition status. Most cases of MVID caused by a MYO5B mutation require lifelong parenteral nutrition support. There have been no prior reports of intestinal rehabilitation towards enteral autonomy in patients with MVID caused by a STX3 gene mutation. This case demonstrates that weaning and discontinuation of parenteral nutrition is possible for patients with STX3 mutations. Patients with CoDEs should attempt enteral feeding when clinical status and stool output allows with close monitoring of micronutrient and electrolyte status. Attempts at enteral feeding based on genotype and clinical data rather than disorder designation should be considered for all patients with genetic enteropathies.

Methods: None Reported.

Results: None Reported.

Conclusion: None Reported.

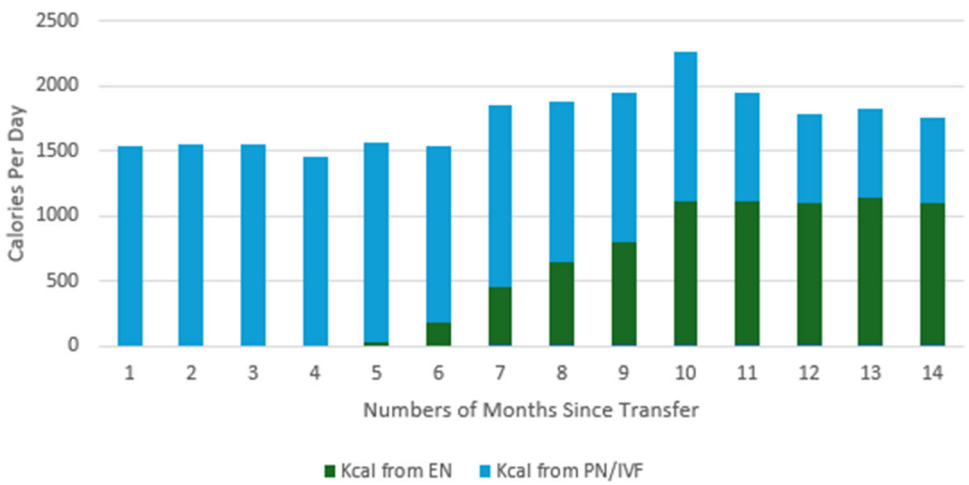

Figure 1. Amount of enteral vs parenteral nutrition support

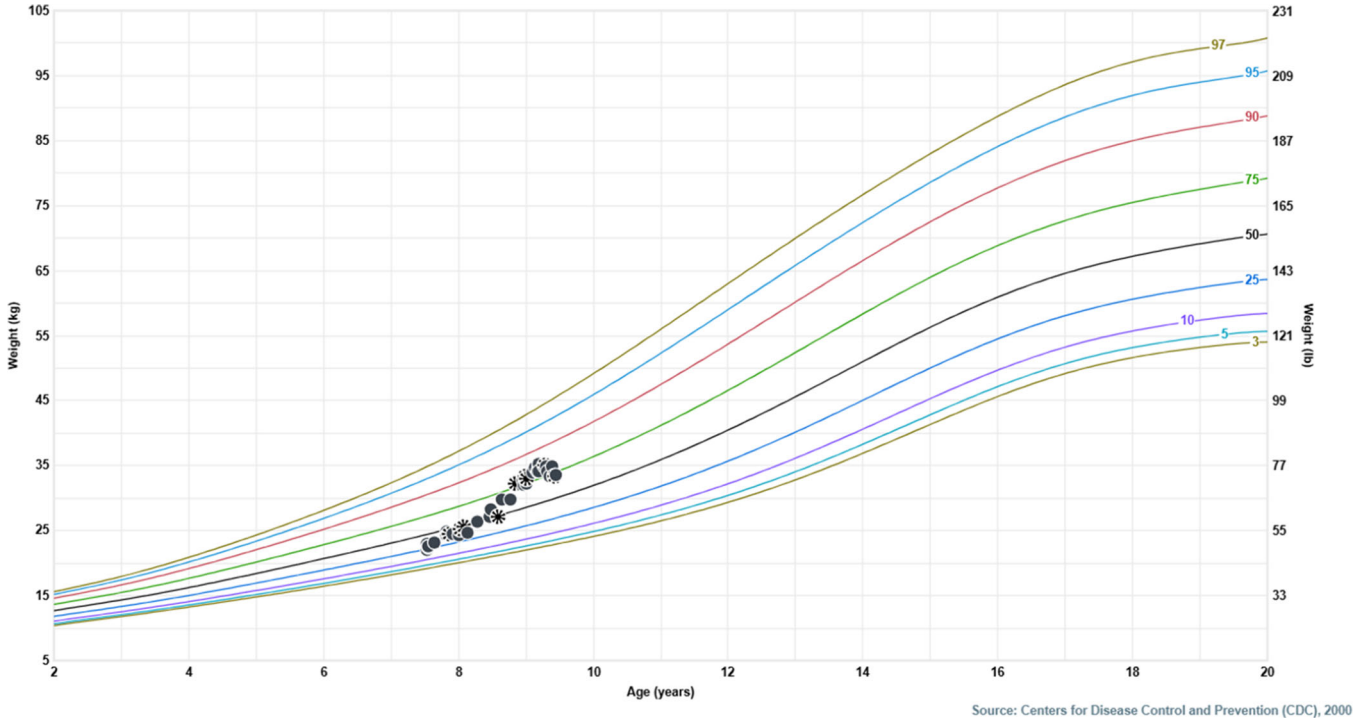

Figure 2. CDC boys aged 2 to 20 years old growth chart

2172696 - Gastrointestinal Co-Morbidities and Nutrition Support Utilization in Patients With Ehlers-Danlos Syndrome

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Financial Support: None Reported.

Background: Ehlers-Danlos Syndrome (EDS) comprises a group of heritable connective tissue disorders frequently associated with autonomic dysfunction and gastrointestinal (GI) complications, including nausea, abdominal pain, constipation, indigestion, and gastroparesis. These GI manifestations can significantly impair nutritional intake, often necessitating enteral or parenteral nutrition support (NS). This study aims to characterize patients with EDS in terms of their associated GI conditions and the prevalence of nutrition support utilization.

Methods: We performed a retrospective analysis of adult patients with EDS diagnosis seen by a registered dietitian (RD) for an outpatient clinic nutrition visit in our large academic medical center system from 2021-2025. Baseline patient characteristics, co-morbid conditions and NS outcomes were compared between patients that received TPN and patients that did not receive TPN. Statistical comparisons were performed using two-sample t-tests.

Results: A total of 16 patients met inclusion criteria. The majority were assigned female at birth (94%) with a mean age of 27 years at the time of EDS diagnosis (Table 1). The average BMI at diagnosis was 22.2 kg/m², with no significant difference between groups. No patients received gastric enteral nutrition (EN); however, 63% received jejunal EN, initiated an average of 16 months post-diagnosis. These patients tolerated a maximum mean EN rate of 40 mL/hr. On average, patients lost 4% of their body weight from the time of EDS diagnosis to EN initiation. Among the 10 patients who received jejunal EN, 8 progressed to TPN, while 2 did not ($p = 0.005$). Overall, 56% of patients required TPN, which was initiated an average of 27 months after EDS diagnosis following a mean weight loss of 11% (Table 1). TPN prescriptions averaged 21 ± 9 kcal/kg/day and 1.4 ± 0.3 g protein/kg/day. Additionally, 44% of TPN recipients required supplemental intravenous fluids (IVF). Patients had an average of 4.1 ± 1.5 co-morbid conditions, with TPN recipients exhibiting significantly more (4.8 ± 1.4) than those not receiving TPN (3.3 ± 1.4; $p = 0.03$) (Table 2). The most prevalent co-morbidities were postural orthostatic tachycardia syndrome (POTS; 94%), gastroparesis (81%), and severe malnutrition (75%). Less common conditions included inflammatory

bowel disease (IBD; 6%), superior mesenteric artery (SMA) syndrome (19%), and celiac disease (19%). TPN patients had a significantly higher incidence of median arcuate ligament syndrome (MALS), severe malnutrition, small intestinal bacterial overgrowth (SIBO), and SMA syndrome ($p < 0.05$).

Conclusion: Patients with EDS commonly experience a range of GI comorbidities. In our cohort, over half required jejunal EN and/or TPN, with those receiving TPN exhibiting significantly more GI conditions. A better understanding of the clinical trajectory that leads to NS is essential to optimizing nutritional care in this complex patient population.

Table 1. Comparison of baseline demographics and nutrition outcomes in EDS patients with and without TPN

Characteristic	Total (n=16)	TPN (n=9)	No TPN (n=7)	*p*-value
Age at EDS diagnosis, years, mean ± SD	27 ± 14	23 ± 7	32 ± 20	0.11
Sex assigned at birth, n (%)				
Male	1 (6%)	0 (0%)	1 (14%)	0.14
Female	14 (94%)	9 (100%)	6 (86%)	0.14
Ethnicity, n (%)				
White	14 (88%)	9 (100%)	5 (71%)	0.05
Black	1 (7%)	0 (0%)	1 (14%)	0.14
Native American	1 (7%)	0 (0%)	1 (14%)	0.14
BMI at EDS diagnosis, kg/m², mean ± SD	22.2 ± 4.7	21.9 ± 5.2	22.5 ± 4.3	0.40
Comorbidities per patient, mean ± SD	4.1 ± 1.5	4.8 ± 1.4	3.3 ± 1.4	**0.03**
Nutrition outcomes (EN)				
Jejunal EN use, n (%)	10 (63%)	8 (89%)	2 (29%)	**0.005**
Time to EN start, months, mean ± SD	16 ± 15	14 ± 14	22 ± 20	0.27
Max jejunal EN rate tolerated, ml/hr, mean ± SD	40 ± 22	41 ± 25	38 ± 11	0.43
% weight loss before EN start, mean ± SD	4 ± 27	0 ± 30	13 ± 17	0.26
Nutrition outcomes (TPN)				
Time to TPN start, months		27 ± 24		
Energy provided, kcal/kg/day		21 ± 9		
Protein provided, g/kg/day		1.4 ± 0.3		
% weight loss before TPN start		11 ± 17		
Patients receiving supplemental IVF, n (%)		4 (44%)		

Abbreviations: BMI, body mass index; EDS, Ehlers-Danlos Syndrome; EN, enteral nutrition; IVF, intravenous fluids; SD, standard deviation; TPN, total parenteral nutrition.

Table 2. Comorbidities in patients with and without TPN

Co-morbidity	Total n (%)	TPN n (%)	No TPN n (%)	*p*-value
Celiac disease	3 (19%)	1 (11%)	2 (29%)	0.20
Eating Disorder	5 (31%)	3 (33%)	2 (29%)	0.43
Gastroparesis	13 (81%)	7 (78%)	6 (86%)	0.36
Inflammatory bowel disease (IBD)	1 (6%)	0 (0%)	1 (14%)	0.14
Mast cell activation syndrome (MCAS)	6 (38%)	3 (33%)	3 (43%)	0.36
Median arcuate ligament syndrome (MALS)	5 (31%)	5 (56%)	0 (0%)	**0.008**
Postural orthostatic tachycardia syndrome (POTS)	15 (94%)	9 (100%)	6 (86%)	0.14
Severe malnutrition	12 (75%)	9 (100%)	3 (43%)	**0.003**
Small intestinal bacterial overgrowth (SIBO)	3 (19%)	3 (33%)	0 (0%)	**0.05**
Superior mesenteric artery (SMA) syndrome	3 (19%)	3 (33%)	0 (0%)	**0.05**

Malnutrition and Nutrition Assessment

Abstract of Distinction Award

2206816 - Sarcopenia Index as a Predictor of Length of Stay in Trauma ICU Patients

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Financial Support: Department of Defense, Baxter, Abbott, Duke Pepper Older Americans Independence Center.

Background: Sarcopenia and poor nutritional status are associated with adverse outcomes after trauma, but bedside measures are often limited. The sarcopenia index, calculated from routinely available serum creatinine and cystatin C values, has emerged as a potential biomarker of muscle mass. Lower sarcopenia index values reflect reduced muscle mass and sarcopenia risk. Whether sarcopenia index or bioelectrical impedance-derived skeletal muscle mass (SMM) can predict recovery in critically injured patients remains uncertain. We hypothesized that lower sarcopenia index, lower SMM, and lower Mini Nutritional Assessment (MNA) scores would each be independently associated with longer hospital length of stay (LOS). To test this hypothesis, we evaluated the associations of sarcopenia index, SMM, and MNA with LOS in a prospective trauma ICU cohort using regression models adjusted for demographic and clinical covariates, with sensitivity analyses for renal function and test timing.

Methods: We conducted a single center observational study of trauma ICU patients with paired bioimpedance analysis (BIA) and renal function data. Sarcopenia index (serum creatinine divided by cystatin C multiplied by 100), bioelectrical impedance derived SMM, and MNA scores were evaluated as predictors of LOS. Our research plan was to first evaluate the unadjusted associations of sarcopenia index, SMM, and MNA with LOS, then fit fully adjusted models controlling for age, sex, BMI, and Injury Severity Score (ISS). Sensitivity analyses incorporated renal function measures (serum creatinine and cystatin C) and the timing of sarcopenia index and BIA testing from admission. Marginal effects were calculated to translate model estimates into differences in LOS in days.

Results: The cohort (N = 24) included patients admitted after fall (50%), motor vehicle collision (42%), or other mechanisms. Median age was 71 years (range 19 to 94), 58% were male, and mean BMI was 27.4 ± 4.8. In unadjusted models, lower sarcopenia index, lower SMM, and lower MNA each trended toward longer LOS. In fully adjusted models with multiple imputation, lower sarcopenia index was independently associated with longer LOS. Each 10-point increase in sarcopenia index corresponded to approximately two fewer hospital days (incidence rate ratio 0.98, 95% confidence interval 0.97-0.99). Results were robust when renal function and measurement timing were included. SMM by BIA showed a directionally similar effect (0.6 fewer days per 5-kilogram increase), but was not statistically significant. MNA was not associated with LOS after adjustment. Exploratory stratification suggested that the sarcopenia index and LOS association was stronger among patients injured by motor vehicle collision compared with fall, but sample sizes limited interaction estimates.

Conclusion: In critically injured patients, lower sarcopenia index values, reflecting lower muscle mass, predicted longer hospital stay independent of age, sex, BMI, injury severity, renal function, and timing of measurement. Neither bioelectrical impedance derived SMM nor MNA score were robust predictors in this cohort. The sarcopenia index, calculated from routine laboratory measures, may represent a simple and clinically useful biomarker of recovery trajectory in trauma populations. Larger multicenter cohorts are needed to confirm the magnitude of association, explore interactions by mechanism of injury, and determine whether sarcopenia index can guide nutritional or rehabilitative interventions.

2206406 - Impact of a Rehabilitation Program Combining Adapted Physical Activity, Nutritional Intervention, and Therapeutic Education on the Quality of Life of Patients With Inflammatory Bowel Disease (IBD)

Solene Dermine, MD[1]; Lea Alioui, MD[1]; Justine Bourdillel[1]; Lore Billiauws, MD[1]; Emilie Lecoq[1]; Clement Bresteau, MD[1]; Syrine Jarraya, MD[1]; Thomas Bazin, MD, PhD[1]; Francisca Joly, MD, PhD[2]

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Financial Support: None Reported.

Background: Patients with inflammatory bowel disease (IBD) experience a significant deterioration in their quality of life. The objective of this pilot study is to evaluate the impact of a rehabilitation program called PROACTIVE including nutritional care, adapted physical activity (APA), and therapeutic education (TP) on the quality of life and physical performance of patients with IBD.

Methods: We conducted a single-center observational study. PROACTIVE was proposed to patients with IBD prior to surgery or following a severe flare-up. The program was carried out in the form of day hospitalizations (2 sessions per week for 6 weeks), with an initial individual multimodal assessment (S0), 10 group sessions, and a final multimodal assessment (S6). Each session included 90 minutes of APA, a TP workshop, and individual visits (dietician, doctor, specific specialist). A new remote assessment (12 months) was then proposed. During assessments, were collected: IBD activity, quality of life (IBD-Disk and SF-36 questionnaire), nutritional assessment (weight, BMI, and body composition by BIA), physical assessment (handgrip, 6-minute endurance test, get up and go), and sedentary lifestyle test (Ricci and Gagnon score). The ECIPE score was used to assess patients' psychoeducational knowledge. The primary endpoint was the change in quality of life at the end of the program (S6). Secondary endpoints were the change in quality of life at M12, the response in muscle strength, muscle mass and physical performance, and the impact of the program on knowledge of the disease. The alpha risk was set at 0.05.

Results: Between April 2023 and June 2025, 37 patients (43% women; 70% Crohn's disease/30% ulcerative colitis), with a mean age of 37 years, were included, completing a total of 397 sessions. At S0, 62% of patients were in clinical remission. Muscle mass deficit was observed in 43% of patients. At S6, a significant improvement in quality of life was observed using the IBDdisk (28/100 vs. 53/100 at S0) ($p = 0.03$) and the SF36 score (63/100 vs. 37/100)($p = 0.03$). At M12, 15/37 patients were evaluated, with a significant maintenance of the improvement in IBDdisk. We observed a gradual improvement in muscle strength, which was significant at M12 (handgrip: 33 and 38 kg vs. 30 kg at S6 and M12, respectively, $p = 0.01$) without a statistically significant improvement in muscle mass (lean body mass index 18.3 and 18.3 vs 17.9). At S6, physical performance improved in endurance tests (559 vs. 470 m, $p = 0.0012$) and in the get-up-and-go test (5.6 vs. 7 s,$p = 0.001$). Patients' knowledge of their disease was significantly improved at S6 and maintained at M12 (32, 30 vs. 25, $p = 0.0017$, 0.0250).

Conclusion: This pilot study evaluating the impact of a rehabilitation program for patients with IBD shows that holistic care improves quality of life, physical performance, and knowledge about their disease. A multicenter study on a larger population would confirm the feasibility and impact of structured, comprehensive care.

2182019 - Phase Angle as a Biomarker of Malnutrition and its Association With Adverse Events in Oncology Patients: A Prospective Cohort Study

Thais Steemburgo, RD, PhD[1]; Larissa Maffini[2]; Camilla Horn[2]; Giovana Camargo[2]; Isabela Prade[2]; Gabriela Souza[2]; Tatiana de Paula[2]
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Financial Support: None Reported.

Background: In clinical practice, nutritional assessment of patients with cancer can be conducted using anthropometric and biochemical parameters, clinical valuation, and subjective tools. The phase angle (PhA), derived from bioelectrical impedance analysis (BIA), is increasingly recognized as an objective marker of body cell mass and overall nutritional status. This study aimed to evaluate the clinical utility of PhA by BIA as a biomarker for identifying malnutrition and its association with adverse clinical outcomes in patients with cancer.

Methods: This prospective study involved adult patients admitted between February and July 2025 to the Hospital de Clínicas de Porto Alegre, Porto Alegre, Brazil. All data were collected within 48 hours of hospital admission. Single-frequency BIA (Biodynamics BIA 450 Bioimpedance Analyzer) was performed after an overnight fast, with the patient lying down and the electrodes positioned on the right side of the body. In addition, patients underwent assessments of anthropometric measurements, nutritional status, calf circumference (CC), and muscle strength using a handgrip strength (HGS) test. Low CC was defined as ≤34 cm for men and ≤33 cm for women, while reduced HGS was defined as < 27 kg for men and < 16 kg for women. Logistic regression analyses, adjusted for potential confounders, were conducted to evaluate the association between low phase angle (PhA < 5°) and adverse outcomes, including length of hospital stay (LOS) and in-hospital mortality.

