Catheter-Related Bloodstream Infection Rates in Advanced Oncology Patients on Home Parenteral Nutrition: Impact of a Standardized Catheter Care Protocol — A Follow-Up Two-Year Study

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Introduction

- Catheter-related bloodstream infections (CRBSIs) are the fourth most common type of healthcare-associated infection.[1]

- CRBSIs are associated with high morbidity and mortality as well as increased medical care costs. The estimated cost per CRBSI is $25,000 to $45,000.[1]

- Cancer patients, who are often immune-compromised, are more susceptible to CRBSI while receiving parenteral nutrition (PN).[1]

- Incidence of CRBSI in the oncology population has ranged from 0.35 to 5.36 per 1,000 catheter days, depending on the neutrophil status of patients.[2]

- The most recent study from Italy by Cotogni had the lowest reported incidence of CRBSI (0.35/1,000). However, only half of their patients were receiving active oncologic treatments during the study period.[2]

- The impact of standardized catheter care on the reduction of CRBSI has been well-established in patients receiving PN with a variety of diagnoses.

- Very few studies have quantified the rate of CRBSI in patients receiving active oncologic treatment while on home parenteral nutrition (HPN).

Our objective for this study was to quantify the impact of following a comprehensive, standardized catheter care protocol on the incidence of CRBSI in oncology patients on HPN who were receiving anti-cancer therapies.

References
1. O'Grady N, et al. Guidelines for the prevention of intravascular catheter-related infections. *Clin Infect Dis.* 2011; 52:162-193.
2. Cotogni P, Pittiruti M, Barbero C, Monge T, Palmo A, Boggio Bertinet D. Catheter-related complications in cancer patients on home parenteral nutrition: a prospective study of over 51,000 catheter days. *JPEN J Parenter Enteral Nutr.* 2011;37:375-83.
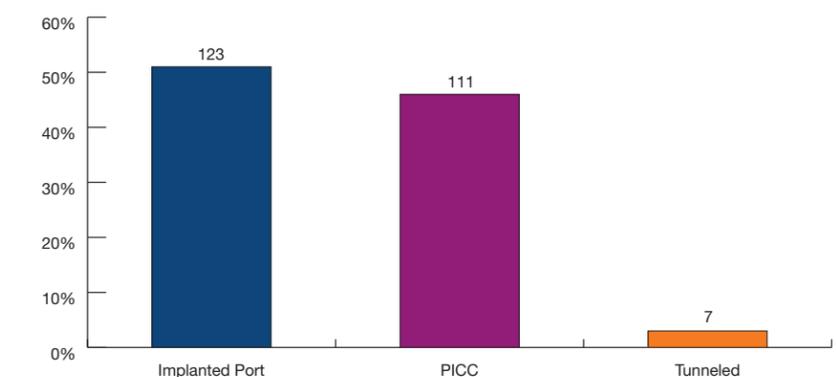
Methods

- A retrospective, non-randomized analysis of 241 adult oncology patients was conducted. All patients received HPN from Coram CVS/specialty infusion services and active treatment at a Cancer Treatment Centers of America® (CTCA) location from January 1, 2012 to December 31, 2013.

- Data collected included demographics, catheter type, dwell days, cancer stage, clinical data, and length of PN therapy.

- A.S.P.E.N. guidelines were used to determine PN indication. Patients were managed by 12 different branches of the home infusion company across the country. Patients received detailed pre-discharge teaching by a team of hospital and home infusion nurses, registered dietitians (RDs), and a dedicated case manager prior to going home with PN.

- Patients in the study were followed using a specific catheter care protocol that included: a strict aseptic flushing and dressing change procedure; weekly sterile dressing changes with use of Chloraprep®; and the application of MicroClave® connectors and SwabCaps® on all lumens that were not in use.

- A weekly assessment was performed that provided details about the patients' clinical status, compliance with catheter care and HPN, and catheter status. Printed materials and custom multimedia videos were used to reinforce infusion technique and patient/caregiver compliance with catheter maintenance protocol.

- Following the CDC definition of CRBSI as bacterial or fungal infection in a patient with a central line when no other site is infected with the same organism, CRBSIs were reported to the home infusion provider nurse and documented in the medical record.

- Catheter dwell days ranged from the start date with the home infusion provider, until the catheter was removed or the patient ended service with the home infusion provider.

- All patients in the study were evaluated by an RD. The Subjective Global Assessment (SGA) was used to assess nutritional status. The SGA is a clinical technique that combines data from subjective and objective aspects of medical history (weight change, dietary intake change, gastrointestinal symptoms, and changes in functional capacity) and physical examination (loss of subcutaneous fat, muscle wasting, ankle or sacral edema, and ascites). After evaluation, patients are categorized into three distinct classes of nutritional status: well-nourished (SGA-A), moderately malnourished (SGA-B), and severely malnourished (SGA-C). The SGA has been validated in a number of diverse patient populations, including cancer patients. It has also been correlated with a number of objective nutritional assessment indicators, as well as morbidity, mortality, and quality-of-life measures.[1] At the subjects' first visit, measurements of height and weight were performed. The subjects wore light clothing and no shoes.

Results

- Of 241 patients, 140 were females (58%) and 101 were males (42%), with an age range of 24 to 85 years.

- The most common cancer types were colorectal, pancreatic, and gynecological malignancies. A majority of the patients had advanced stage cancer (stages 3 and 4) at diagnosis.

- The study included 241 catheters, which covered 16,886 calculated dwell days. The average length of therapy was 70 days. Of the study patients, 123 (51%) had implanted ports, 111 (46%) had PICCs, and 7 (3%) had tunneled catheters (see Chart 1).

- The incidence of CRBSIs was **0.47 per 1,000 catheter days.** The catheter infections were confirmed in eight patients — five with ports, two with PICCs, and one with a tunneled catheter.

- The majority of patients with infections were either moderately malnourished (SGA-B) or severely malnourished (SGA-C) at start of PN therapy. There was no correlation between cancer type and incidence of CRSBIs.
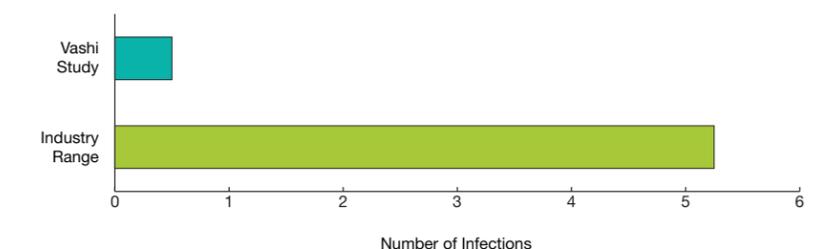
Chart 1: *Patient Device Types*

Conclusions

- Little U.S. comparative data with a wide range of reported results exists on the rate of CRBSIs in HPN patients with a cancer diagnosis who are actively undergoing oncologic treatment.

- With an analysis of two years' worth of data, the study reinforces the concept that following a standardized catheter maintenance protocol that includes intensive instruction from clinicians and weekly clinical and compliance assessments minimizes the incidence of CRBSIs in a high-risk oncology population undergoing active anti-cancer treatments (see Chart 2).

- This data can also serve as a benchmark for potential use by other hospitals in preventing CRBSIs in patients on HPN.

Chart 2: *Number of Catheter Infections Per 1,000 Catheter Days: Vashi Study Compared to Industry-Reported Range[2]*