Comparison of catheter related blood stream infections in home parenteral nutrition patients receiving ethanol lock therapy versus alternative prophylactic catheter care

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Background

Ethanol lock therapy (ELT) has been used historically in patients receiving home parenteral nutrition (HPN) who are at high risk for developing catheter related blood stream infections (CRBSIs). In 2018, The Food and Drug Administration (FDA) approved the use of ethanol for adults with symptomatic hypertrophic obstructive cardiomyopathy.[1,2] This approval caused a significant price increase in commercially manufactured ethanol, which led many nutrition support clinicians to seek alternative prophylactic catheter care orders to prevent CRBSIs.[3]

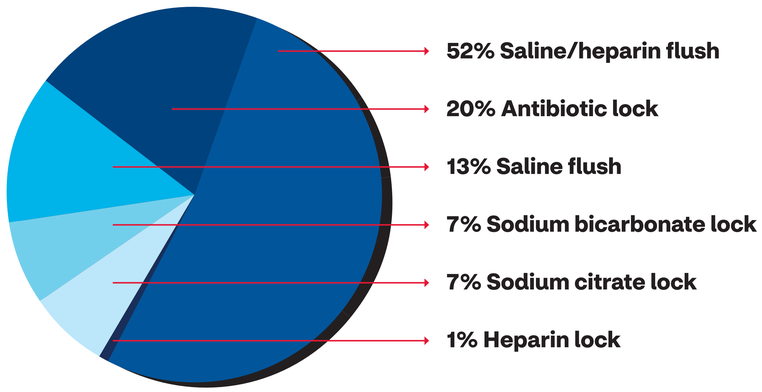
Purpose/Objective

To determine if there was an association between CRBSI rates and the use of ELT compared to alternative prophylactic catheter care types.

Methods

- Inclusion criteria: Adult and pediatric patients receiving HPN and ELT for ≥6 months prior to ELT conservation measures
- Data retrospectively collected from electronic medical records (EMRs) and compared during three different time periods between September 2019 and March 2021
  - Pre-conservation (initial ELT order)
  - Conservation (reduced ELT frequency and/or concentration)
  - Alternative treatment (sodium bicarbonate lock, sodium citrate lock, antibiotic lock, saline flushes, saline and heparin flushes [SASH method])

Figure 1. Alternative treatment therapies (N=216)



- Data on CRBSIs were extracted from the EMR during each period. Criteria for CRBSIs included:
  - Fever over 100.4º F not attributable to other health issues
  - Catheter exit site redness or drainage; and blood/catheter culture or gram stain confirming bacterial or fungal counts
  - Prescriber determination that the catheter is the most likely source of infection, resulting in removal of the catheter and/or treatment with anti-infectives[4]
- Primary outcome measure:
  - Mean CRBSI rate per 1,000 catheter days, compared during each period
  - Significance level was set at $p \leq 0.05$

Results

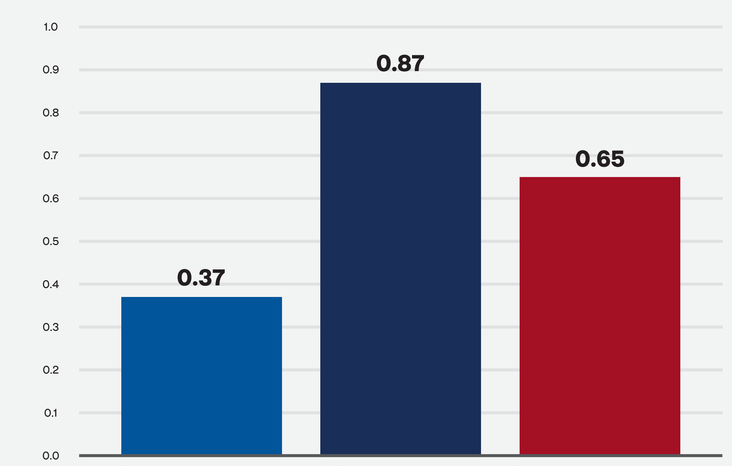
Table 1. Baseline clinical and demographic characteristics of sample (N=218)

Baseline age, y	12.7 (1-82)
BMI, kg/m²	19.3 (13.2-43.8)
Sex, n (%)	
Female	104 (47.7)
Male	114 (52.3)
Primary Indication for HPN, n (%)	
Short bowel syndrome	158 (72.5)
Gastroparesis/dysmotility	21 (9.6)
Fistula	9 (4.1)
Bowel obstruction	6 (2.8)
Other[a]	24 (11)
Duration of time on HPN with Coram, d	1224.5 (2-3148)
Catheter type, n (%)	
CVC	158 (72.5)
PICC	35 (16.1)
Port	6 (2.8)
Missing	19 (8.6)
Catheter lumens, n (%)	
One	149 (68.3)
Two	48 (22.1)
Missing	21 (9.6)
Initial ELT concentration, n (%)	
70%	173 (79.4)
50%	40 (18.3)
30%	3 (1.4)
Other	2 (0.9)
Initial ELT volume, mL	1.0 (0.2-3.0)
Initial ELT dwell time, hr	10 (1-18)

Key: **HPN**, home parenteral nutrition; **d**, days; **PICC**, peripherally inserted central catheter; **CVC**, central venous catheter; **ELT**, ethanol lock therapy. Continuous data presented as median and range.
[a] Other diagnoses included roux-en-y complications, malnutrition, Crohn's disease, malabsorption, functional disorder of intestine, Microvillus disease, syndromic congenital salt wasting diarrhea, Tufting enteropathy, pancreatitis and DiGeorge syndrome.

There was an overall increase in the CRBSI rate from the pre-conservation period to the alternative treatment period, although there were *no statistically significant differences between any of the three periods*.

Figure 2. CRBSI rate per 1,000 catheter days



There were no statistically significant differences between any of the 3 periods (p=0.412; Kruskal Wallis test).
66% of patients in the alternative treatment period received only saline and/or heparin flushes.

Conclusion

- **Both ELT and alternative prophylactic catheter care types may be effective in preventing CRBSIs in high-risk adult and pediatric patients receiving HPN**
- **Randomized, controlled trials are needed to further evaluate the effectiveness of ELT compared to alternative prophylactic catheter care types**
- **Additional studies are also needed to determine the optimal alternative prophylactic catheter care type**

References

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4. Gundogan K, Dave NJ, Griffith DP, et al. Ethanol Lock Therapy markedly reduces catheter-related blood stream infections in adults requiring home parenteral nutrition: a retrospective study from a tertiary medical center. *JPEN J Parenter Enteral Nutr*. 2020;44(4):661-667.