

Catheter-Related Bloodstream Infection Rates in a Large Home Parenteral Nutrition Population: Impact of a Standardized Catheter Care Protocol

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Purpose

Catheter-related blood stream infection (CRBSI) is the most prevalent vascular access device complication in both the hospital and home settings. CRBSIs are associated with high morbidity and mortality as well as increased medical care costs. The objective for this study was to quantify the impact of implementing a standardized catheter care protocol utilizing novel catheter supplies on the incidence of CRBSI in a large and diverse home parenteral nutrition (PN) patient population.

Methodology

A retrospective, non-randomized analysis was completed on 5,619 patients receiving home PN from a single national provider from January 1, 2015 to December 31, 2015. Data from 2015 was compared to data retrospectively collected from 2012 through 2014. Data collected between 2012–2014 represents a population that received PN, but did not uniformly receive the study period's catheter care protocol. Data collected included demographics, diagnoses, payor, nursing care, other therapies provided in addition to PN, catheter type, catheter dwell days, number of catheter lumens, clinical intervention and infecting organism as available. Results are expressed as the number of CRBSIs per 1,000 catheter days.

Patients receiving PN were provided with a specific catheter maintenance bundle (CMB), consisting of four specific products:

- 1) 70% alcohol impregnated disinfection end cap
- 2) Foam disc impregnated with polyhexamethylene biguanide hydrochloride
- 3) Moisture barrier to help protect the IV dressing during bathing
- 4) Securement device for PICCs

In conjunction with the CMB, an education program was initiated, consisting of: internal education on the CMB to all home infusion nurses, pharmacists, dietitians and supporting nonclinical staff; a letter outlining the CMB and its associated education program, sent to the patients and their physicians; and specific patient education tools that addressed both catheter supply use and general guidelines for effective catheter care. This education was provided in addition to the direct education provided to patients and caregiver(s) on how to effectively use the CMB with successful return demonstration. The 2015 results were compared to a pre-study period (January 1, 2014–December 31, 2014).

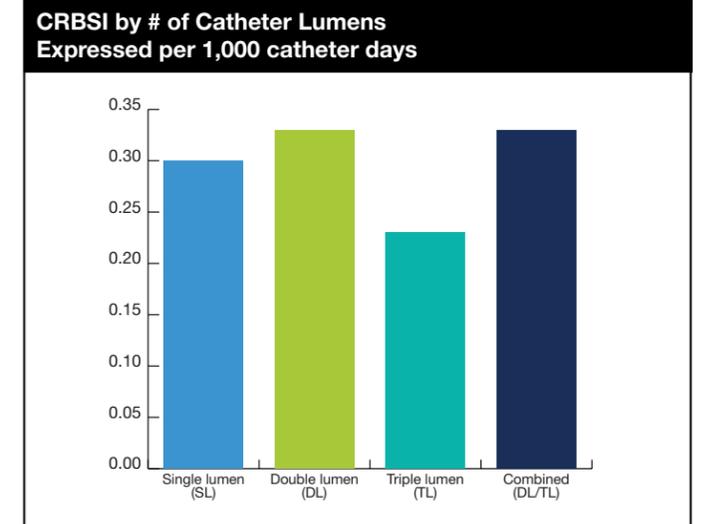
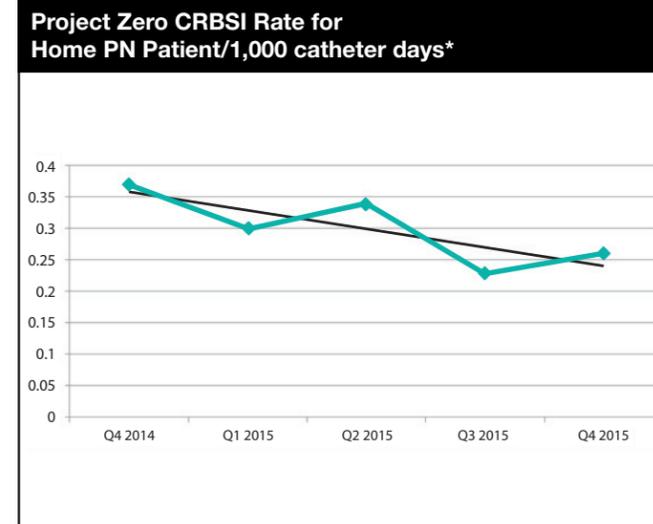
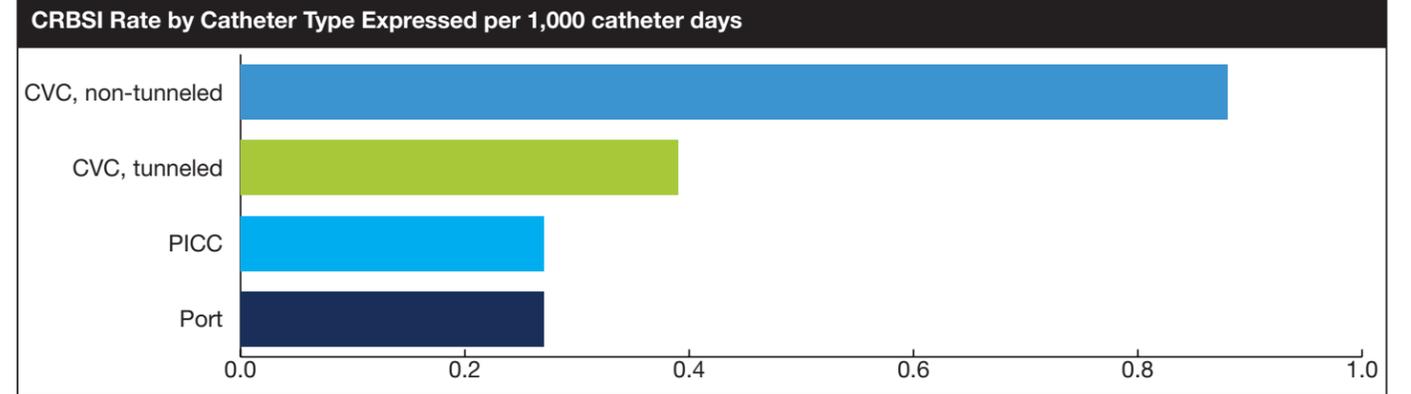
Results

