



Unnecessary Removal of Central Venous Catheters in Cancer Patients with Bloodstream Infections: Impact on Symptom Burden

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ABSTRACT

- Objective:** We aimed to determine the rate of central venous catheter (CVC) removal in cancer patients with bloodstream infections (BSI) with CVC source (central line associated bloodstream infection (CLABSI)) or other non-CVC source. We also aimed to assess patient-reported symptom-burden outcomes for cancer patients undergoing CVC removals and CVC insertions.
- Methods:** Between 2013-2014, we evaluated the rate of CVC removal in 283 cancer patients who presented at our institution with a BSI in the presence of a CVC whereby the positive blood cultures were drawn from the CVC and peripheral vein. In 2015, we collected symptom burden related to CVC removal and insertion procedures in 60 consecutive cancer patients using the MD Anderson Symptom Inventory.
- Results:** The rate of CVC removal in patients with BSI and other non-CVC source was 57% which was identical to patients with CLABSI. (p=0.94). In the 60 patients evaluated for symptom burden, symptoms (such as pain, pressure, distress) were present in up to 57% to 67% of patients undergoing CVC insertion and removal respectively. In 32% of patients, moderate to severe symptoms were reported with a symptom burden level of 4/10 or more.
- Conclusions:** CVC removal occurred unnecessarily in 57% of non-CLABSI patients which was equivalent to patients with CLABSI. Catheter removal and insertion produced moderate to severe symptom burden in cancer patients. Physician education need to be reinforced and safe interventions to salvage the vascular access should be explored.

INTRODUCTION

- Diagnosing catheter-related bloodstream infection (CRBSI) is imperative as it may guide the management of the patient. The guidelines recommend removing the CVC for most pathogens when possible, or alternatively using an antibiotic lock in an attempt to salvage the CVC. However, if the cultures do not point to the CVC as being the source of the BSI, or in the presence of another source of the BSI, CVC may be retained.
- Unnecessary removal and subsequent insertion of the CVC in a different site may be associated with unwarranted mechanical complications and morbidities.
- In this current study, we compared the rate of CVC removal in patients with central line associated bloodstream infections (CLABSI) versus non-CLABSI. We then quantified the patient-reported symptom-burden associated with CVC removal and re-insertion in a high risk cancer patient population in a tertiary cancer center using the MD Anderson Cancer Center Symptom Inventory (MDASI).

METHODS

BSI and CVC Removal

- From January 2013 to March 2014, we identified all the patients who had a CVC and presented for a bloodstream infection (BSI).
- The BSI were classified as CLABSI according to the Centers for Disease Control and Prevention (CDC) criteria or non-CLABSI.
- We only focused on patients who had 2 positive simultaneous blood cultures drawn from the CVC and peripheral site or a blood culture and a catheter tip culture to be able to further categorize them into CRBSI according to the Infectious Diseases Society of America (IDSA) definition.

Symptom Burden

- From June to July 2015, we prospectively evaluated the symptom burden and morbidities of 30 patients undergoing CVC insertion and 30 patients undergoing CVC removal.
- MADSI score assesses patient-reported symptom-burden outcomes associated with CVC removal and CVC insertion in a quantifiable method (21 questions)

RESULTS

- We identified 283 patients who had a CVC and had a BSI with simultaneous blood cultures drawn from the CVC and the peripheral site (Figure 1).

Table 1. Characteristics of patients with CLABSI and non-CLABSI.

Characteristics	CLABSI (n=149) N (%)	Non-CLABSI (n=134) N (%)	p-value
Age (years), median (range)	55 (4-87)	58 (15-84)	0.39
Gender, male	90 (60)	69 (51)	0.13
Type of cancer			0.43
Hematologic malignancy	110/148 (74)	94 (70)	
Solid tumor	38/148 (26)	40 (30)	
No cancer	1		
Neutropenia	81 (54)	88 (66)	0.07
Organism identified			
Gram positive bacteria	77 (52)	47 (35)	0.005
Staphylococci aureus	18 (12)	11 (8)	
CNS	27 (18)	2 (1)	
Gram negative bacteria	69 (46)	77 (57)	0.06
E coli	31 (21)	30 (22)	
Klebsiella	8 (5)	16 (12)	
Pseudomonas	11 (7)	16 (12)	
Candida	3 (2)	7 (5)	0.20
Other organisms*	0	3 (2)	0.10
CVC management (within 5 days)			0.94
CVC removal /exchange	85 (57)	77 (57)	
Days between CVC insertion and bacteremia, median (range)			
All patients	58 (0 - 3,508)	35 (0 - 1,779)	0.36
Gram positive bacteria	60 (0 - 3,508)	30 (0 - 1,185)	0.47
Gram negative bacteria	62 (0 - 2,204)	37 (1 - 1,779)	0.81
Candida	18 (7 - 41)	22 (2 - 67)	0.91
CVC removal/exchange (within 5 days)			
All patients	85 (57)	77 (57)	0.94
Gram positive bacteria	39/77 (51)	26/47 (55)	0.61
Gram negative bacteria	44/69 (64)	45/77 (58)	0.51
Candida	2/3 (67)	5/7 (71)	> .99
Days between bacteremia and CVC removal, (within 5 days) median (range)			
For all patients	2 (0-5)	2 (0-5)	0.70
For Gram positive bacteria	2 (0-5)	3 (0-5)	0.50
For Gram negative bacteria	1 (0-5)	2 (0-5)	0.48
For Candida	2 (2-2)	2 (0-5)	0.83