Results: A total of 120 patients were evaluated [57.2 ± 15.4 years, 48.3% men, 50% with solid tumors). The median LOS was 12 (8 – 22) days, 53.3% of patients were hospitalized for ≥ 12 days, and in-hospital mortality was observed in ~11% of all patients. Compared with patients without cancer, those with cancer exhibited higher rates of malnutrition according to the Subjective Global Assessment (75% vs. 28.3%; $p < 0.001$), lower CC (55% vs. 23.3%; $p < 0.001$), and reduced HGS (58.3% vs. 33.3%; $p = 0.005$). PhA assessment revealed significantly lower values in cancer patients ($p = 0.004$). Moreover, cancer patients with low PhA (< 5°) had 8.5 times higher odds of in-hospital mortality and 9.0 times higher odds of LOS than those with normal PhA.

Conclusion: This study underscores the prognostic value of PhA and supports the clinical relevance of BIA in assessing malnutrition. The association between low PhA levels and adverse outcomes in patients with cancer further emphasizes its potential as a practical tool for routine nutritional evaluation in clinical practice.

Table 1. Characteristics of 120 hospitalized patients according to the presence of cancer

Characteristics	Inpatients			
	Overall (n = 120)	With cancer (n = 60.5%)	Without cancer* (n = 60.5%)	P value
General				
Age (years. mean ± SD)	57.2 ± 15.4	62.0 ± 14.0	52.5 ± 15.3	0.001
Sex (Male)	58 (48.3%)	33 (55%)	25 (41.7%)	0.1
Ethnicity (White)	96 (80%)	46 (76.7%)	50 (83.3%)	0.204
Alcohol user (yes)	44 (36.7%)	23 (38.3)	21 (35%)	0.425
Physical activity (no)	99 (82.5%)	52 (86.7)	47 (78.3%)	0.168
Smoking (yes)	61 (50.8%)	31 (52.5)	30 (50%)	0.757
Clinical				
Type of admission				0.494
Surgical	74 (61.2%)	35 (57.3%)	39 (65%)	
Clinical	46 (38.3%)	25 (42.7%)	21 (35%)	
Comorbidities** (≥2)	56 (46.7%)	31 (51.7%)	25 (41.7%)	0.433
CRP (mg/dL)	90.6 (19.8 – 176.6)	139.6 (78.2-176.6)	63.4 (19.8 – 103.1)	0.003
Outcomes				
LOS (days)	12 (8-22)	17 (10-28)	9 (7-16)	<0.001
LOS ≥ 12 days	64 (53.3%)	42 (70%)	22 (36.6%)	<0.001
In-hospital mortality	13 (10.8%)	13 (21.7)	0	<0.001
Nutritional				
Current weight (kg)	71.5 ± 16.0	68.4 ± 15.3	74.6 ± 16.2	0.034
BMI (kg/m^2)	26.2 ± 5.6	25.3 ± 5.49	27.2 ± 5.6	0.06
Malnutrition (by SGA)	62 (51.7%)	45 (75%)	17 (28.3%)	<0.001
CC (cm)	34.8 ± 4.3	33.8 ± 4.45	35.8 ± 4.0	0.01
CC (low)	47 (39.17%)	33 (55%)	14 (23.3%)	<0.001
HGS (kg)	20 (14-29)	18 (13.25-25)	23.5 (15.5-29.5)	0.031
HGS (low)	55 (45.8%)	35 (58.3%)	20 (33.3%)	0.005
Fat mass. %	27.9 ± 9.2	27.1 ± 10.4	28.7 ± 9.7	0.37
ALSTI (kg/m^2)	24.6 ± 1.3	24.1± 6.1	24.9 ± 6.3	0.496
PhA	5.4 ± 1.4	5.0 ± 1.4	5.8 ± 1.3	0.004

Abreviations: BMI, body mass index; CRP, C- reactive protein; LOS; length of stay; SGA, Subjective Global Assessment; CC, calf circumference; HGS, handgrip strength; ALSTI, appendicular lean soft tissue index; PhA. phase angle.
*Types of cancer included: kidney, liver, pancreas, gastrointestinal tract, lung, and head and neck.
** Comorbidities included: type 2 diabetes, hypertension, and cardiovascular diseases.

Table 2. Association between low PhA and negative outcomes: logistic regression models

	In-hospital mortality			LOS ≥ 12 days		
	OR[a]	95%CI	P value	OR[a]	95%CI	P value
Low PhA <5°	8.47	2.01 - 35.6	0.004	9.06	1.9 - 41.1	0.005

[a] Model adjusted for: sex, age, type of cancer, and comorbidities.

Best of ASPEN Award-Malnutrition and Nutrition Assessment

2200290 - Underrecognized Low Muscle Stores by NFPE: A Retrospective CT-Based Body Composition Analysis

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Financial Support: Morrison Cleveland Clinic Research Collaborative.

Background: Evaluating muscle wasting is central to malnutrition diagnosis but is often underrecognized in clinical practice. Registered Dietitians (RDs) traditionally rely on the Nutrition Focused Physical Exam (NFPE), which may miss subtle or baseline low muscle stores. Computed tomography (CT)-derived skeletal muscle index (SMI) and skeletal muscle density (SMD) provide objective, quantitative measures of muscle mass and quality. RDs trained in radiologic interpretation analysis with NFPE may enhance detection of malnutrition and clarify the impact of

confounding factors such as edema. We hypothesize that this combined approach will identify a greater proportion of patients with low muscle mass compared to NFPE alone.

Methods: We retrospectively analyzed 120 hospitalized adults at risk for malnutrition who underwent both NFPE and CT-based body composition analysis from a clinically indicated scan. Among them, 68 patients were assessed as having no muscle wasting by NFPE. CT analysis at the mid-L3 vertebral level calculated skeletal muscle area and density using an AI-based platform (Voronoi DAFS v3). SMI was classified using sex-specific standardized cutoffs (moderately low = 1–2 SD below mean; severely low = >2 SD below mean). Low SMD was defined per established thresholds. Edema prevalence was compared across malnutrition etiology groups and quantified for overlap with low SMI/SMD.

Results: Among patients without NFPE-identified muscle wasting, 73.5% (n = 50) had low SMI, including 39.7% (n = 27) severely low and 33.8% (n = 23) moderately low. Low SMD was present in 60.3% (n = 41). Chronic malnutrition carried the highest burden of unrecognized severe depletion, with 52.6% severely low SMI and 73.7% low SMD ($p = 0.03$ and $p = 0.04$, respectively). Edema was present in 26.5% (18/68) overall, most frequently in acute malnutrition (41.7%), followed by none (28.6%), chronic (26.3%), and social (0%). Among patients with edema, 72.2% (13/18) had low SMI and 66.7% (12/18) had low SMD, suggesting that fluid retention can obscure underlying muscle depletion.

Conclusion: A substantial proportion of patients deemed to have normal muscle stores by NFPE were found to have low muscle mass and poor muscle quality by CT, particularly in chronic malnutrition. Edema frequently overlapped with low SMI and SMD, indicating that fluid retention may mask true muscle depletion and contribute to discordance between NFPE and CT findings. Incorporating CT-derived body composition into nutritional assessment may improve early recognition of muscle loss, enabling more precise and timely nutrition interventions.

International Abstract of Distinction Award

2203077 - From CT Images to Calories: Two Key Answers for Nutrition Assessment Obtained Through a Single Test

Fiorella Palmas, MD, PhD[1]; Fernanda Mucarzel, BSc[2]; Raul Cartiel, BSc[2]; Cora Oliver, BSc[3]; Aitor Rodriguez[4]; Alba Zabalegui, MD[2]; Guillermo Cardenas, BSc[2]; Rosa Burgos, MD, PhD[3]

[1]Nutrition Unit, Department of Endocrinology and Nutrition, Vall d'Hebron University Hospital, Barcelona, Spain; [2]Nutrition Unit, Department of Endocrinology and Nutrition, Vall d'Hebron University Hospital, Barcelona, Spain, Catalonia; [3]Department of Endocrinology and Nutrition, Vall d'Hebron University Hospital, Barcelona, Spain, Catalonia; [4]Institut De Diagnostic Per La Imatge (IDI), Hospital Universitari Vall d'Hebron, Barcelona, Spain, Catalonia

Financial Support: The model for CT-based estimation is patented in collaboration with Artis Development and the Vall d'Hebron Institute of Research (VHIR). The company did not participate in data collection and did not provide financial support for the study.

Background: In clinical nutrition, adapting energy intake to a patient's needs is essential to avoid complications from overnutrition or malnutrition. Predictive equations are widely used but show considerable variability. Clinical guidelines recommend indirect calorimetry (IC) as the gold standard, although its availability is limited. Computed tomography (CT) is a necessary imaging technique in hospitals, routinely performed for various pathologies. It is also considered a gold standard for body composition (BC) analysis, and recent advances in image processing have facilitated its use. In a previous study, we demonstrated that CT can estimate resting energy expenditure (REE) with accuracy comparable to bioelectrical impedance analysis (BIA) and higher than certain predictive equations 1. Our objective in this study, was to validate the clinical utility of CT-based REE estimation in a larger sample and to compare its performance with more accessible, commonly used methods.

Methods: Hospitalized adult patients with abdominal CT underwent BIA and IC within a maximum interval of 15 days. BC was analyzed at the L3 level using the automated FocusedOn-BC software. REE was estimated using two CT-based models, BIA, and five equations. Agreement with IC was assessed using mean absolute error (MAE), root mean square error (RMSE), concordance correlation coefficient (CCC), bias, and Bland-Altman limits of agreement.

Results: We analyzed 245 patients (63% male, mean age 60.9 ± 19.1 years; BMI 24.6 ± 4.9 kg/m^2). The expanded sample reinforced the discrete superiority of CT-derived REE estimates, which showed the highest concordance with IC and the lowest error, followed by BIA. Predictive equations performed worse overall (Table 1).

Conclusion: CT can simultaneously provide accurate BC analysis and reliable REE estimation. Incorporating REE estimation into CT scans already performed in routine clinical care could optimize nutritional therapy, outperforming traditional methods without additional equipment or costs.

The expanded sample confirmed the robustness of previous results, with modest improvements in CT models. Further studies should refine the models and strengthen clinical applicability.

Table 1. Performance metrics for REE estimation methods (n = 245)

Method	MAE (kcal/d)	RMSE (kcal/d)	CCC	Bias (kcal/d)	LoA lower	LoA upper
CT model 2 (FFM)	227.36	296.67	0.575	0.41	-591.90	592.72
CT model 1 (muscle)	230.63	298.03	0.57	0.23	-595.45	595.92
BIA	247.53	320.23	0.484	2.80	-626.11	631.71
Harris–Benedict	258.3	329.44	0.411	4.75	-642.22	651.71
Ireton-Jones	267.45	347.08	0.559	84.49	-576.67	745.65
Mifflin-St Jeor	271.89	337.34	0.487	-127.36	-740.87	486.15
ESPEN 25 kcal/kg	311.57	395.21	0.473	207.52	-453.05	868.09
ESPEN 30 kcal/kg	557.65	652.72	0.283	542.60	-169.94	1255.14

Methods are ordered by decreasing CCC (highest agreement with indirect calorimetry) and increasing MAE (lowest error relative to calorimetry).

BIA = bioelectrical impedance analysis; CCC = concordance correlation coefficient; CT = computed tomography; FFM = fat-free mass; IC = indirect calorimetry; LoA = limits of agreement; MAE = mean absolute error; REE = resting energy expenditure; RMSE = root mean square error.

International Abstract of Distinction Award

2205497 - The High Burden of Inadequate Nutritional Intake, Sarcopenia, and Low Phase Angle in Hemodialysis Patients in a Public Health System in Latin America

Otilda Valderrama, MD[1]; Ruth Ávila, RND[1]; Rossana Broce, RND[1]; Mayte Batista, RND[1]; María Vergara, RND[1]; Alieth Sáez, RND[1]; Victoria Rodríguez, RND[1]; Adilia Gómez González, RND[1]; Eyleen Montero Romero, RND[1]; Israel Barría, RND[1]; Mónica Montenegro, RDN[1]
[1]Hospital Santo Tomás, Panama

Financial Support: None Reported.

Background: Patients on maintenance hemodialysis often face nutritional challenges, such as reduced appetite, dietary restrictions, and the catabolic effects of dialysis, all of which may lead to insufficient energy and protein intake. These deficits adversely affect body composition and muscle strength, increasing risk of complications, mortality, and reduced quality of life. Sarcopenia has emerged as a key prognostic factor in dialysis populations, while phase angle is increasingly recognized as a marker of cellular health. Guidelines recommend adequate energy and protein intake, yet many hemodialysis patients fall short. Data from Latin America remain scarce regarding dietary inadequacy, sarcopenia, and phase angle. We therefore aimed to characterize these parameters in adult patients undergoing hemodialysis in a public health system in Latin America.

Methods: We conducted an observational, cross-sectional study of adults patients receiving hemodialysis ≥6 months at Hospital Santo Tomás the only tertiary-level referral hospital in the Panamanian public health system, serving patients without private or social insurance. Exclusion criteria were amputations, metallic implants, generalized edema, or missing data. Dietary intake was assessed using a 24-hour recall obtained and compared with international recommendations (≥35 kcal/kg/day and ≥1.3 g/kg/day). Adequacy was categorized as < 80%, 80–99%, 100–120%, or >120%. Body composition was measured after dialysis using multifrequency bioelectrical impedance analysis. Handgrip strength was measured with a Jamar dynamometer following standardized procedures. Calf circumference (CC) and standardized phase angle (PA_Z) were analyzed using published international cutoffs. Sarcopenia was diagnosed according to EWGSOP2 criteria, requiring the coexistence of low muscle strength and low muscle mass. The study protocol was approved by the Institutional Bioethics Committee of our institution.

Results: We analyzed 105 patients with a mean age was 44.8 ± 14.5 years, of which 63.8% were women with a median dialysis time of 24 months (IQR 12–72). Median energy intake was 17.0 kcal/kg/day (IQR 13.2–22.8) and protein intake 0.79 g/kg/day (0.60–0.98). Overall, 82.9% of patients consumed < 80% of their energy requirements, 79.0% consumed < 80% of protein needs, and only 3.8% met both targets. Low muscle strength was identified in 38.8% of men and 50.0% of women, while low muscle mass was found in 22.4% and 50.0%, respectively. Sarcopenia was confirmed in 13.4% of men and 28.9% of women. CC was strongly related to sarcopenia, with prevalence increasing from 3.1% (normal) to 31.2% (moderate reduction; OR 14.3, 95%CI 2.46–83.3) and 54.2% (severe reduction; OR 37.3, 95%CI 7.36–188.2; $p < 0.0001$). ROC analysis demonstrated excellent diagnostic performance for CC and handgrip strength. PA_Z was significantly lower in patients with sarcopenia compared to those without (−3.29 ± 1.60 vs. −1.92 ± 2.48; p = 0.004). Notably, no patient with PA_Z ≥ 0 had sarcopenia. PA_Z correlated positively with CC (r = 0.31, $p < 0.01$) and handgrip strength (r = 0.25, p = 0.009).

Conclusion: Most hemodialysis patients in this cohort failed to achieve recommended energy and protein intakes, with fewer than 5% meeting both nutritional targets. Nearly one in four patients had sarcopenia, particularly women. CC, handgrip strength, and PA_Z showed excellent diagnostic performance and may serve as simple, low-cost tools in clinical practice. Because this population was drawn from a public hospital serving uninsured patients, limited economic resources likely exacerbate nutritional inadequacy. These findings underscore the urgent need to strengthen nutrition care policies and develop targeted interventions in this population.

Table 1. Energy and protein intake adequacy

Variable	Findings
Energy	
Intake, kcal/kg/day (median, IQR)	17.0 (13.2–22.8)
Adequacy, %	
<80%, n (%)	87 (82.9)
80–99%, n (%)	12 (11.4)
100–120%, n (%)	3 (2.9)
>120%, n (%)	3 (2.9)
Protein	
Intake, g/kg/day (median, IQR)	0.79 (0.60–0.98)
Protein adequacy	
<80%, n (%)	83 (79.0)
80–99%, n (%)	14 (13.3)
100–120%, n (%)	2 (1.9)
>120%, n (%)	6 (5.7)
Patients achieving ≥35 kcal/kg/day, n (%)	6 (5.7)
Patients achieving ≥1.3 g/kg/day, n (%)	8 (7.6)
Patients achieving both targets, n (%)	4 (3.8)

Intake adequacy was calculated relative to international recommendations of 35 kcal/kg/day and 1.3 g/kg/day. Values are expressed as median (IQR) or n (%).

Table 2. Body composition and muscle strength by sex

Variable	Men (n=67)	Women (n=38)
Handgrip strength (kg)		
Median (IQR)	29.8 (20.7–37.5)	14.3 (10.3–21.3)
Low, n (%)	26 (38.8%)	19 (50.0%)
Normal, n (%)	41 (61.2%)	19 (50.0%)
Skeletal muscle mass index (kg/m^2)		
Mean ± SD	8.06 ± 1.64	6.16 ± 1.34
Low, n (%)	15 (22.4%)	19 (50.0%)
Normal, n (%)	52 (77.6%)	19 (50.0%)
Prevalence Low HS + Low SMMI	9 (13.43%)	11 (28.95%)
<40y	4 (16.7%)	6 (40%)
40-49y	2 (9.1%)	1 (16.7%)
50-59y	2 (25%)	2 (33.3%)
60-69y	1 (10%)	2 (22.2%)
≥70y	0 (0%)	0 (0%)
Phase angle, median (IQR)	5.40 (4.20–6.40)	5.10 (4.10–6.75)
Calf circumference adjusted (cm), median (IQR)	36 (33 – 39)	33.5 (29.2 – 38.4)
Normal	44 (65.7%)	21 (55.3%)
Moderate reduction	10 (14.9%)	6 (15.8%)
Severe reduction	13 (19.4%)	11 (28.9%)

Low handgrip strength and low skeletal muscle mass index were defined according to EWGSOP2 criteria. Values are expressed as mean ± SD, median (IQR), or n (%).

