Best of ASPEN - Parenteral Nutrition Therapy

1361789 - Microbiology Characteristics of Blood Stream Infection in Dysmotility Patients on Home Parenteral Nutrition

Amy Nishnick, RD, LD, CNSC; Tausif Siddiqui, MD; Denise Jezerski, RD, LD, CNSC; Elizabeth Friedel, RD, LD, CNSC; Sara Yacyshyn, MD; Brigette Fuentes; Donald Kirby, FACP, FACN, FACG, AGAF, FASPEN, CNSC, CPNS; Ezra Steiger, MD; Gail Cresci, PhD, RD, LD
Cleveland Clinic, Cleveland, Ohio

Background: Previous studies report higher mortality rates amongst patients receiving home parenteral nutrition (HPN) for gastrointestinal dysmotility. Utilization of HPN in dysmotility patients is increasing and there are limited data exploring the frequency of HPN-associated major complications in this population. Emerging evidence suggests HPN and GI dysmotility is associated with decreased gut microbial diversity with overgrowth of potential pathogenic microbes (gut dysbiosis). Gut dysbiosis can impair the gut barrier and facilitate bacterial translocation into systemic circulation. This study aimed to identify complication rates for catheter related blood stream infection (CRBSI), intestinal failure associated liver disease (IFALD), and catheter venous complication – venous thrombosis (CVC-VT) in HPN patients with dysmotility HPN compared to those without dysmotility. Associations with cultured bacteria and CRBSI in dysmotility were also performed.

Methods: This retrospective study was approved by the Cleveland Clinic IRB and utilized an IRB approved registry. Data collection included patient demographics, HPN information, and HPN complications for patients receiving HPN between 3/1/2016 and 3/1/2020. Chi-square test compared the predominantly cultured bacteria and differences in the complications between HPN patients with dysmotility to those without dysmotility. A p value of < 0.05 was considered statistically significant.

Results: A total of 1368 HPN episodes in 1266 patients were identified. For reference, a HPN episode is equal to the period between HPN start date to the HPN end date. A patient may have more than one HPN episode if the PN was started and stopped more than two times over the course of the 4-year reporting period. Patients with dysmotility comprised 23% (n = 318) of the HPN patient episodes. The major indications for HPN in the remaining 1050 patient episodes were short bowel syndrome (37.4%, n = 512), mechanical bowel obstruction (18.3%, n = 250), enterocutaneous fistula (15.9%, n = 217) and mucosal disease (5.2%, n = 71). The dysmotility group (26.7%) and the SBS group (30.3%) had the highest overall number of complications. Of the complications analyzed in all patients, CRBSI was the most common (19.2%), followed by IFALD and CVC associated thrombosis. CRBSI incidences were standardized by HPN duration (ie, per 1000 HPN days). The overall CRBSI rate was 0.56 per 1000 HPN days. CRBSI rates were higher in the dysmotility group (0.66 per 1000 HPN days) compared to the non-dysmotility group (0.52 per 1000 HPN days), ($p < 0.02$). Chi-squared statistical tests were applied to identify an association in microbes involved in CRBSIs and patients with dysmotility. A significant ($p < 0.05$) relationship was found for three classes of microbes, Candida, Pseudomonas aeruginosa, and Staphylococcus hominis, and the presence of dysmotility.

Conclusion: Patients with dysmotility receiving HPN have higher rates of CRBSI compared to non-dysmotility patients. Several microbes are associated with CRBSI in dysmotility patients. These microbes are also found in the gut of patients with gut dysbiosis. Whether microbes from the gut of dysmotility patients translocate and cause CRBSI in dysmotility patients receiving HPN is not known. Data presented here suggest future prospective causative investigation is warranted.

Financial Support: n/a

Abstract of Distinction

1327989 - Evaluation of Parenteral Nutrition Order Safety Upon Transitions of Care

Diana Mulherin, PharmD, BNCSP, BCCCP; Vanessa Kumpf, PharmD, BCNSP, FASPEN; Jill Murphree, MS, RD, CNSC; Sarah Cogle, PharmD, BCCCP, BCNSP; Ankita Sisselman, MD; Dawn Adams, MD, MS, CNSC
Vanderbilt University Medical Center, Nashville, Tennessee

Background: Parenteral nutrition (PN) is a complex therapy commonly utilized in hospitals as well as home and alternate site settings for patients with intestinal failure. The potential for errors is considerable, especially as patients transition between care settings. PN safety is threatened by persistent product shortages, the loss of formal nutrition support teams (NSTs), and significant education gaps that have

been identified across all disciplines over the past several decades. These factors have resulted in non-standardized and often disorganized management of PN therapy across all practice settings. The purpose of this study is to evaluate the safety (compliance with compatibility, stability, or safe practice standards) of existing PN orders upon transfer to a large, academic medical center for inpatient or outpatient PN management.

