

Catheter related blood stream infections rates in home parenteral nutrition patients receiving sodium bicarbonate lock therapy compared to ethanol lock therapy

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Background

The lack of a generic ethanol product has led some practitioners and institutions to conclude that ethanol lock therapy (ELT) is no longer a cost-effective therapy for CRBSI.¹ Sodium bicarbonate (NaHCO₃) has demonstrated anti-infective and anticoagulation properties with significant prevention of catheter loss due to CRBSI in comparison to normal saline in one large study conducted in patients receiving hemodialysis.² Given the NaHCO₃ safety profile, availability and affordability, it is worthwhile to explore its effectiveness as a catheter lock therapy in the home parenteral nutrition (HPN) patient population.

Purpose/Objective

The objective of this study was to compare CRBSI rates in HPN patients administering sodium bicarbonate lock therapy (SBLT) to historical case controls using ELT.

Methods

- **Inclusion criteria:** Adult and pediatric patients receiving HPN and 70% ELT with subsequent change to 8.4% SBLT within two 12-month time periods
- Data was retrospectively collected from electronic medical record (EMR) and compared between the two time periods of lock therapy: 1/31/2019 – 1/31/2020 for ELT and 6/1/2020 – 6/2/2021 for SBLT
- Data on CRBSIs were extracted from EMR for each time period. Criteria for CRBSI included:
 - Fever over 100.4°F not attributed 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 catheter removal or treatment with anti-infectives³
- Primary outcomes measure:
 - Mean CRBSI rate per 1,000 catheter days, comparing each 12-month time period
 - A P value <0.05 was considered statistically significant

Results

Table 1. Baseline clinical and demographic characteristics of sample (N=24)^a

Age (y)	7.4 (0.7-64.1) ^b	
BMI (kg/m ²)	16.7 (13.1 – 25.4)	
Sex, n (%)	Female	10 (41.7)
	Male	14 (58.3)
Primary indication for HPN, n (%)		
	Short bowel syndrome	19 (79.2)
	Gastroparesis/dysmotility	3 (12.5)
	Bowel obstruction	2 (8.3)
Duration of time on HPN with Coram (y)	1.8 (0.2 – 6.8)	
Catheter type, n (%)		
	PICC	5 (20.8)
	CVC	18 (75.0)
	Missing	1 (4.2)
Catheter lumens, n (%)		
	One	19 (79.2)
	Two	3 (12.5)
	Missing	2 (8.3)
HPN characteristics		
	Length of infusion (h)	14 (7-20)
	Frequency (days/wk)	7 (3-7)
	Additional IV therapies provided, n (%)	18 (75.0)