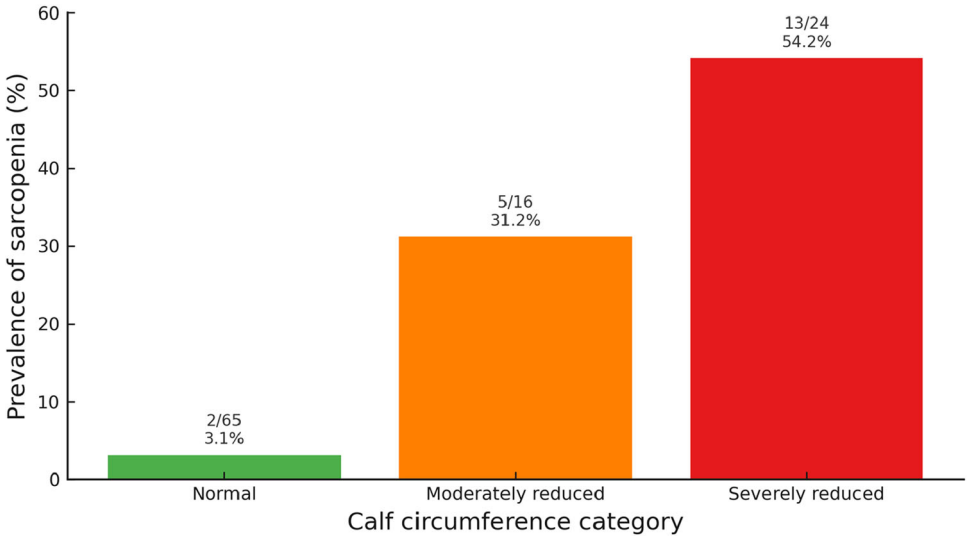

Figure 1. Prevalence of sarcopenia according to calf circumference categories

Values are shown as n/total and percentage.

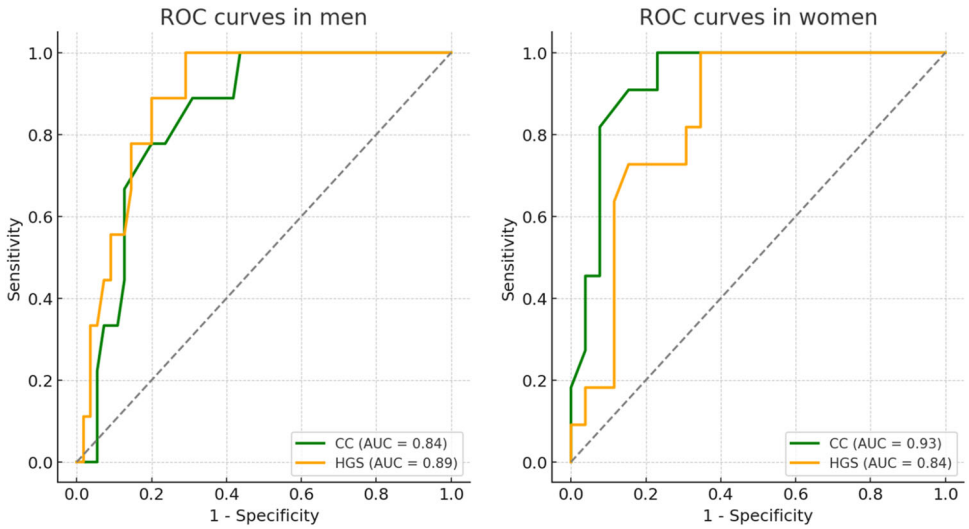

Figure 2. ROC curves of calf circumference (CC) and handgrip strength (HGS) for sarcopenia prediction, stratified by sex

Receiver operating characteristic (ROC) curves illustrating the diagnostic performance of calf circumference and handgrip strength for identifying sarcopenia according to EWGSOP2 criteria. In men, optimal cut-off points were CC < 34.0 cm (AUC = 0.84) and HGS < 23.6 kg (AUC = 0.89). In women, optimal cut-offs were CC < 32.5 cm (AUC = 0.93) and HGS < 14.6 kg (AUC = 0.84).

Critical Care and Critical Health Issues

2206030 - Early IC-Guided and RD-Led Personalized Nutrition Using the SeND Home (StructurEd Nutrition Delivery) Pathway in Trauma Laparotomy Patients

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Financial Support: Department of Defense, Baxter, Abbott.

Background: Trauma laparotomy patients are at high risk for malnutrition, yet energy and protein delivery remain consistently below target in most intensive care settings. Barriers include delayed initiation and discontinuation of parenteral nutrition (PN), inconsistent timing of nasogastric tube (NGT) removal, and lack of standardized use of oral nutrition supplements (ONS). The SeND Home Structured Nutrition Delivery Pathway was developed to overcome these barriers by establishing a registered dietitian (RD) driven model of nutrition care. Within this pathway, surgeons determine whether oral or enteral intake is feasible; however, RDs are responsible for all aspects of PN initiation and discontinuation, NGT removal, and prescribing ONS once oral intake resumes. Indirect calorimetry (IC) is integrated to personalize energy targets.

Methods: We implemented the SeND Home pathway in trauma laparotomy patients and prospectively evaluated the first 10 patients enrolled. Patients in the intervention group were managed by the pathway, which included IC-based nutrition targets, PN initiation on day 3 if oral or enteral intake was inadequate, RD-directed PN discontinuation, mandatory ONS with meals, and structured transition from PN to enteral or oral intake. Control patients received standard care, with late PN initiation on day 7 if oral or enteral intake was inadequate, and nutrition decisions were directed by the surgical team. Daily PN, EN, and ONS intake were recorded for 14 days or until discharge. The intake of a regular diet could not be reliably quantified.

Results: Ten patients were included (intervention n = 4, control n = 6). In the intervention group, the mean resting energy expenditure, measured by IC, was 1860 kcal per day (range, 1083–2518). Mean daily energy delivery was 326–887 kcal, corresponding to 26–49 percent of REE (mean 34 percent). Mean protein delivery was 48 g per day (range 25–72). In the control group, mean daily energy delivery was 797–834 kcal with protein delivery of 67–80 g per day. All intervention patients received ONS with oral meals, and PN was discontinued by RD decision once intake advanced. By day 7, most intervention patients had transitioned to combined PN and EN or oral intake, whereas control patients remained PN-dependent after initiation.

Conclusion: The SeND Home Structured Nutrition Delivery Pathway demonstrates that shifting authority for PN initiation and discontinuation, NGT removal, ONS supplementation, and transitions to oral intake from surgeons to RDs is feasible in trauma laparotomy patients. Even with IC-guided energy targets, adequacy of delivery remained low, reflecting the complexity of surgical critical illness. However, the pathway successfully standardized transitions, ensured universal use of ONS, and allowed for timely discontinuation of PN. These findings suggest that RD-led protocols can address longstanding structural barriers in nutrition delivery. The ongoing implementation will evaluate pathway expansion in a larger cohort and its impact on achieving nutritional adequacy and functional and Quality of Life outcomes.

2204115 - ABCs of Critical Care: Adding "G" for Good Nutrition to the ICU Bundle

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Financial Support: None Reported.

Background: The ABCDEF bundle is an evidenced-based, quality improvement strategy to improve patient care and reduce negative outcomes in the Intensive Care Unit (ICU), including duration of mechanical ventilation, delirium and coma, while promoting mobility and family engagement. Nutrition is notably missing from this interdisciplinary bundle. To address this gap, a large, multi-site health system added a new component: "G" for Good Nutrition. This novel inclusion of nutrition in ICU care incorporates protocols for early initiation of enteral nutrition (EN) and standardized 18-hour EN feeds to reduce feeding interruptions.

Methods: The health system introduced the ABCDEF ICU bundle in 2021 and added "Good Nutrition" standardized ICU enteral nutrition protocols in 2023 including: early initiation of EN within 24-48 hours; progressive EN advancement to >80% of estimated nutrition needs; and standardized 18-hour feeds to meet goal EN without interruption. A health system dashboard was created in 2025 to track RDN compliance in completing a nutrition evaluation on each patient within 2 days of ICU admission. The dashboard additionally tracks whether the patient's nutrition risk status was captured by the Malnutrition Screening Tool (MST) at time of hospital admission, and whether the RDN diagnosed nutrition risk (malnutrition and/or over/underweight) while the patient was in the ICU. Outcome measures tracked after initiation of this multifactorial ICU bundle include average ICU length of stay (LOS) and average ventilator days.

Results: Since the introduction of the Good Nutrition protocol in the ABCDEFG ICU bundle, 97% of hospital ICUs in the health system incorporated cyclic enteral feeding by 2025, to reduce interruptions in nutrition provision. ICU 2-day compliance improved in 2025 from 61% to up to 78% across the health system. RDNs diagnosed nutrition risk for approximately 30% of ICU patients assessed, exceeding the approximately 19% who were identified as at risk by the MST screen on admission. Average ICU LOS decreased from 3.9 days in 2021 to 3.7 days in 2024 across the health system. Average ventilator days decreased from 3.9 days in 2021 to 3.3 days in 2024. Improvements in outcome measures were noted after the 2021 implementation of multifactorial initiatives including pain and sedation management, spontaneous awakening/breathing trials, delirium management, and early mobility and family engagement, in collaboration with the Good Nutrition protocols implemented from 2023-2025.

Conclusion: The ABCDEF bundle is an evidence-based strategy for improving patient centered care and clinical outcomes in the ICU. One health system added the unique component of Good Nutrition with the goal of introducing early EN, promoting progressive advancement to 80% of EN goal via standardized 18-hour feeds, and systemwide tracking of ICU metrics including timeliness of interventions and malnutrition risk identification. Good Nutrition protocols can support the multifactorial interventions of the ICU bundle, including early mobility and early extubation. The ABCDEFG ICU bundle has the potential to reduce iatrogenic malnutrition, reduce ICU LOS and ventilator days, and improve post-ICU function. Future nutrition initiatives to be introduced into the ICU bundle include early supplemental parenteral nutrition, and enteral trickle feeds when appropriate, for patients on non-invasive mechanical ventilation.

2182279 - Copper Deficiency From Trace Element Withholding in Continuous Renal Replacement Therapy Patients With Hyperbilirubinemia: A Case Series Driving Micronutrient Practice Improvement

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Financial Support: None Reported.

Background: Hepatic dysfunction is common in critically ill patients and may result from ischemic hepatitis, cholestasis, hemolysis, or congestive hepatopathy, conditions often marked by elevated liver enzymes, bilirubin, and altered micronutrient metabolism. Copper is frequently withheld from parenteral nutrition (PN) in these conditions when conjugated bilirubin (CB) exceeds 2 mg/dL due to concerns regarding hepatic accumulation and toxicity. However, this practice is based on data from long-term home PN patients and may not be applicable to the critically ill, particularly those receiving continuous renal replacement therapy (CRRT), where copper is lost in the effluent, increasing deficiency risk. Additional risk factors for copper deficiency include enteral nutrition with energy provision < 1500 kcal/day, jejunal feeding, end-stage liver disease, and history of bariatric surgery. Prolonged CRRT (>7–10 days) can further significantly deplete copper stores. While commercial trace element products provide 0.3 mg/day, adequate for home PN, critically ill patients on CRRT may require 1–2 mg/day. In patients with liver dysfunction and elevated CB > 2 mg/dL, withholding copper without monitoring can lead to severe deficiency, manifesting as cytopenias, neurological symptoms, and impaired wound healing. Despite these risks, current micronutrient guidelines lack specific recommendations for copper management during CRRT in the setting of hepatic dysfunction. Following a case series of severe copper deficiency in patients receiving copper-free PN during prolonged CRRT and liver dysfunction, we identified a critical gap in micronutrient management. As part of a quality improvement initiative, we implemented a revised protocol to enhance copper monitoring and supplementation in this high-risk population.

Methods: Data were extracted from electronic medical records for patients who received concurrent PN and CRRT with CB > 2 mg/dL between September 2020 and July 2022. Collected variables included patient characteristics, as well as clinical and nutritional outcomes (Tables 1 and 2).

Results: With adherence to our prior micronutrient practice standards, which recommended withholding copper when CB exceeded 2 mg/dL, all patients developed severe copper deficiency (serum copper < 76 mcg/dL and ceruloplasmin < 20 mg/dL), with cytopenia-related complications. In response to these findings, our ICU micronutrient protocol was revised to strengthen copper monitoring and supplementation for patients receiving PN and CRRT in the setting of hepatic dysfunction (Figure 1).

Conclusion: In patients receiving PN and CRRT, withholding copper due to elevated CB > 2 mg/dL may lead to severe copper deficiency. ICU protocols should incorporate close copper monitoring and adequate supplementation during CRRT, even in the presence of liver dysfunction, to prevent iatrogenic deficiencies and associated complications.

Table 1. Characteristics of patients with conjugated bilirubin >2 mg/dL receiving concurrent copper-free PN and CRRT

Case	Age	Sex	BMI (kg/m2)	Reason for Admit/Clinical Course	Etiology of Liver Dysfunction	Risk factors for Micronutrient Deficiency before CRRT
1	57	M	47.7	- Cardiac surgery - Post-cardiotomy shock - + VA ECMO	Acute ischemic hepatitis	<1500 kcal x2 weeks
2	52	M	24	Liver Transplant	ESLD	- ESLD - <1500 kcal x2 weeks
3	66	M	24.8	- Cardiac surgery - Post- cardiotomy shock - + VV ECMO	Acute ischemic hepatitis	<1500 kcal/day x2 weeks
4	64	M	20.7	VA ECMO bridge to recovery	Acute ischemic hepatitis	- <1500 kcal x2 weeks - Admitted with severe malnutrition (meeting <75% nutrition needs >1 month)
5	31	M	30.9	Liver Transplant	ESLD	- ESLD - Admitted with severe malnutrition meeting (<75% nutrition needs >1 month)
6	67	M	29.8	- Cardiac surgery - Post- cardiotomy shock - +VA ECMO	Acute ischemic hepatitis	<1500 kcal/day x1 week PTA

CRRT = continuous renal replacement therapy; ESLD = end-stage liver disease; kcal = kilocalorie; kg/m² = kilograms per meter squared; M = male; PN = parenteral nutrition; VA ECMO = venoarterial extracorporeal membrane oxygenation; VV ECMO = venovenous extracorporeal membrane oxygenation.

Table 2. Clinical and nutritional outcomes in patients with conjugated bilirubin >2 mg/dL receiving concurrent copper-free PN and CRRT

Case	Days in ICU before CRRT	# Days on CRRT	# Days CRRT + PN	# Days on CRRT + Copper-Free PN	Total Bilirubin Start of PN	Conjugated (Direct) Bilirubin (mg/dL) start of PN	*Copper Level (mcg/dl) During PN + CRRT	*Ceruloplasmin (mg/dL) during PN + CRRT	*CRP (mg/dL) during PN + CRRT	S/S of Deficiency	Platelet (K/uL)	RBC (MIL/uL)	WBC (K/uL)	ICU LOS (days)	In Hospital Mortality
1	13	61	36	7	8.6	7.66	26	17	4.7	Thrombocytopenia	86	2.42	23.6	68	Yes
2	3	18	8	6	16.1	5.06	55	12	2	Anemia, thrombocytopenia	22	2.64	7.2	23	No
3	15	41	36	36	20.2	>10.00	33	18	17.4	Thrombocytopenia	39	2.42	5.4	56	Yes
4	1	32	22	9	3.2	2.49	37	12	15	Thrombocytopenia	88	3.47	15	33	Yes
5	5	33	7	7	31	>10.00	44	16	5.7	Thrombocytopenia	19	2.4	56.5	44	No
6	0	16	14	5	10.6	8.48	63	19	7.5	Thrombocytopenia	29	2.81	18.41	16	Yes

CRP: C-reactive protein; CRRT: continuous renal replacement therapy; g/dL: grams per deciliter; Hg: hemoglobin; ICU: intensive care unit; K/μL: thousands per microliter; LOS: length of stay; mcg/dL: micrograms per deciliter; mg/dL: milligrams per deciliter; MIL/μL: millions per microliter; PN: parenteral nutrition; RBC: red blood cell; S/S: signs and symptoms; WBC: white blood cell *Copper levels in relation to CRP: • Ceruloplasmin <20 mg/dL confirms copper deficiency, regardless of CRP level • Serum copper <76 mcg/dL with CRP > 2 mg/dL suggests likely copper deficiency • Serum copper <50 mcg/dL confirms coppers deficiency, with or without elevated CRP.

Previous PN Micronutrient Protocol for CRRT	Updated PN Micronutrient Protocol for CRRT
Parenteral route: - Standard MVI + trace - if conjugated bilirubin >2 mg/dl: o No trace elements to omit copper and manganese o Add back 60 mcg of selenium and 3 mg of zinc	Parenteral route: *consider enteral route for vit B6, C and folic acid as appropriate/able* o Provide standard MVI and Trace elements o Add additional ▪ Thiamine: 100 mg/day (or up to 300 mg per dietitian discretion) ▪ Vitamin C: 250 mg (or up to 500 mg per dietitian discretion) ▪ Folic Acid: 1 mg daily ▪ Vitamin B6: 50 mg daily ▪ Selenium: 40 mcg additional (100 mcg/day total with 60 mcg coming from trace elements) ▪ Zinc: 2-7 mg additional (5-10/day mg total with 3 mg coming from trace elements) ▪ Copper: 1-2 mg (1.3-2.3 mg/day total including 0.3 mg in trace elements) ▪ If copper deficient: add 2-4 mg x6 days followed by maintenance dose (1-2 mg/day total) If conjugated bilirubin >2 mg/dl on CRRT, still at high risk for copper deficiency o Remove trace elements to omit manganese o Add additional ▪ Zinc: 5-10 mg/day ▪ Selenium: 60-100 mcg/day ▪ Copper: 1 mg/day o Monitor copper levels every 1-2 weeks ▪ Normal or elevated copper values with CRP >2 mg/dL do not exclude deficiency ▪ Assess for medical s/s of deficiency: pancytopenia, neutropenia, thrombocytopenia, microcytic anemia, delayed wound healing o Monitor manganese every 2 weeks to avoid deficiency state

Figure 1. Comparison of PN micronutrient protocol for CRRT: Pre- and post-case series

Mcg = microgram; Mg = milligram; mg/dL = milligram per deciliter; CRP = C-reactive protein; PN = parenteral nutrition; CRRT = continuous renal replacement therapy.

International Abstract of Distinction Award

2207158 - MFN2 Dysfunction Mediates Candida Albicans–Induced Mitochondrial and Calcium Dysregulation in ICU-Acquired Weakness

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[1]Nanjing Jinling Hospital, Affiliated Hospital of Medical School, Nanjing University, Nanjing, Jiangsu; [2]Medical School of Nanjing University, Nanjing, Jiangsu

Financial Support: None Reported.

Background: Intensive care unit-acquired weakness (ICU-AW) is a common and severe complication among critically ill patients, characterized by rapid onset and prolonged impairment. A significant number of ICU survivors continue to exhibit skeletal muscle dysfunction even one year after discharge. Although the gut microbiota is widely acknowledged as a critical regulator of muscle atrophy and host physiology, the role of the gut mycobiome—particularly in critical illness—remains poorly understood.

Methods: An experimental ICU-AW mouse model was established to explore the involvement of gut fungi in skeletal muscle impairment. Fungal supplementation confirmed the detrimental role of C. albicans in muscle function and mitochondrial damage. Multi-omics analyses revealed that C. albicans–induced gut microbiota dysbiosis promoted sphinganine accumulation, leading to mitochondrial impairment. RNA-seq elucidated the mechanism underlying sphinganine-induced disruption of mitochondrial Ca^{2+} regulation, which was further validated through pharmacological modulation of SERCA2.