Note: * Other organisms included 2 non-candida fungal infections and 1 polymicrobial infection which included both gram positive and gram negative bacteria.

Table 2. Characteristics of CVC Insertion and Removal Procedures

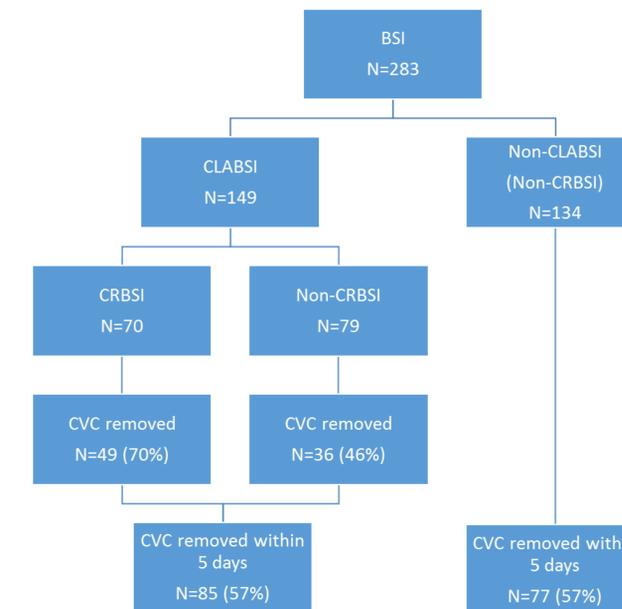
Characteristics	CVC Insertion Group N=30 (%)	CVC Removal Group N=30 (%)	P
Catheter Type			<0.001
Non-Tunneled	17 (57)	0	
PICC	11 (37)	1 (3)	
Implanted	0	29 (97)	
Dialysis	2 (7)	0	
CVC Insertion Site			<0.001
Subclavian	17 (57)	3 (10)	
Jugular	0	26 (87)	
Basilic	11 (37)	0	
Brachial	1 (3)	1 (3)	
Femoral	1 (3)	0	

Table 3. Most common symptoms of any grade level present in patients undergoing CVC insertion and removal groups

Symptoms	Percentage of all patients with symptoms of any level	Percentage of patients in Insertion group with symptoms of any level	Percentage of patients in removal group with symptoms of any level
Burning due to local anesthesia	55	43	67
Pressure due to catheter threading	50	50	50
Pain	47	57	37
Drowsiness	45	43	47
Distress	40	27	53
Fatigue	37	33	40
Numbness	28	23	33
Dry mouth	27	20	33

RESULTS (Cont'd)

Figure 1. Patients with central venous catheters (CVC) and bloodstream infections who had simultaneous blood cultures drawn from CVC and peripheral site.



BSI, bloodstream infection; CLABSI, central line-associated bloodstream infection; CRBSI, catheter-related bloodstream infection; CVC, central venous catheter

CONCLUSIONS

- CVCs are unnecessarily removed in 57% of cancer patients with non-CLABSI which is identical to the rate of CVC removal in patients with CLABSI.
- CVC insertion and removal is commonly associated with physical symptoms (such as pain, pressure and distress) that are perceived as severe in almost one third of the patients.
- Given this high rate of unnecessary CVC removal in the setting of BSI, intense physician education is necessary to instruct healthcare providers to avoid unnecessary removal of the CVC in patients with no evidence of CLABSI or with apparent non-CVC source for the BSI.
- Further development of catheter salvage strategies even in the setting of documented CLABSI is warranted in order to prevent the morbidity and symptom-burdens associated with CVC removal and reinsertion.