CRBSI rate for 5,619 patients receiving home parenteral nutrition during the calendar year of 2015 was 0.29/1,000 catheter days. This was a decrease compared to the pre-study period results of 0.36/1,000 catheter days. Pediatric patients experienced a higher rate of CRBSI than adults. No significant difference was noted in CRBSI by gender. Non-tunneled catheters had the highest rate of CRBSI compared to all other catheter types. Triple lumen catheters demonstrated the lowest CRBSI rate. Use of triple lumen catheters in the home is relatively low and represents 3% of this patient population's catheters. Single lumen and double lumen catheters had similar CRBSI rates. Patients managed by a nursing agency not contracted by the provider had the highest CRBSI infection rates.

Table 1 – 2015 CRBSIs	
Total catheter days	890,489
Total # of CRBSIs	251
CRBSI Rate	Expressed per 1,000 catheter days
Overall CRBSI rate	0.29
CRBSI rate – pediatric	0.44
CRBSI rate – adult	0.26

Table 2 – Rate of CRBSI by Gender/Level of Nursing Care	
Gender	Expressed per 1,000 catheter days
Females	0.31
Males	0.32
Level of Nursing Care	Expressed per 1,000 catheter days
Level 1-Home infusion Provider Nursing	0.29
Level 2-Nursing Agency billed to Insurer	0.35
Level 2a-Nursing Agency subcontracted by infusion provider	0.32
Level 3-Patient independent with care	0.29

Note: overall rate of CRBSI was 0.29/1,000. However, when data was evaluated by gender or nursing agency, it was not always complete. The data represented includes all patients who had a nursing agency and/or gender documented.



*Reported BSI Rates in Home PN Population: Buchman et al, JPEN, 2014: 0.35/1,000 catheter days; Santaripa et al, Clin J Nutr, Dec 2016: 1.74/1,000 catheter days; Al-Tawil et al, Saudi J Gastroenterol, Jul-Aug 2016: 2.9/1,000 catheter days.

Conclusion

A 19% reduction in CRBSI was demonstrated utilizing a standardized application of a catheter care protocol with catheter maintenance bundle, compared to the pre-study period. CRBSI can be effectively reduced in a non-homogeneous home PN patient population through the use of a standardized catheter care protocol and catheter maintenance bundle.