Results: We observed profound fungal dysbiosis in patients with ICU-AW, marked by a pronounced expansion of Candida albicans. In a murine model of ICU-AW, supplementation with C. albicans exacerbated muscle weakness, reduced grip strength, and promoted skeletal muscle loss, accompanied by mitochondrial abnormalities such as swelling and vacuolization. Integrative analysis of fecal metabolomics, 16S sequencing, and co-culture assays revealed that C. albicans disrupted the abundance of Bacteroides caecimuris, resulting in accumulation of sphinganine—a metabolite that impaired skeletal muscle function and mitochondrial integrity. Targeted metabolomics confirmed elevated sphinganine levels in skeletal muscle. Transcriptomic profiling indicated significant downregulation of the SERCA2 gene ($log_2FC > 1$, Padj < 0.05). Molecular docking studies supported a direct interaction between sphinganine and SERCA2. Mechanistically, SERCA2 downregulation disrupted Ca^{2+} homeostasis,

leading to mitochondrial Ca^{2+} overload, loss of mitochondrial membrane potential (ΔΨm), elevated ROS production, and ultimately mitochondrial dysfunction. Pharmacological activation of SERCA2 with CDN1163 restored mitochondrial function and attenuated muscle atrophy, whereas inhibition with thapsigargin exacerbated mitochondrial Ca^{2+} overload, ROS accumulation, and muscle wasting.

Conclusion: Our findings demonstrate that Candida albicans exacerbates ICU-AW by altering Bacteroides abundance, driving sphinganine accumulation, downregulating SERCA2 expression, and disrupting Ca^{2+} homeostasis, ultimately resulting in skeletal muscle weakness and mitochondrial dysfunction. This study unveils a novel host–fungus–bacterium axis in critical illness and proposes that targeting Ca^{2+} dysregulation may offer a therapeutic avenue for mitigating ICU-AW.

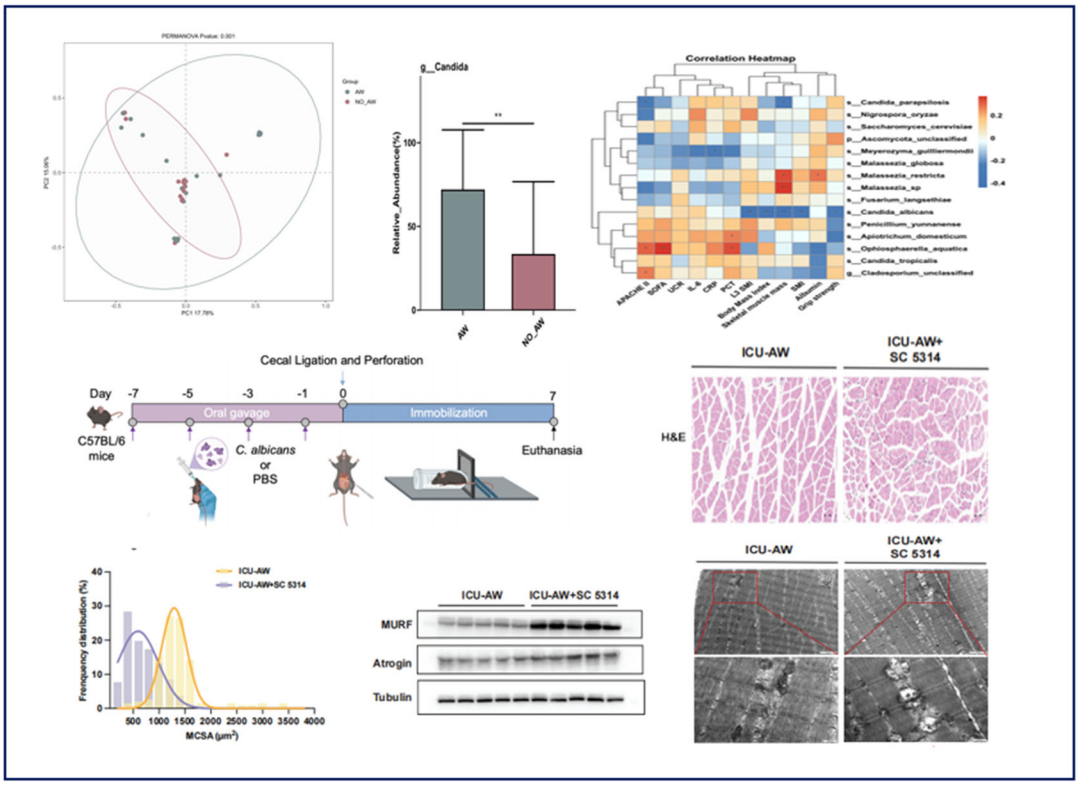

Figure 1. C. Albicans exacerbates skeletal muscle wasting and mitochondrial dysfunction in an ICU-AW mouse model

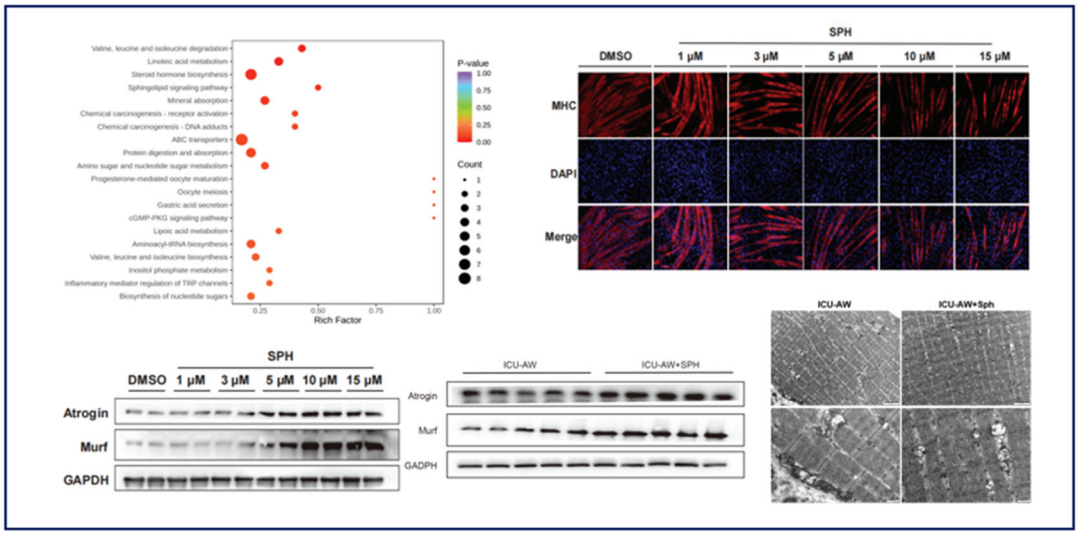

Figure 2. C. Albicans accelerates skeletal muscle atrophy through sphinganine

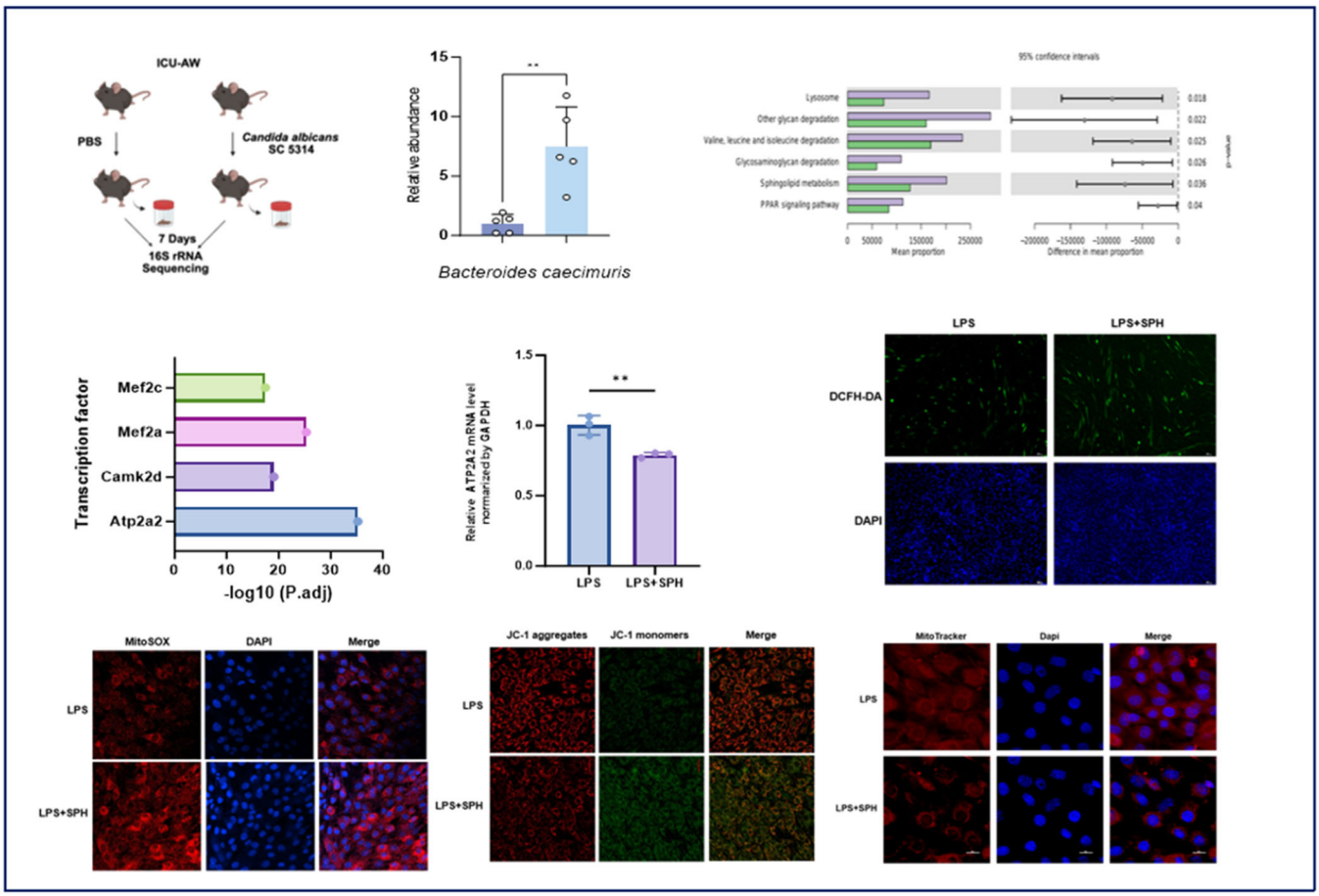

Figure 3. SERCA2 dysfunction mediates sphinganine-induced mitochondrial impairment in skeletal muscle

Best International Abstract Award

International Abstract of Distinction Award

2178747 - Exploring the Effect of Bolus Amino Acid Supplementation and Mobilization on Anabolic, Catabolic, and Autophagic Pathways in the Late Acute Phase of Critical Illness: A Randomized Controlled Trial

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Financial Support: Fresenius Kabi Deutschland GmbH JUMPStart Research Grant.

Background: Critical illness leads to substantial muscle loss. In our primary study, a combined intervention of intravenous amino acid (AA) supplementation and cycle ergometry during the first ICU week did not significantly affect muscle mass loss compared with standard care. This pre-planned secondary analysis explored the effects of the intervention on anabolic and catabolic signaling pathways, including autophagy-related markers.

Methods: We conducted a randomized parallel-group trial in surgical ICU patients (≥18 years) expected to remain in ICU for >7 days. Participants were randomly assigned to two groups, both receiving standard care nutrition and mobilization. The intervention group also received a daily intravenous AA bolus with 45 minutes of cycle ergometry, starting on ICU Day 3 – 4 for a mean of 6 days. Muscle biopsies were obtained from the vastus lateralis muscle before and after the intervention (on average ICU Days 2 and 8). Signaling proteins related to anabolic (4E-binding protein 1 [4E-BP1], protein

kinase B [Akt], mechanistic target of rapamycin [mTOR], ribosomal protein S6 kinase beta-1 [p70S6K], eukaryotic elongation factor 2 [eEF2], and insulin receptor substrate 1 [IRS1]), catabolic (forkhead box O1 [FOXO1], FOXO3b, nuclear factor kappa B [NFκB], and muscle-RING finger protein-1 [MuRF1]), and autophagy (lysosome associated membrane protein 2 [LAMP2], microtubule-associated protein 1 light chain 3-II [LC3II], LC3II/I ratio, and p62) pathways were assessed by western blotting. Plasma AA concentrations were measured on a single intervention day (on average ICU Day 5) at three time points (before, 3 hours after, and 24 hours after AA infusion), using gas chromatography-mass spectrometry. Analyses included mixed model analysis of variance/covariance (ANOVA/ANCOVA) and least significant difference (LSD) pairwise comparisons.

Results: Plasma AAs did not change significantly overall post-bolus, although transient increases in individual AAs were observed. Signaling proteins showed no overall group differences over time, except for phosphorylated (p-) p62 and total (t-) NFκB ($p = 0.034$ and $p = 0.028$, respectively). Pairwise comparisons revealed increased p-Akt and p-FOXO3b in the control group (p-Akt: pre 1.38 vs. post 3.14, $p = 0.024$; p-FOXO3b: pre: 10.64 vs. post: 30.39, $p = 0.045$). Baseline differences were present for p-FOXO1, p-FOXO3b and t-NFκB. ANCOVA indicated that post-intervention differences in p-FOXO1 and t-NFκB were baseline driven, whereas FOXO3b was not influenced by baseline or group. Autophagy markers LC3-II and t-p62 decreased significantly in the control group (LC3II: pre 19.98 vs. post 14.82, $p = 0.045$; t-p62: pre 6.23 vs. post 3.96, $p = 0.047$). Post-intervention, the LC3-II/I ratio was significantly lower in the intervention group versus the control group. ANCOVA adjusting for baseline values confirmed that the difference was attributable to the group effect rather than baseline differences (control: 0.43 vs. intervention 0.26, $p = 0.049$).

Conclusion: Combined intravenous AA supplementation and cycle ergometry modulates anabolic, catabolic, and autophagy-related responses in critically ill patients. Some catabolic markers appear influenced by baseline inflammation, suggesting that patients' inflammatory status may determine who benefits from this intervention. Notably, differences in autophagy markers suggest a potential attenuation of autophagic activity in the intervention group. In addition, changes in p-p62 may reflect modulation of oxidative defence mechanisms, warranting further investigation.

Best of ASPEN Award-Critical Care and Critical Health Issues
Abstract of Distinction Award

2176198 - Utilizing Vasopressor Dose Equivalence Score-Guided Enteral Nutrition Initiation for Patients With Hemodynamic Instability

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Financial Support: None Reported.

Background: Early initiation of enteral nutrition (EN) is recommended in critically ill patients and is associated with improved clinical outcomes. However, the administration of EN in hemodynamically unstable patients receiving vasopressor therapy remains controversial. These patients may have increased gastrointestinal (GI) complications. The most serious concern is the potential development of non-occlusive mesenteric ischemia (NOMI), a rare but severe complication with a reported incidence of 0.3-8.5%. Consequently, EN may be delayed until hemodynamic stability is achieved, impacting nutrient delivery and contributing to malnutrition and associated adverse outcomes. A recent consensus statement by the American Society of Parenteral and Enteral Nutrition states vasopressors are not a contraindication to early EN with careful monitoring. The statement suggests using a vasopressor dose equivalence (VDE) score with other monitoring parameters to guide clinicians on safe timing to initiate and advance EN. Historically, practice at this academic institution was to use the vasoactive-inotropic score (VIS) to guide initiation of EN. Concerns about delays in EN initiation and inadequate nutritional delivery prompted an interdisciplinary review and update in practice (Table 1).

Methods: An interdisciplinary work group updated practice for initiating EN in the setting of vasopressor therapy in a mixed critically ill patient population. Following a comprehensive literature review, the work group collaborated to define evidence-based parameters to create an updated clinical reference (Figure 1), which was approved by the Adult Critical Care Committee and disseminated to intensive care unit team members. A VDE flowsheet row was created in the electronic medical record (EMR) to support data capture and enable ongoing evaluation of the revised practice to assess safety and tolerance. A retrospective chart review was conducted for patients admitted from December 1, 2024, to May 31, 2025, with VDE greater than 0 who received EN. Data collected included VDE score at time of EN initiation and GI tolerance 72 hours post-initiation of EN. GI intolerance was defined as emesis, GI bleed, mesenteric ischemia, gastric residual volumes greater than 500 milliliters, or documented hold of EN due to feeding intolerance. Timing of EN initiation was compared between historic and updated practice. To assess the safety of the updated practice, a separate report was run to identify cases of NOMI during the same time frame and cross referenced with the VDE and EN cohort.

Results: EN was initiated in 197 patients receiving vasopressor therapy during the study period. EN was appropriately initiated earlier compared to prior practice in 16.5% of patients (Figure 2). GI intolerance rates in the first 72 hours of EN support were not higher than anticipated in the

general critical care population (Figure 3). NOMI was observed in one patient who had received EN and vasopressors. The patient had a VDE score up to 10 while on EN prior to holding feeds due to concern for ileus and bowel distention. They developed NOMI 48 hours after EN was held. NOMI incidence was 0.005% and was not increased with the practice update.

Conclusion: Implementation of VDE-guided initiation of EN for patients on vasopressors allowed for earlier initiation and advancement of EN without increased risk of NOMI. Integration of a VDE-specific flowsheet into the EMR facilitated data tracking and evaluation of safety and tolerance. When used alongside other clinical parameters, the VDE score can support safe and timely decisions about initiating EN in critically ill patients on vasopressors. These findings add to the limited evidence supporting safety of enteral nutrition in patients on low to moderate dose vasopressors.

Table 1. Comparison of VDE score and VIS score

Vasopressor Dose Equivalent (VDE) Score[5]	Vasoactive-Inotropic Score (VIS)
Sum of: **Dopamine Dose (µcg/kg/min) x 1** **Epinephrine Dose (µcg/kg/min) x 100** **Norepinephrine Dose (µcg/kg/min) x 100** Phenylephrine Dose (µcg/kg/min) x 10 **Vasopressin Dose** (units/min) x 250 Angiotensin II Dose (µcg/kg/min) x 1000 Metaraminol Dose (µcg/kg/min) x 12.5	Sum of: **Dopamine Dose (µcg/kg/min) x 1** **Epinephrine Dose (µcg/kg/min) x 100** **Norepinephrine Dose (µcg/kg/min) x 100** Milrinone Dose (µcg/kg/min) x 10 **Vasopressin Dose** (units/kg/min) x 10,000 Dobutamine Dose (µcg/kg/min) x 1
ASPEN suggested use, for controlled shock: - For VDE >12, consider trophic only or holding EN. Updated practice, for controlled shock: - If appropriate for EN and meeting clinical parameters (including mean arterial pressure, lactate goals) with VDE <30 and stable or down trending VDE score, consider initiating trickle feeds, advance slowly every 8-24 hours as tolerated to goal rate.	Historic practice: If MAP >60 and lactate <2 and: - VIS >14: Hold EN. - VIS 10-14: Trickle feeds only. - VIS <10: Initiate and advance EN.

Abbreviations: µcg = micrograms; kg = kilogram; min = minute.