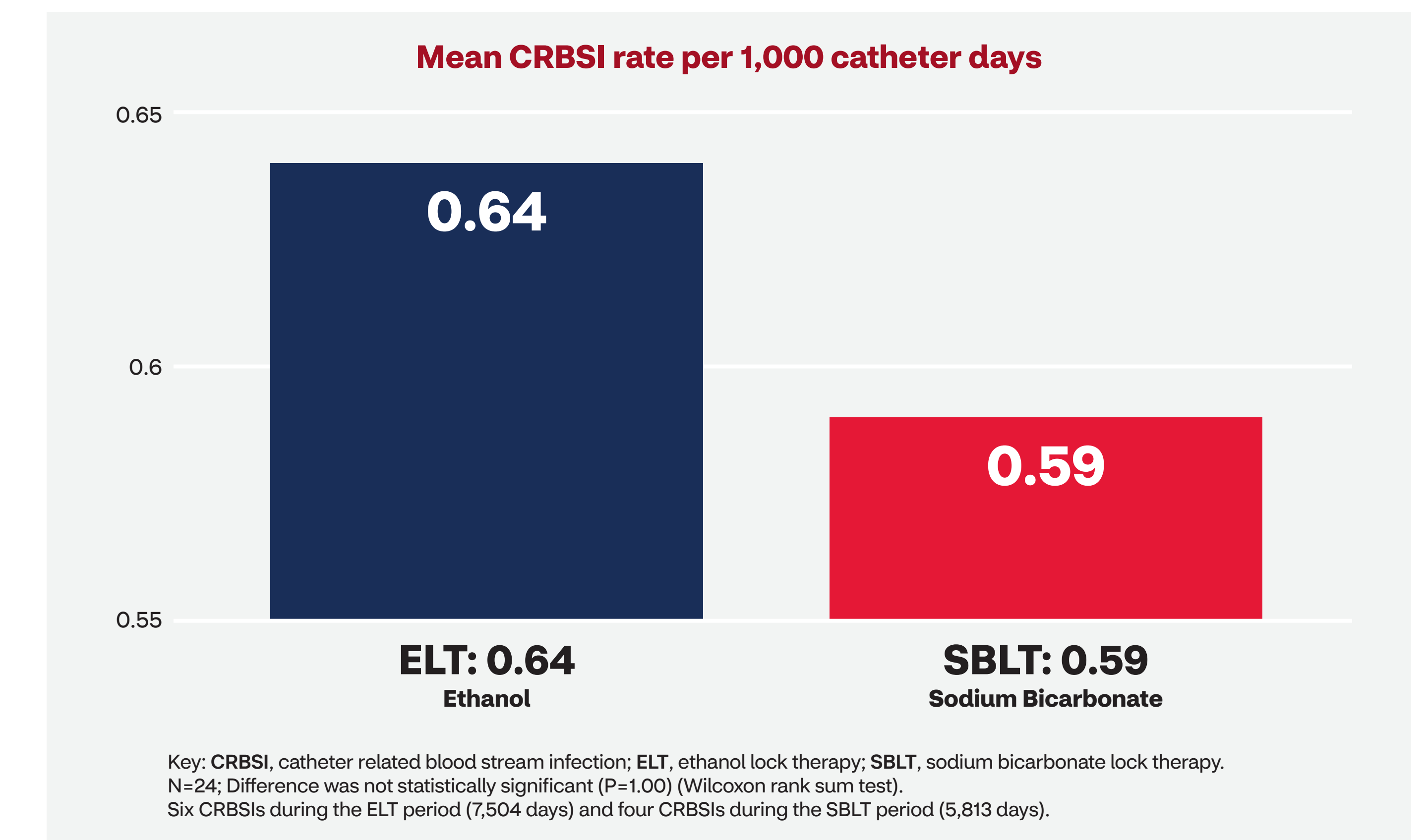
Key: BMI, body mass index; HPN, home parenteral nutrition; PICC, peripherally inserted central catheter; CVC, central venous catheter; IV, intravenous. Continuous data presented as median (range).
^a Baseline characteristics at the time of ethanol lock therapy.
^b >18 years of age; n=4.

Table 2. Characteristics of lock therapy (N=24)

	ELT	SBLT
Frequency, d/wk	7 (1-7) ^a	7 (1-7)
Volume, mL	0.6 (0.2-3.0)	0.5 (0.2-2.0)
Dwell time, h	8 (3-14) ^b	9.5 (5-17) ^c

Key: ELT, 70% ethanol lock therapy; SBLT, 8.4% sodium bicarbonate lock therapy. Continuous data presented as median (range).
^a n=23 (frequency was 'as needed' for 1 order).
^b n=20 (dwell time not specified on label instructions for 4 orders).
^c n=22 (dwell time not specified on label instructions for 2 orders).

Figure 1. Mean CRBSI rate comparison between use of ethanol vs. sodium bicarbonate as catheter lock therapy



Conclusion

- Both ELT AND SBLT may be effective in preventing CRBSI in adult and pediatric patients receiving long-term HPN. The CRBSI rate of both groups in this study was well below the 1.4-2.0 infection rate per 1,000 catheter days found in one study of risk factors for bloodstream infections in HPN patients.⁴
- Adequately powered, randomized, controlled trials are needed to further evaluate the safety and efficacy of using SBLT as a means of preventing CRBSI.
- Additional studies are needed to determine the optimal SBLT protocol, including concentration, frequency, and dwell time to prevent CRBSI in the HPN population.

References

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