Methods: In May 2021 our multidisciplinary NST began completing a safety evaluation via electronic questionnaire for any patient transitioning into our inpatient or outpatient service on PN from an outside hospital, facility, or home infusion provider. Records from May 2021 to July 2022 were extracted from this database for evaluation. The primary outcome was percentage of PN orders with at least one safety violation, which was defined as any PN order detail that was deemed to be less than optimal for the specific clinical scenario as assessed by our NST (2 MDs, 2 advanced practice providers, 3 RDs, 3 PharmDs) and based on ASPEN safety recommendations (Figure 1). Issues could range from minor problems unlikely to cause harm to serious errors leading to life-threatening safety events. Secondary outcomes were incidence of macronutrient, electrolyte, volume, additive, order clarity, compatibility, stability, or other PN safety violations. Adverse events (AEs) deemed by the NST to have an etiology related to the previous PN formula were also recorded. Descriptive statistics were used to summarize baseline demographics as well as primary and secondary outcomes.

Results: Sixty-one patients were included in the study (Table 1) with a total of 76 PN orders evaluated upon transition of care to our service. Sixty-eight (89.5%) orders contained at least one PN safety violation. A total of 195 safety violations were identified (Table 2). Safety violations involving PN micronutrients (electrolytes, vitamins, minerals) were most frequent (n = 81), followed by macronutrients (n = 56), order clarity (n = 26), and volume (n = 23). Drug shortages were associated with violations in 24 orders, while an additional 20 orders contained violations possibly related to a drug shortage. Safety violations resulted in a total of 36 AEs that occurred in 22 different patients. AEs included malnutrition/weight loss (n = 5), dehydration/kidney injury (n = 4), volume overload (n = 6), electrolyte abnormalities (n = 7), poor glycemic control (n = 5), abnormal liver function tests (n = 4), and other (n = 5). Two cases with significant AEs are illustrated in Figure 2.

Conclusion: Violations in PN order safety were present in almost every order evaluated upon transfer of care. The consequences of PN safety violations are not benign, as adverse events were commonly identified. This strongly supports the need for improved PN education and training across all disciplines, especially for those without access to a multidisciplinary NST.

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Table 1. Baseline Demographics and Clinical Characteristics.

Patient characteristics	n (%) or median (IQR)
Age, median (IQR)	60 (46,68)
Female sex	44 (72.1)
PN indication	
Ileus/SBO/pain	29 (38.2)
Fistula/leak/bowel rest	30 (39.5)
Malabsorption	16 (21.1)
Other	1 (1.3)
PN diagnosis	
Benign post-op	41 (53.9)
Malignant neoplasm	10 (13.2)
Other GI	9 (11.8)
IBD	4 (5.3)
Systemic disease	3 (3.9)
Pancreatitis	4 (5.3)
Benign neoplasm	2 (2.6)
Congenital disease	2 (2.6)
Critical care	1 (1.3)
Level of care at transition	
Inpatient	62 (81.6)
Outpatient	14 (18.4)
Previous care setting	
Home	29 (38.2)
Hospital	26 (34.2)
Facility	21 (27.6)
Clinician type(s) managing previous PN order	
Pharmacist	23 (30.3)
Dietitian	17 (22.4)
Physician	3 (3.9)
Advanced practice provider	0 (0)
Pharmacist + dietitian	10 (13.2)
Physician + dietitian	6 (7.9)
Physician + pharmacist	2 (2.6)
Unknown	15 (19.7)

Table 2. PN Safety Violations.

Safety violations (n=195)	Frequency
Macronutrients (n=56)	
Calories too high	10
Calories too low	3
Protein too high	4
Protein too low	12
Protein concentration too low	0
Dextrose too high	8
Dextrose too low	1
Dextrose concentration too low	0
ILE too high	10
ILE too low	1
ILE concentration too low	1
ILE infused separately over 24 hours	3
Other ILE issue	3
Electrolytes, vitamins, minerals (n=81)	
Sodium too high	6
Sodium too low	5
Multiple potassium salts ordered unnecessarily	12
Potassium phosphate ordered in preference of sodium phosphate unnecessarily	18
No calcium in PN (if inappropriate)	7
Other electrolyte issue	10
No or low multivitamins	15*
No or low trace elements	6*
Other vitamin/mineral issue	2
Volume (n=23)	
Volume/rate too high	4
Volume/rate too low	4
Formula uncycled in patient on long-term PN	12
Formula cycled while critically ill and clinically unstable	2
Other volume issue	2
Additives	6
Order clarity	26
Continuation of care	3