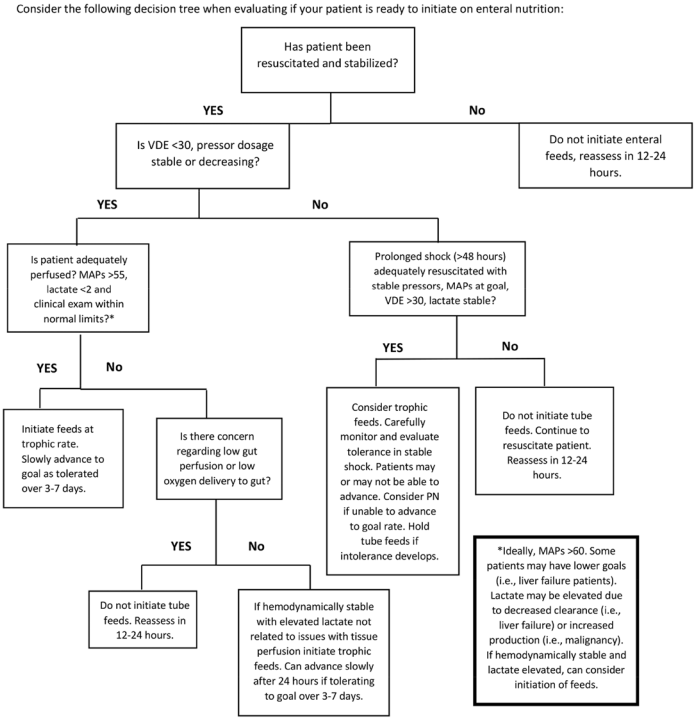

Figure 1. Decision tree for initiation of EN

Abbreviations: MAP = mean arterial pressure. Decision tree for utilization in medical, surgical, neurologic, and cardiac intensive care units.

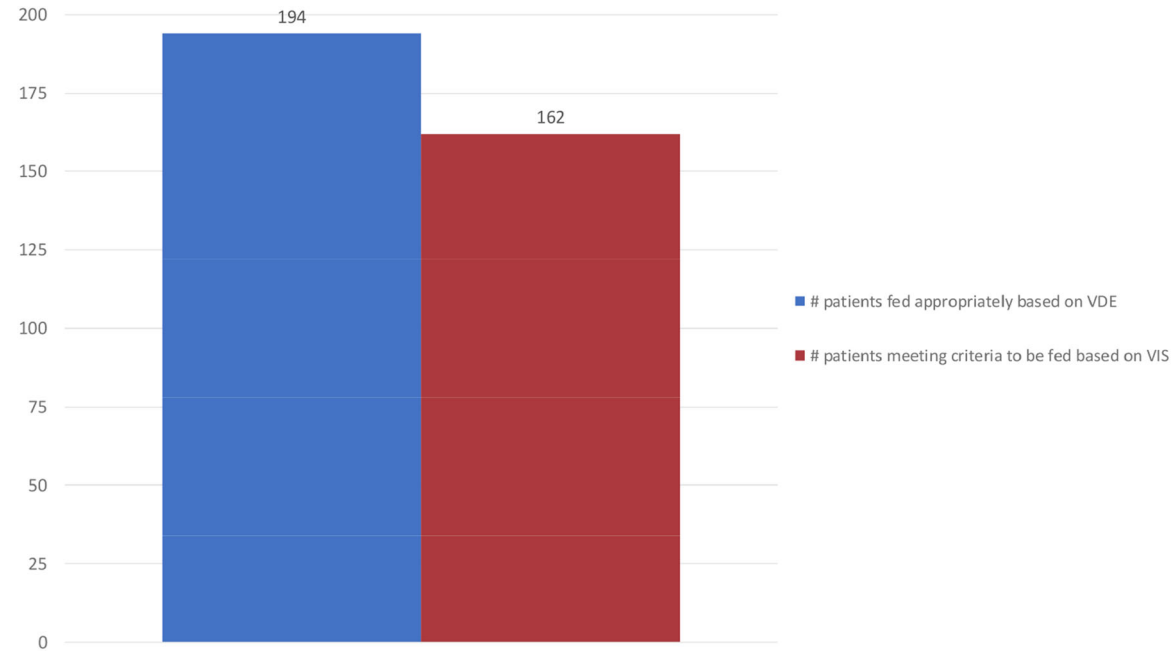

Figure 2. Comparison of feeding initiation: VDE- versus VIS-guided practices

Time frame: December 1, 2024 through May 31, 2025.

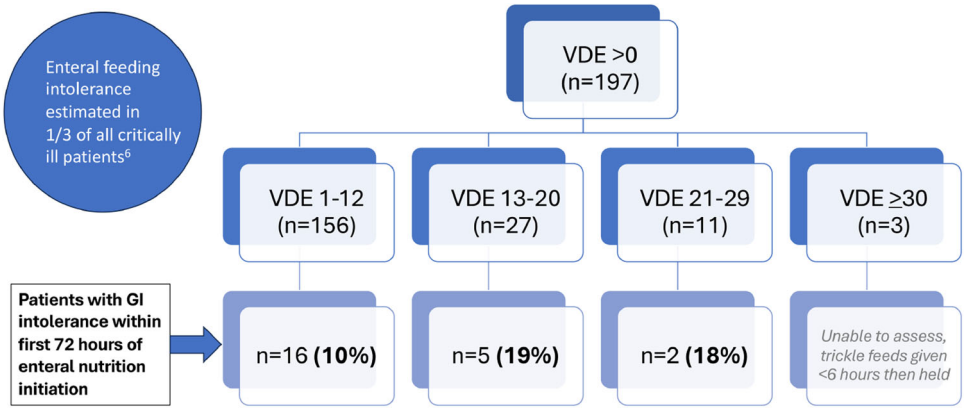

Figure 3. Gastrointestinal intolerance rates for patients receiving enteral nutrition and vasopressor therapy

Time frame: December 1, 2024 through May 31, 2025.

GI, Obesity, Metabolic, and Other Nutrition-Related Concepts

International Abstract of Distinction Award

2204162 - An Anti-Inflammatory Diet and Exercise in IBD Patients Improve Patient-Reported Outcome Measures

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Financial Support: Aage and Johanne Louis-Hansens fund (grant number 20-2B-7892), Klimafonden (The climate foundation) (grant number 2022-0007) and Colitis-Crohn Foreningen (The Danish IBD Association) (grant number 2899) funded this study.

Background: The incidence of inflammatory bowel diseases (IBD) is increasing. The western diet including red meat, dairy and ultra processed foods, has been linked to both development and flares of IBD. Physical activity has been shown to relieve patient experienced symptom burden. The aims of this eight-week intervention study were to investigate whether an anti-inflammatory diet and increased physical activity could reduce patient reported fatigue and disease symptoms in patients with IBD. Furthermore, the aims were to examine the impact of the intervention on body composition and carbon dioxide emissions (CO2e).

Methods: This study design was a single-arm intervention study with follow-up after four (W4) and eight weeks (W8). Outpatients with IBD including Crohn's disease and ulcerative colitis received guidance on the anti-inflammatory diet principles as well as general recommendations on physical activity. Optional recipes including limited fish, chicken and fermented dairy were shared for inspiration to secure the anti-inflammatory principlesssss as well as protein intake. Fatigue and disease activity were evaluated by patient reported outcome measures (PROMS): Inflammatory Bowel Disease-Fatigue Self-assessment Scale and Harvey Bradshaw Index. Body composition was assessed using Inbody 270. Dietary intake and CO2e were collected based on the participants' diet registration performed two days prior to baseline and follow-ups.

Results: Of the 46 included patients, 42 completed the eight-week intervention. Most participants were female (60.9%), and mean age was 40.5 ± 12.1 years. BMI, weight, fat mass (kg and %), fatigue, disease activity, CO2e as well as dietary intake ($p < 0.05$) all decreased from W0 to W8. Furthermore, muscle mass (%) increased from W0 to W8 ($p < 0.05$). Participants increased their time used for physical activity from W0 to W8 ($p < 0.001$). A positive correlation was found between IBD-F and HBI at W4 and W8 ($p < 0.05$), and there was a negative correlation between IDF-F and muscle mass (%) at W0, W4 and W8 respectively ($p < 0.05$). Additionally, positive correlations were found between muscle mass (%), protein and calorie intake in percentages of requirements at W0, W4 and W8 ($p < 0.05$).

Conclusion: The eight-week intervention comprising guidance on an anti-inflammatory diet and general recommendations for physical activity positively impacted PROMS for fatigue and disease symptoms. Participants experienced weight loss, primarily as a reduction in fat mass relative to muscle mass. Further research is warranted to optimize dietary intake and intensify physical activity, particularly incorporating tailored resistance training.

International Abstract of Distinction Award

2182600 - The Relationship of Skeletal Muscle Mass to Delirium in Hospitalized Older Patients

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Financial Support: None Reported.

Background: Delirium is a frequent and serious neuropsychiatric condition among hospitalized older adults. Patients with delirium are associated with a higher risk of adverse clinical outcomes, including longer length of hospital stay and increased mortality rate. Low skeletal muscle mass (SMM), a common condition in the aging population, is linked to decreased physical function, metabolic disturbances, and persistent inflammation—all of which may contribute to the onset of delirium. Despite these potential connections, research exploring the association between SMM and delirium remains scarce, particularly within Asian populations. This study aimed to investigate the relationship between SMM and the risk of developing delirium in hospitalized older patients.

Methods: A prospective cohort study was conducted in the internal medicine inpatient department of Ramathibodi Hospital, Mahidol University, from August 1, 2023, to January 31, 2025. The study enrolled patients aged 60 years and older who were admitted to internal medicine wards. We measured SMM at the time of admission using bioelectrical impedance analysis (BIA) with the InBody S10 device. Data on patient demographics, comorbid conditions, and nutritional status were collected. The incidence of delirium was assessed daily throughout hospitalization using the Confusion Assessment Method (CAM). To examine the association between SMM and the incidence of delirium, multivariate Cox proportional hazards regression analysis was performed, adjusting for potential confounders including age, presence of malignancy, Clinical Frailty Scale score, Barthel Index for activities of daily living (ADL), Lawton Instrumental Activities of Daily Living (IADL) score, and Montreal Cognitive Assessment (MoCA) score.

Results: A total of 214 patients were included in the study, with a mean age of 73.7 ± 9.0 years. The delirium incidence was 15.8 cases per 1,000 person-days. Older age (above 70 years), frailty, and cognitive impairment (MoCA score below 25) were significantly associated with a higher risk of developing delirium, with adjusted hazard ratios (HRs) of 1.06 (95% CI: 1.02–1.10, p = 0.002), 3.54 (95% CI: 1.59–7.88, p = 0.002), and 8.66 (95% CI: 1.18–63.43, p = 0.034), respectively. Additionally, higher appendicular skeletal muscle mass (ASM) and appendicular skeletal muscle mass index (ASMI) were independently associated with a lower risk of delirium, with adjusted HRs of 0.90 (95% CI: 0.82–0.99, p = 0.039) and 0.70 (95% CI: 0.51–0.96, p = 0.026), respectively.

Conclusion: Older age, frailty, and cognitive impairment were significant risk factors for the development of delirium in hospitalized older adults. Whereas higher levels of ASM and ASMI were independently associated with a reduced risk of delirium. These findings highlight the potential protective role of preserved skeletal muscle mass in mitigating delirium risk. The results underscore the clinical relevance of routinely assessing skeletal muscle mass as part of comprehensive geriatric evaluation upon hospital admission. Early identification of patients with low SMM may enhance risk stratification for delirium and inform targeted preventive interventions aimed at improving outcomes in this vulnerable population.

Trainee Award

Best of ASPEN Award-GI, Obesity, Metabolic, and Other Nutrition-Related Concepts

2167016 - Individual and Combined Effects of Fasting and Inflammation on Gastrointestinal Motility and Gene Expression of Enteroendocrine Cell Markers

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Financial Support: The Boston Children's Hospital Anesthesia Ignition Award.

Background: Gastrointestinal (GI) motility is disrupted in conditions of fasting and systemic inflammation, common stressors in critical illness. Enteroendocrine (EE) cells are regulators of GI homeostasis that may be impacted independently and synergistically by fasting and inflammation. We investigated how fasting and inflammation influence GI motility and EE cell markers, independently and combined, in a murine model.

Methods: Adult 8-12 week old female and male C57Bl/6 mice were exposed to one of four conditions: fasting only (+F/-L), inflammation only (-F/ + L), fasting and inflammation (+F/ + L), and control (-F/-L). Fasted mice were deprived of standard chow for 72 hours and allowed water ad libitum. Inflammation was induced by intraperitoneal injection of lipopolysaccharide (LPS) six hours before euthanasia, and -L mice received vehicle control. Distribution of orogastrically gavaged FITC-dextran 1 hour after gavage determined GI motility. Quantitative PCR was performed to characterize EE cells. All assessments were performed in individual GI segments. GI motility is reported as the mean ± SD %FITC fluorescence per segment. Mean ± SD delta CT (dCT= CT from target gene – CT from housekeeping gene) of individual segments were calculated.

Results: Normal GI motility was represented by %FITC peaks in the ileum and cecum (37.1 ± 20.9% and 31.5 ± 22.1% respectively) in -F/-L mice. All other experimental conditions had slowed GI motility. +F/-L mice had a similar %FITC in the stomach as -F/-L mice (5.4 ± 6.3%) but %FITC peaks in the jejunum (51.6 ± 38.9%) and ileum (36.8 ± 38.2%). -F/ + L mice had all the FITC retained between the stomach and ileum (St=35.2 ± 12.9%, Du=31.9 ± 24.8%, Je=21.9 ± 24.1%, Il=10.6 ± 20.3%). +F/ + L mice caused the most profound motility disruption, with %FITC confined to the stomach through jejunum (St=38.6 ± 18.1%, Du=25.9 ± 16.7%, Je=33.4 ± 33.0%). EE cell characterization target genes included chromogranin A (CHGA), a general marker of EE cells, and EE cell hormones associated with fasting (ghrelin, GHRL; glucagon, GCG) and feeding (cholecystokinin, CCK; gastric inhibitory polypeptide, GIP; peptide YY, PYY) states. The average dCT of from all GI segments for each target gene trended towards higher expression for the +F/-L mice when compared to -F/-L (Table 1) with statistically significant differences in the colon for GHRL (+ F/ − L 17.53 ± 0.60 vs −F/ − L 24.49 ± 1.72, p = 0.002), the duodenum and ileum for CCK (+ F/ − L 15.71 ± 2.81 vs −F/ − L 19.96 ± 2.64, p = 0.014; +F/ − L 16.06 ± 0.22 vs −F/ − L 20.16 ± 1.51, p = 0.02, respectively), the colon for GIP (+ F/ − L 21.47 ± 0.54 vs −F/ − L 28.05 ± 2.62, p = 0.007), and the ileum for PYY (+ F/ − L 8.34 ± 0.30 vs −F/ − L

12.88 ± 3.81,p = 0.035). +F/ + L had more expression for GHRL, CCK and PYY, and -F/ + L for CCK and PYY compared to -F/-L in select segments of the distal small intestine to colon (Table 1).

Conclusion: Fasting and inflammation synergistically impact GI motility, but fasting had greater effects on EE cell gene expression than inflammation alone or fasting and inflammation. These findings support the notion that fasting alone in critical illness may contribute to GI dysmotility and therefore early feeding may support the return of GI homeostasis.

Table 1. EE cell marker and hormone mRNA expression within mouse groups in GI tissue segments

Mouse group	*-Fasting/ -LPS*	*-Fasting/+LPS*	*+Fasting/-LPS*	*+Fasting/+LPS*	p-value, two-way ANOVA
Hormone	CHGA				CHGA
Stomach dCt	10.39 ± 3.47	12.53 ± 2.90	9.07 ± 0.43	9.30 ± 1.38	NS
Duodenum dCt	14.90 ± 2.96	14.67 ± 2.30	12.86 ± 1.63	12.50 ± 0.43	NS
Jejunum dCt	14.34 ± 2.48	14.89 ± 2.28	13.59 ± 1.51	14.86 ± 0.95	NS
Ileum dCt	14.92 ± 2.91	16.31 ± 0.47	12.95 ± 0.73	13.59 ± 1.23	NS
Colon dCt	14.56 ± 2.26	12.15 ± 1.98	10.73 ± 0.84	11.71 ± 1.07	NS
Hormone	GHRL				GHRL
Stomach dCt	9.01 ± 4.48	9.00 ± 4.03	6.11 ± 0.44	5.87 ± 1.16	NS
Duodenum dCt	15.74 ± 3.93	15.55 ± 4.33	12.91 ± 0.74	14.21 ± 0.73	NS
Jejunum dCt	17.56 ± 2.55	17.66 ± 2.43	16.03 ± 1.28	17.26 ± 0.66	NS
Ileum dCt	18.96 ± 3.10	21.60 ± 2.85	16.62 ± 0.75	16.81 ± 1.79	NS
Colon dCt	24.49 ± 1.72	20.98 ± 1.65	17.53 ± 0.60	16.91 ± 2.22	0.002 -F/-L vs +F/-L 0.0001 -F/-L vs +F/+L
Hormone	GCG				GCG
Stomach dCt	17.59 ± 4.25	19.74 ± 3.46	15.20 ± 1.11	15.27 ± 1.03	NS
Duodenum dCt	20.25 ± 4.50	21.60 ± 3.38	16.52 ± 1.25	17.39 ± 0.78	NS
Jejunum dCt	19.04 ± 3.56	18.40 ± 2.24	16.01 ± 1.36	17.38 ± 0.61	NS
Ileum dCt	17.32 ± 3.89	18.35 ± 1.98	13.40 ± 1.58	13.92 ± 1.85	NS
Colon dCt	16.76 ± 5.17	14.48 ± 3.39	12.37 ± 1.48	12.29 ± 1.23	NS
Hormone	CCK				CCK
Stomach dCt	21.28 ± 3.10	20.43 ± 2.01	18.03 ± 1.14	18.51 ± 2.66	NS
Duodenum dCt	19.96 ± 2.64	17.62 ± 1.14	15.71 ± 2.81	17.96 ± 1.15	0.0136 -F/-L vs +F/-L
Jejunum dCt	20.48 ± 1.84	17.05 ± 1.03	16.93 ± 0.52	16.29 ± 0.72	0.0436 -F/-L vs -F/+L 0.0037 -F/-L vs +F/+L
Ileum dCt	20.16 ± 1.51	19.86 ± 1.69	16.06 ± 0.22	14.65 ± 1.70	0.0204 -F/-L vs +F/-L <0.0001 -F/-L vs +F/+L 0.046 -F/+L vs +F/-L <0.0001 -F/+L vs +F/+L
Colon dCt	19.41 ± 1.51	17.13 ± 1.11	16.34 ± 2.96	15.74 ± 0.68	0.0342 -F/-L vs +F/+L
Hormone	GIP				GIP
Stomach dCt	18.20 ± 3.25	18.10 ± 2.66	19.20 ± 1.53	18.50 ± 2.00	NS
Duodenum dCt	13.70 ± 4.30	15.64 ± 2.92	12.11 ± 1.05	11.95 ± 0.95	NS
Jejunum dCt	14.72 ± 3.11	15.45 ± 3.26	13.54 ± 1.68	14.91 ± 0.75	NS
Ileum dCt	17.09 ± 3.67	19.96 ± 3.21	15.64 ± 1.42	15.69 ± 1.90	NS
Colon dCt	28.05 ± 2.62	24.70 ± 3.44	21.47 ± 0.54	23.97 ± 2.47	0.0073 -F/-L vs +F/-L
Hormone	PYY				PYY
Stomach dCt	14.09 ± 2.30	14.24 ± 2.11	13.97 ± 0.87	14.63 ± 0.56	NS
Duodenum dCt	17.12 ± 2.80	17.38 ± 2.60	14.38 ± 1.59	16.65 ± 1.85	NS
Jejunum dCt	14.79 ± 2.37	14.53 ± 2.81	11.13 ± 1.12	12.30 ± 0.84	NS
Ileum dCt	12.88 ± 3.81	15.40 ± 2.89	8.34 ± 0.30	8.80 ± 1.07	0.0346 -F/-L vs +F/-L 0.0336 -F/-L vs +F/+L <0.0001 -F/+L vs +F/-L <0.0001 -F/+L vs +F/+L
Colon dCt	10.73 ± 2.38	6.79 ± 1.55	7.88 ± 0.95	8.42 ± 0.87	0.0476 -F/-L vs -F/+L

Abstract of Distinction Award

2200344 - Impact of Tirzepatide on Weight and Hepatic Outcomes in Adolescents With MASLD

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Financial Support: None Reported.

Background: Metabolic dysfunction-associated steatotic liver disease (MASLD) is the leading chronic liver disease in children and adolescents, mirroring the obesity epidemic. Lifestyle modifications remain the cornerstone of treatment, although anti-obesity medications are increasingly prescribed as adjuncts. Tirzepatide, a dual glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide-1 (GLP-1) receptor agonist, was recently approved for type 2 diabetes mellitus (T2DM) and obesity in patients ≥18 years old. It has demonstrated substantial weight loss and glycemic improvements, with evidence suggesting greater impact than GLP-1 receptor agonists alone. Emerging adult data also show potential for histologic improvements in steatohepatitis; however pediatric and adolescent data are lacking. Given increasing use in adolescents, our objective was to evaluate the real-world impact of tirzepatide on hepatic and cardiometabolic outcomes in adolescents with MASLD.

Methods: This single-center retrospective study included patients ≤ 21 years old with a diagnosis of MASLD, who were prescribed tirzepatide between 1/1/2020 – 7/30/25 at the Children's Hospital of Philadelphia. Data were collected at baseline and at 3-6 months post-initiation, including laboratory, anthropometric, demographic, side effect, dosing, and therapy duration data. Primary outcomes were a change in alanine aminotransferase (ALT) and total percent body weight loss (%TBWL) from baseline to 3-6 months on therapy. Secondary outcomes included changes in body mass index (BMI), glycated hemoglobin (HbA1C), lipid profile, vitamin D, aspartate aminotransferase (AST), and gamma-glutamyl transpeptidase (GGT). Wilcoxon signed-rank testing was performed.

Results: 10 patients met inclusion criteria (60% female, 70% White); 6 were prescribed tirzepatide for obesity and 4 for T2DM. Median age at initiation was 18 years, with post-therapy data collected at a median of 5 months. %TBWL post-therapy was 7% (IQR 2 to 11, $p = 0.02$); 50% achieved ≥ 5% TBWL and 40% achieved ≥ 10% TBWL. Significant reductions were observed in ALT (− 24 U/L, IQR − 34 to − 14, $p = 0.002$), AST (−15 U/L, IQR − 29 to − 7, $p = 0.006$), GGT (− 3 U/L, IQR − 8 to − 3, $p = 0.03$), and BMI (− 2.4 kg/m^2, IQR − 3.2 to − 1.1, $p = 0.03$). Changes in lipid panel and HbA1c were not significant. Median baseline vitamin D was 25 ng/mL (IQR 18 to 37), with 75% demonstrating insufficiency; no post-therapy data were available. Mild nausea was the most commonly reported side effect.

Conclusion: This is the first dedicated analysis of tirzepatide use in adolescents with MASLD. Within 3-6 months of treatment, we observed clinically meaningful weight loss with %TBWL and BMI reduction consistent with prior obesity studies and reaching thresholds linked to improvement of steatosis. Significant reductions in ALT and GGT – both surrogate markers of histologic improvement of steatohepatitis – were also observed. High prevalence of vitamin D insufficiency at baseline underscores the importance of screening for and monitoring nutritional deficiencies, especially during weight-modifying therapy. The absence of HbA1C reduction likely reflects the predominance of non-diabetic patients and limited follow-up in this early real-world experience with tirzepatide. In summary, these findings identify tirzepatide as a promising therapeutic option in addition to lifestyle for adolescents with MASLD, with strong weight-lowering effects and potential to improve hepatic and cardiometabolic outcomes.

Table 1. Changes in anthropometrics and laboratory values while on tirzepatide

Outcome	*N*	Baseline (median)	3-6 months (median)	Median change* (IQR)	p-value
Weight (kg)	10	103	96	−7 (−9 to −2)	0.03
%TBWL	10	-	-	7 (2 to 11)	0.02
BMI (kg/m²)	10	36.1	33.9	−2.4 (−3.2 to −1.1)	0.03
ALT (U/L)	10	79	56	−24 (−34 to −14)	0.002
AST (U/L)	10	62	36	−15 (−29 to −7)	0.006
GGT (U/L)	7	56	32	−3 (−8 to −3)	0.03
HbA1c (%)	10	5.75	5.45	−0.45 (−1.17 to −0.1)	0.19
Total cholesterol (mg/dL)	6	215	175	−28 (−57 to 1)	0.22
Triglycerides (mg/dL)	6	190	157	−3 (−36 to 10)	0.84
HDL (mg/dL)	6	36	39	5 (2 to 5)	0.40
LDL (mg/dL)	6	132	107	−35 (−51 to −12)	0.94

*Median change values represent the median of individual paired changes.

Abbreviations: *P*-value = probability value; %TBWL = total percent body weight loss; BMI = body mass index; ALT = alanine aminotransferase; AST = aspartate aminotransferase; GGT = gamma glutamyl transferase; HbA1C = glycated hemoglobin; HDL = high density lipoprotein; LDL = low density lipoprotein.

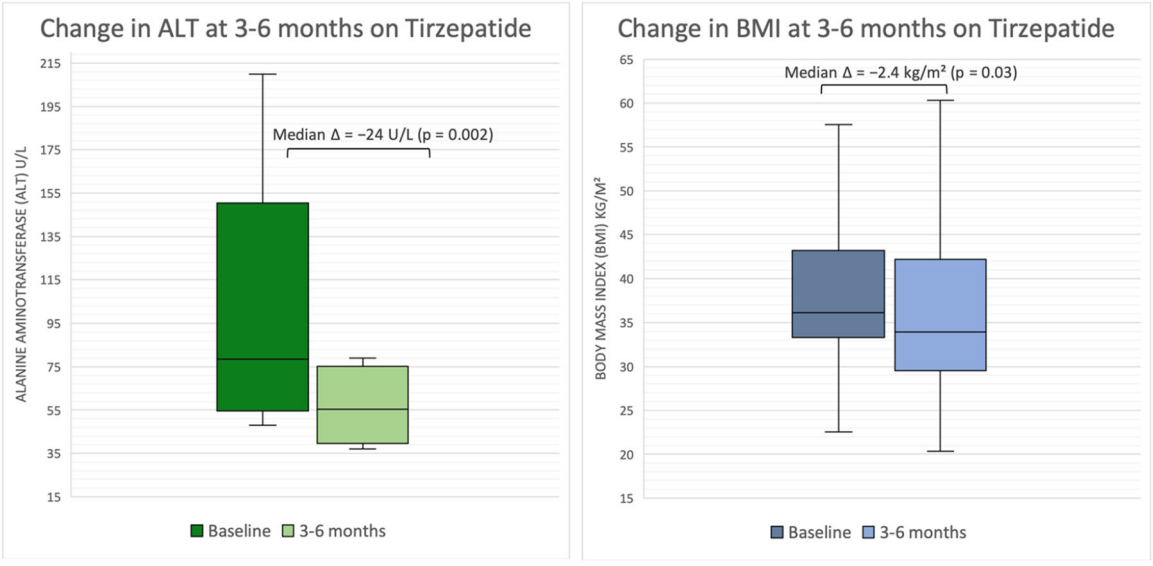

Figure 1. Distribution of changes in ALT and BMI after 3-6 months on tirzepatide

2196379 - Accuracy and Precision of a Portable Indirect Calorimetry Device for Assessing Resting Metabolic Rate in Individuals With BMI ≥ 35 kg/m2 and Advanced Osteoarthritis

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Financial Support: Arthritis Society Canada.

Background: Individuals with both obesity and advanced knee osteoarthritis have altered body composition, functional limitations, and metabolic disturbances that affect energy balance. This highlights the need for accurate, practical methods to assess resting metabolic rate (RMR). Conventional metabolic carts (MC) are widely used in research settings, but they are not portable and require trained personnel, calibration, and long measurement times. Portable indirect calorimetry (PIC) devices have emerged as promising alternatives. These systems are compact, faster, and easier to calibrate and operate. However, the agreement between PIC devices and reference methods remains (e.g., MC) unclear in populations with severe obesity and osteoarthritis. This study aimed to evaluate the agreement between RMR measured by MC and PIC in individuals aged 40-75 with a BMI ≥ 35 kg/m^2 and advanced knee osteoarthritis.

Methods: Individuals followed a standard preparation before RMR assessment, including overnight fasting. MC assessment lasted 30 min, while PIC (Q-NRG®) lasted 15 min. We explored 3 different PIC measurement reports: up to 15 min, up to 10 min, and the best 5 min (automatically chosen by the device). Wilcoxon test compared PIC measures to MC. Group relative bias was calculated and considered acceptable if ≤±5%. We evaluated PIC individual-level accuracy using Bland-Altman limits of agreement (LOA), whether the relative bias from MC was within ±10%, and employing Lin's concordance coefficient correlation (LCCC), with precision and accuracy considered poor if LCCC ≤ 0.9. Spearman/Pearson correlations investigated the influence of BMI, age, and body composition (dual-energy x-ray absorptiometry) on relative bias. Mann-Whitney U test compared relative bias between sexes.

Results: Forty-nine individuals (73.5% female; age 63.6 ± 6.9 years, and BMI 41.8 ± 4.6 kg/m^2) were included. Mean RMRs (kcal) were 1720 ± 286 (MC), 1809 ± 338 (15 min), 1818 ± 340 (10 min), and 1818 ± 330 (5 min) (Table 1). At the group level, all PIC measures were different than MC ($p < 0.05$); however, group relative bias for the 15 min measurement was < 5%. The LOA for PIC measures were: 1) 15 min: bias 4.7 ± 7.7%, LOA + 19.8, −10.3%; 2) 10 min: bias 5.2 ± 7.6%, LOA + 20.1, – 9.7%; and 3) 5 min: bias 6.1 ± 14.6%, LOA + 34.8, – 22.6%. The LOA ranged from approximately 30% (15 and 10 min) to 57.4% (5 min) (Figures 1-3). Individual-level accuracy increased with longer measurement time, both the percentage within ±10% and LCCC, respectively: 1) 15 min: 76% and 0.869, 2) 10 min: 69% and 0.800, and 3) 5 min: 53% and 0.649. RMR overestimation was at least 3 times higher than underestimation with PIC. BMI, age, fat mass, and fat-free mass did not influence relative bias.

Conclusion: Compared to the MC, PIC overestimated RMR in individuals with BMI ≥ 35 kg/m^2 and advanced osteoarthritis. Shorter measurement durations progressively reduced agreement, with the best 5-min machine calculation showing the highest bias, lowest concordance, and widest LOA. Overall, a 15-min PIC measurement offers the most reliable alternative to the MC, with potential for ease of use, enabling application in clinical practice. However, improvements in overall accuracy and precision are still warranted.

Table 1. Participant characteristics and resting metabolic rate of individuals with BMI ≥ 35 kg/m^2 and advanced osteoarthritis

	Total (N=49)	Female (n=36)	Male (n=13)
Age (years)	63.6±6.9	63.8±6.9	63.0±7.3
Body weight (kg)	114.3±15.0	110.2±13.3	125.6±14.1
Height (cm)	165.2±8.1	161.7±5.6	175.0±5.4
Body mass index (kg/m^2)	41.8±4.6	42.1±4.7	41.0±4.2
Fat-free mass (kg)	57.1±11.1	51.2±5.1	73.2±5.7
Fat mass (kg)	57.2±10.6	58.9±10.3	52.4±10.4
Fat mass (%)	50.1±6.7	53.2±4.2	41.4±4.1
RMR: Metabolic cart (kcal)	1726±286	1614±211	2034±242
RMR: PIC up to 15 minutes (kcal)	1809±338	1669±232	2196±280
RMR: PIC up to 10 minutes (kcal)	1818±340	1679±239	2202±280
RMR: PIC best 5 minutes (kcal)	1818±330	1684±236	2189±267

PIC = portable indirect calorimetry; RMR = resting metabolic rate.

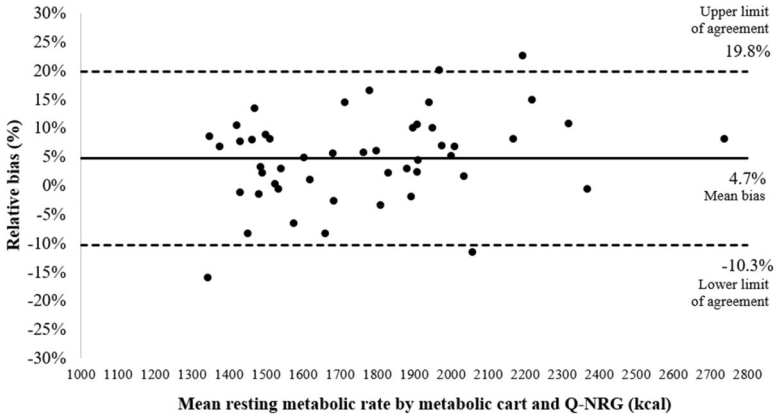

Figure 1. Bland-Altman analysis comparing the resting metabolic rate evaluated by portable indirect calorimetry (15-minute protocol) and a metabolic cart in individuals with BMI ≥ 35 kg/m^2 and advanced osteoarthritis

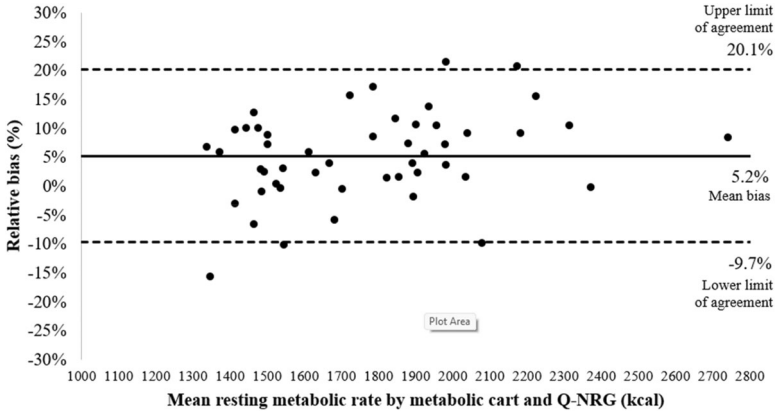

Figure 2. Bland-Altman analysis comparing the resting metabolic rate evaluated by portable indirect calorimetry (10-minute protocol) and a metabolic cart in individuals with BMI ≥ 35 kg/m^2 and advanced osteoarthritis

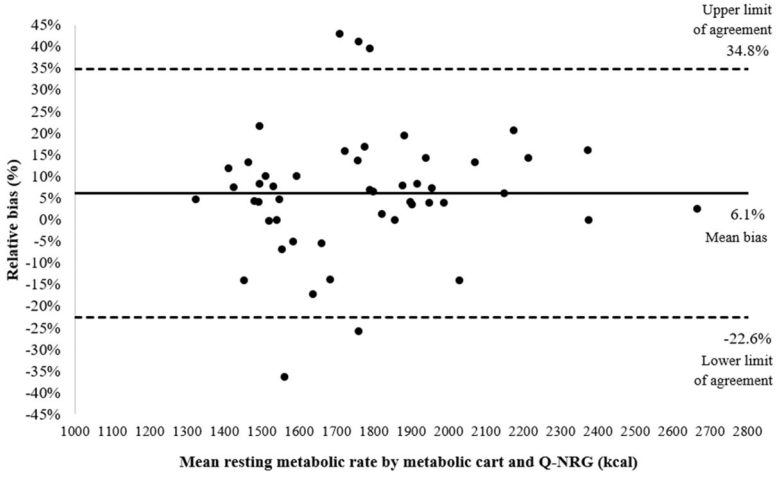

Figure 3. Bland-Altman analysis comparing the resting metabolic rate evaluated by portable indirect calorimetry (best 5 min) and a metabolic cart in individuals with BMI ≥ 35 kg/m^2 and advanced osteoarthritis

Abstract of Distinction Award

2207108 - LPS Induced Gut Barrier Disruption Drives Liver Injury in a Novel Transwell Co-Culture System

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Financial Support: None Reported.

Background: Intestinal failure-associated liver disease (IFALD) is a serious complication of prolonged parenteral nutrition (PN), characterized by cholestasis, inflammation, and hepatic dysfunction. A critical driver of IFALD is the loss of intestinal barrier integrity, allowing microbial-derived molecules like lipopolysaccharide (LPS) to cross the epithelium and activate inflammatory pathways in the liver via gut-liver communication. However, the direct epithelial contributions to hepatic inflammation remain poorly defined. We developed a dual-organoid model incorporating porcine intestinal enteroids and liver organoids to examine the effects of LPS-induced epithelial injury.

Methods: 3D enteroids were generated from neonatal Yorkshire pig small intestine and cultured for 7 days. Enteroids were then exposed to escalating doses of LPS (1, 2, 5 μg/mL). Tight junction integrity (ZO-1), immune activation (TLR4, IL-8, IL-10), and barrier disruption were evaluated at 48 hours. Inflammatory responses, bile acid transporter expression (FXR, BSEP, NTCP), and apoptosis was analyzed. For gut-liver axis modeling, enteroids were transitioned to 2D monolayers by seeding onto collagen-coated transwell inserts (0.4 μm pore size). Monolayers were cultured for 5-7 days. The transwell setup allowed soluble factors derived from the LPS-treated intestinal monolayers to diffuse basolaterally and influence the liver organoids. After 48 hours of co-culture, liver organoids were harvested for gene and protein analysis of inflammatory markers, FXR signaling, and bile acid transporters.

Results: LPS induced dose-dependent epithelial damage, with reduced ZO-1 expression, increased TLR4 and IL-8 levels, and compromised barrier function. Liver organoids exposed to LPS-injured intestinal monolayers exhibited elevated inflammatory gene expression and reduced FXR, BSEP, and NTCP levels, indicating bile acid dysregulation. In vivo, TPN-fed piglets showed elevated serum IFN-γ ($p = 0.009$), IL-8 ($p = 0.011$), and LPS ($p < 0.0001$) compared to EN controls, validating clinical relevance.

Conclusion: This transwell-based gut-liver organoid co-culture system effectively models epithelial injury and downstream hepatic consequences relevant to intestinal failure-associated liver disease (IFALD). Our findings demonstrate that LPS-induced disruption of the intestinal barrier is sufficient to transmit pro-inflammatory and cholestatic signals to liver tissue in the absence of direct hepatic LPS exposure. These results provide mechanistic insight into epithelial contributions to IFALD and establish this organoid model as a valuable platform for preclinical testing of gut-directed therapies.