*6 orders contained no multivitamins, 2 orders contained no trace elements

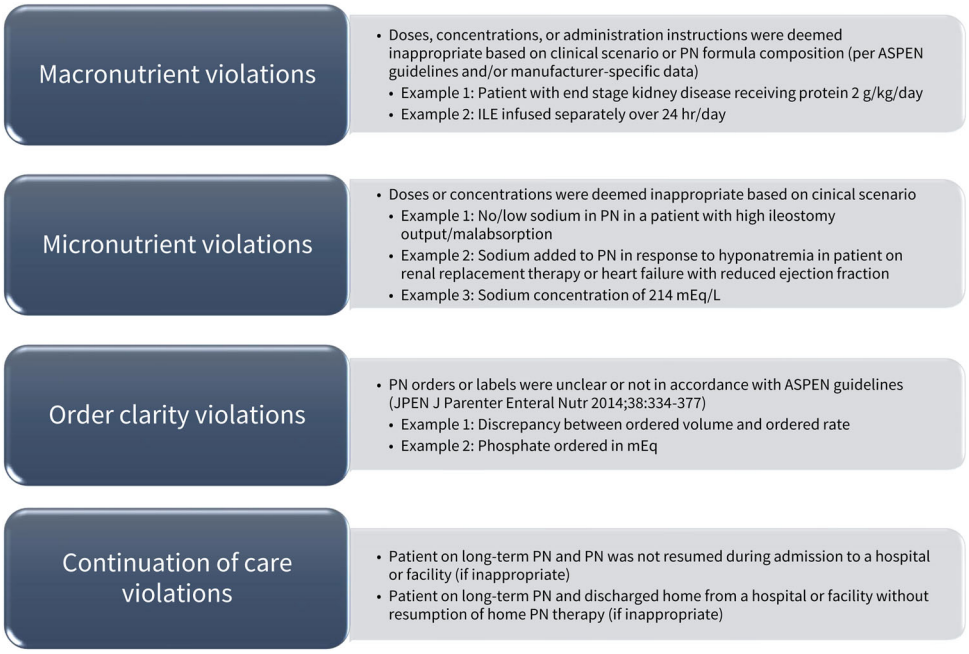

Figure 1. Supplemental definitions and examples of safety violations. The purpose of this figure is to provide additional descriptions of safety violations listed in Table 2.

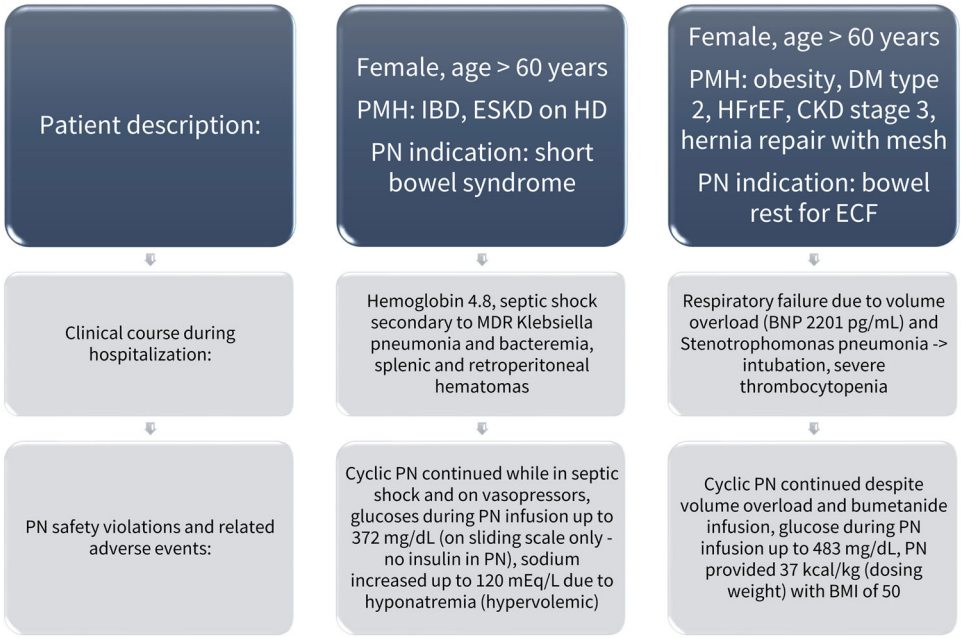

Figure 2. Two cases with significant adverse events related to PN management. BNP: B-type natriuretic peptide, CKD: chronic kidney disease, DM: diabetes mellitus, ECF: enterocutaneous fistula, ESKD: end stage kidney disease, HD: hemodialysis, HFrEF: heart failure with reduced ejection fraction, IBD: inflammatory bowel disease, MDR: multi-drug resistant.

Abstract of Distinction

1367314 - Micronutrients Deficiency in Patients Receiving Parenteral Nutrition: Effect of Multivitamin Supply Shortage

Osman Mohamed Elfadil, MBBS; Bradley Salonen, MD; Jennifer Carnell, PharmD; Sara Bonnes, MD; Ryan Hurt, MD, PhD; Manpreet Mundi, MD
Mayo Clinic, Rochester, Minnesota