Pediatric, Neonatal, Pregnancy, and Lactation

Best of ASPEN Award-Pediatric, Neonatal, Pregnancy, and Lactation

International Abstract of Distinction Award

2154833 - Prevalence of Malnutrition and Evaluation of Malnutrition Risk Screening (MNRS) Tools in Hospitalized Pediatric Patients

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Financial Support: None Reported.

Background: Malnutrition is prevalent among hospitalized pediatric patients, impacting clinical outcomes. Early risk identification via malnutrition risk screening (MNRS) tools is crucial, yet their validity in local settings remains unclear. This study assesses the prevalence of malnutrition and evaluates MNRS tools against standard nutritional assessments.

Methods: A cross-sectional study was conducted among pediatric inpatients at the Philippine General Hospital from August to September 2024. Anthropometric measurements and Pediatric Subjective Global Nutritional Assessment (PSGNA) were used to classify nutritional status. Four MNRS tools—STRONGkids, STAMP, PYMS, and PNST—were applied to each patient. The validity, reliability, and inter-observer agreement of these tools were assessed. Sensitivity, specificity, and predictive values were computed using WHO growth standards and PSGNA (Pediatric Subjective Global Nutritional Assessment) as reference methods.

Results: Among the 511 pediatric patients included, 22.7% were wasted, 37.7% were stunted, and 54% were classified as malnourished based on PSGNA. On multivariable logistic regression analysis, being malnourished was associated with genetic comorbidities (OR 3.131, 95% CI 1.020-9.614, p = 0.046) and neurologic comorbidities (OR 3.302, 95% CI 1.343-8.115, p = 0.009). Conversely, those with primary caregivers other than their parents, with fathers who are high school graduates, with conditions classified as "others", and those with gastroenterologic (OR 0.221, 95% CI 0.063-0.777, p = 0.019), hematology-oncology (OR 0.131, 95% CI 0.043-0.400, $p < 0.001$), infectious (OR 0.117, 95% CI 0.037-0.367, $p < 0.001$), neurologic (OR 0.123, 95% CI 0.04-0.375, $p < 0.001$), and surgical conditions (OR 0.116, 95% CI 0.037-0.370, $p < 0.001$) were associated with lower risk for malnutrition. On the other hand, children with hematology-oncology conditions (OR 0.267, 95% CI 0.113-0.631, p = 0.003), infectious diseases (OR 0.349, 95% CI 0.152-0.801, p = 0.013), and surgical conditions (OR 0.311, 95% CI 0.123-0.784, p = 0.013) were associated with lower risk for stunting. STRONGkids and STAMP had comparable sensitivity for PSGNA (94.2% vs 94.57%), although STRONGkids exhibited the highest sensitivity (96.55%) and negative predictive value (NPV; 95.51%) for detecting wasting, while STAMP showed the highest sensitivity (92.23%) and NPV (82.02%) for stunting. All MNRS tools demonstrated high inter-observer agreement (Cohen's Kappa >0.88), with STRONGkids having the highest Cohen's Kappa value at 0.978 with low standard error of 0.009, almost perfect level of agreement, and low average duration at 2.3 minutes compared to PSGNA at 5.17 minutes.

Conclusion: Malnutrition remains prevalent among hospitalized pediatric patients, with PSGNA identifying significantly more cases than anthropometric measurements alone. Its association with socio-economic factors and specific disease conditions underscores the multifactorial nature of malnutrition. Given its broader scope—including temporal changes and physical examination—PSGNA may offer a more comprehensive assessment of nutritional status. These findings emphasize the need to incorporate functional and clinical criteria into routine hospital-based nutritional screening and management protocols. STRONGkids is a highly sensitive, reliable, and time-efficient MNRS tool for hospitalized pediatric patients. Its ease of use and strong predictive value support its integration into routine nutritional screening to enhance early intervention and patient outcomes.

Table 1. Multivariable logistic regression models investigating independent risk factors for malnutrition based on WHO and PSGNA

Risk Factors	WHO Child Reference Standards				PSGNA			
	Length/height-for-age							
	Sig.	OR	95% CI		Sig.	OR	95% CI	
			Lower	Upper			Lower	Upper
Age group								
Infant								
Under-5	0.056	0.547	0.295	1.015	0.576	0.806	0.379	1.716
School-age	**0.004**	0.291	0.124	0.681	0.940	0.963	0.364	2.550
Adolescent	**0.012**	0.465	0.256	0.843	0.852	0.886	0.249	3.148
Parents' marital status	ns	-	-	-				
Married								
Cohabiting but not married					0.765	1.073	0.676	1.703
Separated					0.335	1.496	0.660	3.391
Number of household members	ns	-	-	-				
2-5								
6-10					0.765	1.073	0.676	1.703
>10					0.335	1.496	0.660	3.391
Primary caregiver	ns	-	-	-				
Both parents								
Single parents					0.576	0.793	0.352	1.787
Others					**0.033**	0.308	0.104	0.907
Mother's educational attainment	ns	-	-	-				
Elementary graduate or undergraduate					0.283	1.370	0.771	2.435
Highschool graduate								
College graduate					0.558	0.792	0.363	1.730
Father's educational attainment	ns	-	-	-				
Elementary graduate or undergraduate								
Highschool graduate					**0.024**	0.531	0.306	0.919
College graduate					0.205	0.578	0.285	1.349
Parents' occupation	ns	-	-	-				
Both unemployed								
Only father is employed					0.987	0.994	0.499	1.983
Only mother is employed					0.432	1.371	0.625	3.007
Both employed					0.303	0.641	0.275	1.494
Family monthly household income	ns	-	-	-				
< P10,957								
P10,957 to P21,193					0.784	1.070	0.660	1.733
≥P21,194					0.896	1.045	0.541	2.019
Disease classification								
Cardiology								
Gastroenterology	0.317	0.606	0.227	1.618	**0.019**	0.221	0.063	0.777
Hematology and Oncology	**0.003**	0.267	0.113	0.631	**< 0.001**	0.131	0.043	0.400
Infectious and tropical diseases	**0.013**	0.349	0.152	0.801	**< 0.001**	0.117	0.037	0.367
Neurology	0.204	0.581	0.252	1.341	**< 0.001**	0.123	0.040	0.375
Surgery	**0.013**	0.311	0.123	0.784	**< 0.001**	0.116	0.037	0.370
Others	**0.007**	0.311	0.134	0.722	**< 0.001**	0.091	0.030	0.280
Comorbidity classification								
None								
Cardiology	**0.002**	5.800	1.857	18.112	0.975	0.122	0.433	1.889
Genetics	0.942	1.037	0.389	2.763	**0.046**	3.131	1.020	9.614
Hematology and Oncology	0.332	1.487	0.668	3.311	0.838	0.922	0.425	2.001
Neurology	**< 0.001**	6.330	2.675	14.977	**0.009**	3.302	1.343	8.115
Pulmonology	0.564	1.291	0.542	3.074	0.128	0.483	0.189	1.233
Others	0.294	1.427	0.734	2.775	0.191	1.583	0.795	3.152

(BMI, body mass index ; CI, confidence interval; ns, no significance on univariate analysis; OR, odds risk; PSGNA, Pediatric Subjective Global Nutritional Assessment; WHO, World Health Organization)

Adolescents were less likely to be stunted compared to infants and school-age children had an even lower likelihood of stunting. Children with primary caregivers other than their parents were less likely to be malnourished based on PSGNA. Additionally, those whose fathers were high school graduates had a lower risk of malnutrition. Regarding disease classifications, children with hematology-oncology conditions had the lowest likelihood of stunting compared to those with cardiac diseases. Other conditions that were also associated with lower odds of stunting included infectious diseases, surgical conditions, and other conditions. Similarly, children with conditions classified as "others" had the lowest likelihood of malnutrition based on PSGNA. Lower odds of malnutrition were also observed among those with gastroenterology, hematology-oncology, infectious, neurologic, and surgical conditions. Conversely, children with cardiac comorbidities were more likely to be stunted compared to those with no comorbidities, while those with neurologic conditions had an even higher likelihood of stunting. On the other hand, malnutrition based on PSGNA was more likely among children with genetic comorbidities and neurologic comorbidities. (BMI, body mass index; CI, confidence interval; ns, no significance on univariate analysis; OR, odds risk; PSGNA, Pediatric Subjective Global Nutritional Assessment; WHO, World Health Organization).

Table 2. Evaluation of MNRS as the test method, with WHO and PSGNA as the reference methods

MNRS Tool	Parameter	Sensitivity	Specificity	PPV	NPV	Accuracy	Odds Ratio	AUC
STRONG-kids	Weight-for height or BMI-for- age	96.55%	21.52%	26.54%	95.51%	62.1%	7.68	0.590
	Height-for- age	86.01%	19.5%	39.34%	69.66%	52.5%	1.49	0.528
	PSGNA	94.2%	31.06%	61.61%	82.02%	65.2%	7.32	0.626
STAMP	Weight-for height or BMI-for- age	95.69%	14.68%	24.78%	92.06%	59.3%	3.82	0.552
	Height-for- age	92.23%	15.09%	39.73%	76.19%	56.1%	2.11	0.537
	PSGNA	94.57%	20.43%	58.26%	76.19%	60.5%	4.47	0.575
PYMS	Weight-for height or BMI-for- age	91.38%	51.65%	35.69%	95.33%	70.7%	11.3	0.715
	Height-for- age	67.36%	47.48%	43.77%	70.56%	55.4%	1.87	0.574
	PSGNA	84.78%	73.19%	78.79%	80.37%	79.5%	15.2	0.790
PNST	Weight-for height or BMI-for- age	59.48%	79.49%	46.00%	86.98%	66.6%	5.69	0.695
	Height-for- age	39.9%	77.04%	51.33%	67.87%	56.9%	2.23	0.585
	PSGNA	49.64%	94.47%	91.33%	61.5%	70.3%	16.8	0.721

(AUC, Area Under the Curve; BMI, Body Mass Index; MNRS, Malnutrition Risk Screening; NPV negative predictive value; PPV, positive predictive value; PNST, Paediatric nutrition screening tool; PSGNA, Pediatric Subjective Global Nutritional Assessment; PYMS, Pediatric Yorkhill Malnutrition Screening; STAMP, Screening Tool for the Assessment of Malnutrition in Paediatrics; STRONGkids, Screening Tool for Risk of Impaired Nutritional Status and Growth; WHO, World Health Organization)

Among the malnutrition risk screening tools, STRONGkids demonstrated the highest sensitivity and negative predictive value for detecting the risk of wasting based on weight-for-height or BMI-for-age. For stunting risk assessment based on height/length-for-age, STAMP exhibited the highest sensitivity and NPV. When assessing malnutrition based on PSGNA, both STAMP and STRONGkids had high sensitivity, with STRONGkids showing the highest NPV. (AUC, Area Under the Curve; BMI, Body Mass Index; MNRS, Malnutrition Risk Screening; NPV negative predictive value; PPV, positive predictive value; PNST, Paediatric nutrition screening tool; PSGNA, Pediatric Subjective Global Nutritional Assessment; PYMS, Pediatric Yorkhill Malnutrition Screening; STAMP, Screening Tool for the Assessment of Malnutrition in Paediatrics; STRONGkids, Screening Tool for Risk of Impaired Nutritional Status and Growth; WHO, World Health Organization).

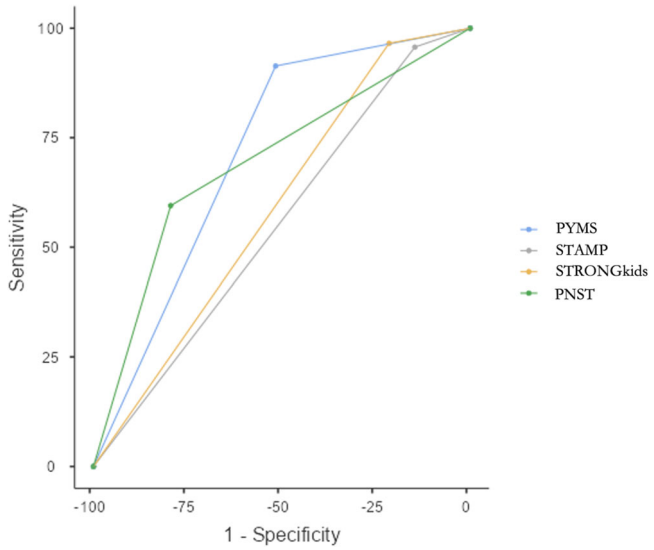

Figure 1. Receiver Operating Characteristics (ROC) curves of the malnutrition risk screening tools with PSGNA as the standard

STRONGkids had the highest sensitivity for screening for malnutrition. On the other hand, PYMS had the highest combined sensitivity and specificity, with the highest Area Under the Curve (AUC) based on ROC curves. (STAMP, Screening Tool for the Assessment of Malnutrition; STRONGkids, Screening Tool for Risk on Nutritional status and Growth; PNST, Pediatric Nutrition Screening Tool; PYMS, Paediatric Yorkhill Malnutrition Screening; PSGNA, Pediatric Subjective Global Nutritional Assessment).

2200227 - Effect of Two Clinical Guidelines on Calcium and Phosphate Dosing on the Risk of Hypophosphatemia in Newborn VLBW Infants Receiving Parenteral Nutrition

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Financial Support: None Reported.

Background: Newborn preterm infants prescribed parenteral nutrition (PN) are at risk for developing hypophosphatemia from inadequate intake and/or refeeding syndrome. Our Nutrition Support Team (NST) observed a high prevalence of hypophosphatemia during PN therapy in newborn preterm infants that necessitated deviations from the calcium (Ca) and phosphorous (PO4) dosing ratios recommended by the ASPEN 2014 Clinical Guidelines (ASPEN2014-CG) that recommends a Ca:PO4 ratio of 1.3:1 (mmol:mmol)[ref#1]. Furthermore, the hypophosphatemia was unexplained by typical risk factors associated with refeeding hypophosphatemia [ref#2]. In 2018, the European Society of Pediatric Gastroenterology and Nutrition (ESPGHAN2018-CG) [ref#3], published an alternative dosing ratio of Ca:PO4 (0.8:1 to 1:1). Therefore, the purpose of this quality improvement (QI) project was to compare the effects of dosing Ca:PO4 according to ASPEN2014-CG versus ESPGHAN2018-CG on rates of hypophosphatemia during PN therapy newborn VLBW infants.

Methods: All newborn VLBW infants had serum electrolytes measured at baseline and regularly monitored as PN components were adjusted to meet nutritional goals, including in-ratio dosing of Ca:PO4. The goal range for normal serum PO4 in VLBW infants was 5.0 to 7.3 mg/dL. Eligibility included birthweight £1500 g, central venous access availability, and PN initiation at birth. From 7/2023 to 1/2024, Ca:PO4 were dosed according to ASPEN2014-CG; subsequently, from 7/2024 to 1/2025, dosed according to ESPGHAN2018-CG. Data collected included birth weight, sex, serum PO4, and daily PN composition. The outcomes were frequency of normal serum PO4 vs. hypophosphatemia or hyperphosphatemia necessitating deviation from the guideline-based in-ratio dosing of Ca:PO4. The results were analyzed using Pearson's chi-square to compare the frequency of need for deviations from ASPEN2014-CG vs ESPGHAN2018-CG based dosing of Ca:PO4, to maintain normal serum PO4.

Results: A total of 113 VLBW: among them, 64 infants (females = 27), birth weight, median (IQR): 930 g (718-1250), received Ca:PO4 dosed according to ASPEN2014-GC, and 49 (females = 23), 1173 g (965 - 1500 g), dosed according to ESPGHAN2018-CG. The rates of hypophosphatemia were similar at baseline (day '0') and on days '1' and '2' of PN therapy; however, from days '3' to '5', there were lower rates of hypophosphatemia in the ESPGHAN2018-CG group compared to ASPEN2014-CG: 52%, 56% and 38% vs.74%, 79% and 83% respectively (See Figure 1). The likelihood of maintaining normal serum PO4 using in-ratio dosing of Ca:PO4 was significantly higher from days 3 to 5 in the ESPGHAN2018-CG group compared to the ASPEN2014-CG group: 41.3% vs 18%, p = 0.01 (day 3), 39% vs 15%, p = 0.007 (day 4), and. 54% vs 12%, p = 000 (day 5).

Conclusion: Hypophosphatemia was frequent in newborn VLBW infants on PN therapy. However, when following ESPGHAN2018-CG for dosing of Ca:PO4 compared to ASPEN2014-CG, infants were less likely to become hypophosphatemic, with clinical significance appearing at day 3 and onwards. These findings highlight the urgent need to update guidelines with regards to optimal dosing of Ca and PO4 in newborn VLBW infants. Further studies could look into differentiating nutritional hypophosphatemia from refeeding hypophosphatemia in this at-risk population.

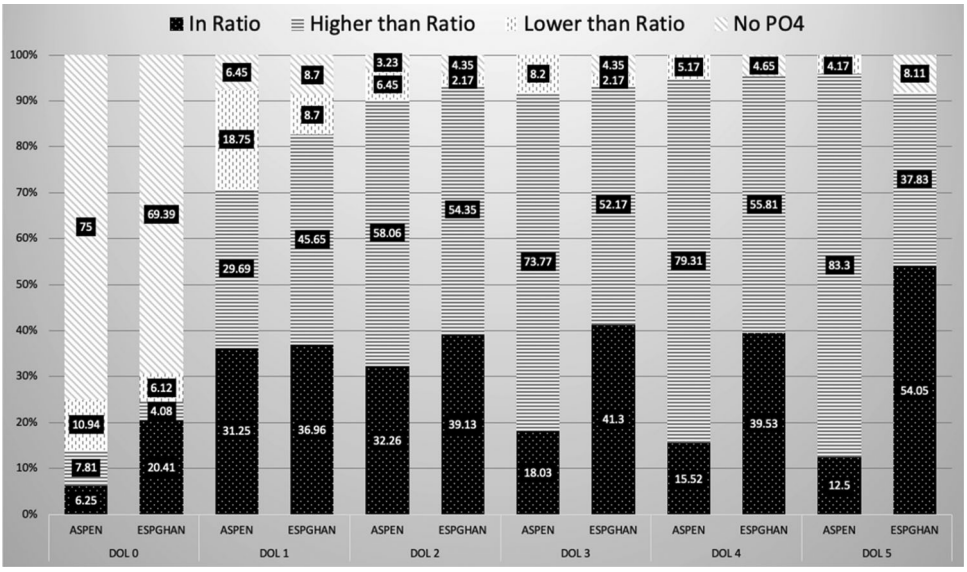

Figure 1. Percentage of calcium and phosphorous ratio in range based on ASPEN vs ESPGHAN Guidelines

2201859 - A Pilot Analysis of Outcomes From a Direct-to-Patient Registry on the Use of an Immobilized Lipase Cartridge in Pediatric Patients With Short Bowel Syndrome Dependent on Parenteral Nutrition

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Financial Support: Alcresta Therapeutics

Background: Adequate nutrition for infants and children is critical to growth and development. Pediatric patients living with intestinal failure (IF)/short bowel syndrome (SBS) are highly dependent on supplemental nutrition and are susceptible to malnutrition due to fat malabsorption. While parenteral nutrition (PN) is often necessary for growth and development in this population, the goal of reducing PN and promoting enteral autonomy (EA) is crucial to negating long-term PN associated complications. Use of an immobilized lipase cartridge (ILC) with enteral feeding has shown improved fat absorption and enteral feeding tolerance in patients with exocrine pancreatic insufficiency associated with cystic fibrosis. Further, a porcine model of SBS showed improved nutrition absorption and reduced PN dependence following enteral feeding via ILC, but clinical studies on the safety and efficacy of ILC use in patients with IF/SBS are still pending. A direct-to-patient prospective observational data registry has been developed to collect patient characteristics and clinical outcomes of pediatric IF/SBS patients receiving enteral nutrition (EN)

through an ILC. This pediatric gastrointestinal registry aims to capture data on patient characteristics and clinical outcomes in IF/SBS patients who use an ILC with enteral feeds. This is the initial analysis describing the safety and efficacy of ILC use in this population.

Methods: This prospective direct-to-patient observational registry was initiated in July 2024 following central institutional review board (IRB) approval to enroll pediatric IF/SBS patients receiving EN through RELiZORB (Alcresta Therapeutics, Inc.) immobilized lipase cartridge (ILC). Real-world data collection, including medical history, anthropometric measurements, quality of life (caregiver-as-proxy), and progression towards EA, is ongoing. An initial pilot analysis of baseline (before ILC use) participant anthropometrics and nutrition status for PN-dependent SBS participants was performed and compared to change from baseline following 3 to 6 months of ILC usage.

Results: A total of 103 participants from 52 clinics in the United States have enrolled as of April 2025. Data from a subset of participants diagnosed with SBS and dependent upon PN (n = 55) were collected. Per the April 2025 timepoint, 17 PN-dependent participants had 3 months of anthropometric data and 6 participants had 6 months of data while using ILC. Registry participants dependent on PN were underweight with a mean weight CDC z-score of −1.34 (Table 1) at the time of initial ILC use. Further, average baseline PN usage was 839.6 kcal/day with a volume of 1253 mL, indicating a significant dependence on PN (Table 1). Subsequent analyses for a limited subset of patients analyzing the change from baseline following 3 and 6 months of ILC usage for PN-dependent SBS participants are shown in Table 2. Pediatric PN-dependent SBS participants receiving EN administered through ILC showed an improvement in weight z-score overtime with ILC usage (Figure 1). Additionally, trends indicate an overall decrease in PN use (Figure 2).

Conclusion: Promising preliminary findings from a limited participant set suggest potential efficacy benefits in PN-dependent pediatric SBS participants using ILC. Building on this pilot analysis, additional analyses with more participants are planned with results anticipated by February 2026.

Table 1. Baseline participant anthropometrics and nutrition status

Variable/Characteristic	Statistic	PN Dependent SBS Participants (n=55)
Sex		
Female	N (%)	23 (41.8%)
Male		32 (40.5%)
Age (years)	Mean (range)	8.02 (0.21, 18.66)
Discontinued Due to Product Complaint or AE	N (%)	3 (5.45%)
Weight (CDC z-score)	Mean (SD)	-1.34 (1.55)
Height (CDC z-score; n=54)	Mean (SD)	-1.88 (1.87)
BMI (CDC z-score; n=49)	Mean (SD)	-0.11 (1.58)
Etiology of SBS		
Necrotizing enterocolitis	N (%)	21 (38%)
Midgut volvulus		6 (11%)
Intestinal atresia		7 (12%)
Gastroschisis		6 (11%)
Multiple		11 (20%)
Teduglutide use	N (%)	19 (34.5)
Duration Prior to ILC start (months)	Mean (SD)	26.72 (28.43)
PN use		
Calories (kcal/day; n=46)	Mean (SD)	839.6 (402.3)
Volume (mL/day; n=48)	Mean (SD)	1253 (561.4)
EN use		
Calories (kcal/day; n=53)	Mean (SD)	833.6 (566.1)
Volume (mL/day; n=54)	Mean (SD)	760.1 (475.1)

Table 2. Anthropometric and nutrition changes for PN-dependent SBS participants following ILC usage

Variable/Characteristic	Statistic	Months Post ILC	
		3 Months	6 Months
Weight (CDC z-score) Change	N	17	6
	Mean (SD)	0.17 (0.47)	0.24 (0.67)
Height (CDC z-score) Change	N	17	6
	Mean (SD)	0.15 (0.46)	0.25 (0.52)
BMI (CDC z-score) Change	N	16	6
	Mean (SD)	0.05 (0.78)	0.05 (0.60)
PN use			
Percent Change Calories (kcal/kg/day)	N	9	5
	Mean (SD)	0.11 (50.03)	-29.0 (36.54)
Percent Change Volume (mL/day)	N	12	6
	Mean (SD)	7.07 (32.60)	-17.2 (27.73)
EN use			
Percent Change Calories (kcal/kg/day)	N	13	6
	Mean (SD)	18.00 (72.72)	83.58 (168.1)

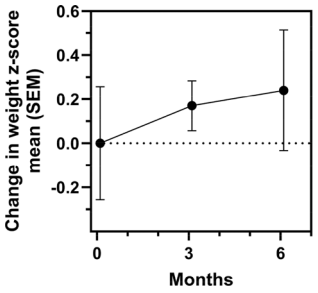

Figure 1. Weight change for PN-dependent SBS participants following ILC usage

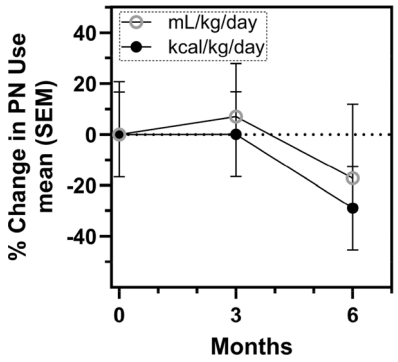

Figure 2. PN use for PN-dependent SBS participants following ILC usage

2192573 - Adherence to Guideline-Based Nutritional Interventions Following Diagnosis of Neonatal Malnutrition in the NICU

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Financial Support: None Reported.

Background: Malnutrition in hospitalized infants, particularly those in the neonatal intensive care unit (NICU), can result in adverse outcomes including impaired growth, longer hospital stays, and developmental delays. In 2018, the Academy of Nutrition and Dietetics proposed diagnostic indicators for neonatal malnutrition; however, limited data exist on the clinical response to a malnutrition diagnosis in the NICU.

Methods: This retrospective cohort study includes infants admitted to a single NICU in 2024, diagnosed with malnutrition after day of life (DOL) 15. Malnutrition is defined as a decline in WAZ > 0.8 SD from birth weight. Clinical and nutritional data was extracted from the electronic health record, including daily prescribed caloric intake, feeding type, and WAZ at birth, diagnosis, and disposition. Segmented mixed-effects linear regression evaluated changes in prescribed caloric intake before and after diagnosis.

Results: Of the 932 infants that were admitted, 130 (14%) were diagnosed with malnutrition; 115 met inclusion criteria. At diagnosis, median total energy intake was 122.6 kcal/kg/day (IQR: 112–130) and protein intake was 3.6 g/kg/day (IQR: 2.9–4.3). Forty-one percent achieved the target ≥10% caloric increase within 7 days. Those who did not achieve this target had higher baseline energy intake on day of diagnosis, than those who did (125 vs. 115 kcal/kg/day, $p < 0.001$). Change in WAZ from birth to discharge did not differ by intervention status (p = 0.580). Post-diagnosis energy intake increased by 2.9% (relative to energy intake on day of diagnosis) but was not statistically significant (p = 0.074).

Conclusion: Less than half of infants received the recommended caloric increase after malnutrition diagnosis, suggesting opportunities to improve adherence to nutrition guidelines in the NICU. Identifying clinical barriers and their impact on growth may improve strategies to optimize post-diagnosis nutrition care in the NICU.

2206780 - Relationship Between Enteral Nutrition Initiation and Delivery in the Pediatric Intensive Care Unit and Long-Term Feeding Functional Outcomes in Neonates With Congenital Diaphragmatic Hernia

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Financial Support: None Reported.

Background: Congenital diaphragmatic hernia (CDH) is a critical congenital defect with high risk of malnutrition. Enteral nutrition (EN) practices may impact long-term functional and nutritional outcomes in CDH survivors. We aimed to examine the relationship between EN initiation and adequacy and functional status scale (FSS), specifically the feeding domain score (FDS), after hospital discharge in CDH survivors.

Methods: Single-center retrospective cohort study of infants with CDH admitted to the PICU. Baseline demographics, disease-specific variables, anthropometric data, and EN and clinical characteristics were collected. We extracted medical record data to calculate FSS scores including a feeding domain at 2 timepoints: hospital discharge and >12-months after discharge. FSS included 6 domains: respiratory, mental status, sensory, communication, motor and feeding. The feeding domain score (FDS) is divided into: 1- age appropriate nutrition by mouth, 2- need for help with feeding outside of expected developmental stage (mild dysfunction), 3- need for tube feedings (moderate dysfunction), 4- parenteral nutrition (PN) with tube feeds (severe dysfunction), and 5- all PN (very severe dysfunction). We excluded patients that were transferred out of the PICU or who died before discharge, never had tube feeds, or who had missing data.

Results: 132 of 266 patients with CDH were excluded resulting in a sample of 134 newborns [56% male, median (IQR) birth weight 3.08 kg (2,68, 3.38)] admitted to the PICU from Jan 2009 to Dec 2022. CDH was left-sided in 76%. Defect sizes were A (16%), B (32%), C (48%), and D (4%). Median [IQR] time to EN initiation was 10 days (6, 19) with 72.4% of patients fed via gastric tube and 27.6% via post-pyloric tube. Distribution of FDS at discharge was 3.7% of patients with normal function, 43.3% and 53% of patients with mild and moderate dysfunction, respectively, and no patients had severe or very severe feeding dysfunction. Time to EN initiation was longer and EN adequacy day 3 after EN initiation was lower as the defect size increased, [(A- 7 days (5, 9) & 32% EN adequacy (12%, 50%); B- 8 days (5, 13) & 34% EN adequacy (17%, 57%); C- 15 days (8, 24) & 23% EN adequacy (13%, 35%); D- 20 days (14, 25) & 22% EN adequacy (0%, 65%)]. FDS at discharge increased with defect size at birth, [FDS at discharge based on defect size A- 2 (2,2), B- 2 (2,3), C- 3 (2.75, 3), D- 3 (3,3)]. At >12 months follow-up, median FDS improved for patients with defect size A, B and C but not D, [FDS > 12 months after discharge based on defect size A- 1 (1,1), B- 1 (1,1), C- 1 (1, 3), D- 3 (3,3)].

Conclusion: We observed that time to EN initiation and percent EN adequacy day 3 after EN initiation and severity of feeding dysfunction at hospital discharge correlate with CDH defect size in neonates with CDH who required tube feeds. Future studies will consider modifiable aspects of nutrition care and delivery in the PICU for patients with larger CDH defect size and how these might impact short- and long-term outcomes.

International Abstract of Distinction Award

2199732 - Impact of Increased Phosphate in Total Parenteral Nutrition on the Incidence of Refeeding Syndrome in Preterm Infants: A Comparative Study

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Financial Support: None Reported.

Background: Refeeding syndrome (RFS) is a major metabolic complication that may affect preterm infants during the early days of total parenteral nutrition (TPN), particularly when phosphate intake is low. This study assessed whether early phosphate supplementation initiated on the first day of life reduces the incidence of RFS and improves short-term clinical outcomes in very-preterm infants.

Methods: A comparative study with retrospective (before phosphate increase; January 2015 and October 2023) and prospective (after phosphate increase; November 2023 and April 2025) cohorts. This study included very preterm infants who were born at King Saud Medical City, a tertiary referral center, at ≤32 weeks of gestation, had a birth weight of < 1500 g, received parenteral nutrition immediately after birth and admitted to a level 3 neonatal intensive care unit. Modified log-Poisson regression with generalized linear models and a robust variance estimator (Huber–White) were used to adjust for potential confounding factors.

Results: A total of 962 infants met our inclusion criteria. A significant reduction in the incidence of refeeding syndrome was observed in the prospective group after increasing phosphate in TPN (P < 0.001). Infants with prospective group had also lower late onset of sepsis and necrotizing enterocolitis (P = 003, < 0.001; respectively). The multivariable regression analysis revealed that infants who received higher phosphate in TPN in first week of life had significantly lower RFS risk (aRR 0.59; 95% 0.44-0.79).

Conclusion: Early phosphate supplementation was associated with a reduced incidence of RFS and improved clinical outcomes in very-preterm infants. Nevertheless, randomized controlled trials should be conducted to validate these findings and inform future nutrition guidelines.

Table 1. Maternal and neonatal characteristics of the study participants

Variables	N	Before early phosphate intake (n = 761)	After early phosphate intake (n = 201)	P-value
Gestational age (weeks), median (IQR)	962	29 (27.0–31.0)	28 (27–30.0)	0.72
Birth weight (grams), (IQR)	962	1,100 (870–1,320)	1,100 (840–1,290)	0.33
Z-score of birth weight, (IQR)	962	−0.5 (−1.0 to 0.0)	−0.5 (−1.1 to 0.07)	0.95
Birth length (cm), median (IQR)	962	37 (34–39)	36 (33–38)	0.11
Z-score of birth length, (IQR)	962	−0.5 (−1.2 to 0.4)	−0.4 (−1.3 to 0.4)	0.88
Head circumference (cm), (IQR)	962	26 (24–28)	26 (24–27)	0.28
Z-score of head circumference, (IQR)	962	−0.2 (−0.9 to 0.4)	−0.2 (−0.9 to 0.4)	0.55
1-Min Apgar score, median (IQR)	962	6 (4–7)	5 (3–6)	<0.001*
5-Min Apgar score, median (IQR)	962	7 (6–8)	6 (6–8)	<0.001*
Small-for-gestational-age, n (%)	962	111 (14.6)	37 (18.5)	0.18
Male sex, n (%)	962	396 (52)	92 (45.8)	0.13
Antenatal steroid treatment, n (%)	962	400 (52.6)	91 (45.3)	0.07
Gestational diabetes mellitus, n (%)	962	37 (4.9)	11 (5.5)	0.72
Maternal hypertension, n (%)	962	186 (24.4)	36 (17.9)	0.06
Preterm rupture of the membrane, n (%)	962	79 (10.3)	30 (14.9)	0.08
Inotropes, n (%)	962	318 (41.8)	53 (26.4)	<0.001*
Hydrocortisone, n (%)	962	168 (22.1)	29 (14.4)	0.51
Respiratory distress syndrome requiring surfactant, n (%)	962	505 (66.4)	143 (71.1)	0.21
Mechanical ventilation, n (%)	962	547 (71.9)	140 (69.7)	0.54
Duration of mechanical ventilation, (IQR)	962	10 (4–21)	9 (3–18)	0.17
SNAPPE-II	962	20 (11–33)	22 (15–34)	0.79

Table 2. Univariate analysis of growth anthropometrics, neonatal morbidity, and mortality stratified by early phosphate intake in TPN

Variables	N	Before early phosphate intake (n = 761)	After early phosphate intake (n = 201)	P-value
Growth anthropometric measurements				
Weight gain velocity (g/kg/day), median (IQR)	723	7.2 (6.2–8.7)	7.6 (6.3–9.2)	0.54
Weight at discharge (g), median (IQR)	723	1900 (1820–2,100)	1960 (1830–2,400)	0.25
Δ Weight z-score, median (IQR)	723	−1.5 (−2.34 to −0.85)	−1.4 (−2.25 to −0.87)	0.46
Neonatal morbidities and mortality				
Refeeding syndrome, n (%)	962	289 (38)	45 (22.4)	**<0.001***
Bronchopulmonary dysplasia, n (%)	616	226 (43.4)	46 (48.4)	0.37
Late-onset sepsis (culture-proven), n (%)	962	320 (42)	61 (30.3)	**0.003***
Any intraventricular hemorrhage, n (%)	962	281 (36.9)	71 (35.3)	0.74
Necrotizing enterocolitis (stage ≥ 2), n (%)				
Medical management	962	242 (31.8)	27 (13.4)	**<0.001***
Surgical management		49 (6.4)	4 (2)	**0.01***
Mortality, n (%)	962	186 (24.4)	53 (26.4)	0.58
Length of hospital stay, median (IQR), days	723	45 (27–70)	29 (14–47)	**<0.001***

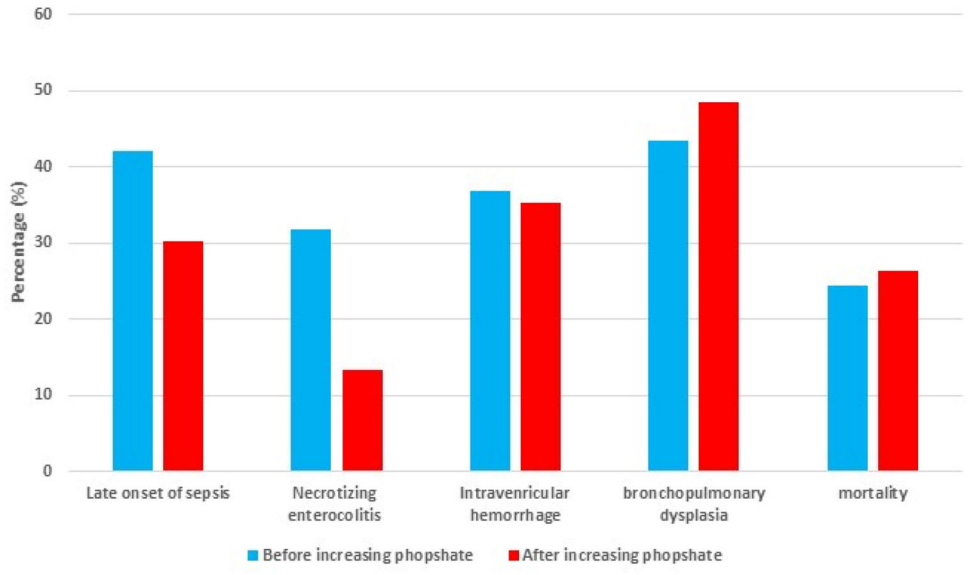

Figure 1. Neonatal morbidities and mortality before and after increasing phosphate in neonatal TPN

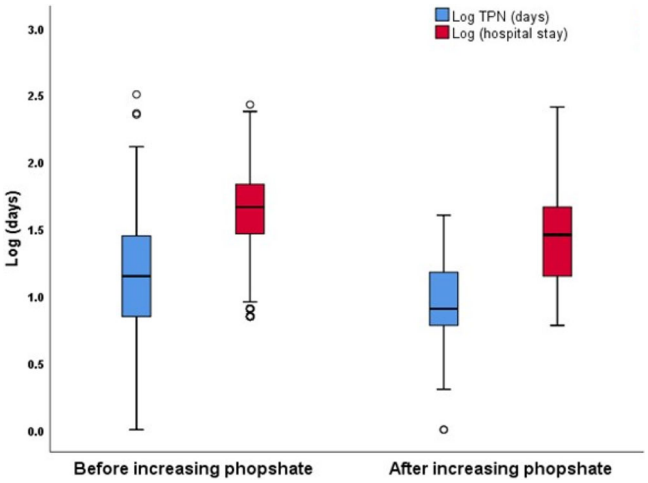

Figure 2. Boxplot of median TPN days and hospital stay before and after increasing phosphate in TPN