

## Assessment of Factors Associated with Hospital-Acquired Central Line Associated Blood Stream Infections

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### Introduction

- Sentara CarePlex Hospital (SCH) is a 224 bed community hospital and part of a 12-hospital system.
- Between January 2012 and June 2014 a total of 25 CLABSIs were reported, with 10 reported in the first six months of 2014.
- Like all hospitals and outpatient surgery facilities, SCH has a major focus on prevention of CLABSIs, which impact both patient outcomes and cost of care.

### Background and Significance

- Hospital-acquired central line associated bloodstream infections (CLABSIs) are dangerous adverse events which affect approximately 250,000 patients in the United States annually (Tedja et al., 2014), resulting in additional treatment costs ranging from \$5,734 to \$22,939 per patient .
- A plethora of research has been conducted relative to risk factors associated with CLABSI. Research by Chopra et al. (2014) suggests that there is an association between the risk of peripherally inserted central catheter bloodstream infection and hospital length of stay, suggesting that sicker patients who receive any indwelling vascular catheter are at greater risk of developing a CLABSI. Their research identified hospital length of stay, intensive care unit status, and the number of peripherally inserted peripheral catheter (PICC) lumens as significantly associated with PICC-bloodstream infection. Number of PICC lumens was also found to be associated with both greater risk and earlier time to infection.

### Project Aims

This study aimed to explore patient and clinical characteristics associated with CLABSIs during inpatient treatment at CarePlex between January 2012 and June 2014. The impact of CLABSI on utilization was also explored. Evidence-based practice questions included:

- Is there a relationship between patient characteristics, clinical characteristics, utilization, and CLABSI?
- Is there a difference in patient characteristics, clinical characteristics, and utilization between patients positive for CLABSI and patients negative for CLABSI?

### Methodology

The objective of this retrospective, secondary data analysis is to explore patient and clinical characteristics of patients, age 18 and older, who developed hospital-acquired CLABSIs during inpatient treatment at SCH between 01/01/2012 and 06/30/2014.

Demographic Characteristics	CLABSI		No CLABSI		Total	
	n	%	n	%	n	%
Discharge Year						
2012	1	4.2	181	41.0	182	39.1
2013	13	54.2	183	41.5	196	42.2
2014	10	41.7	77	17.2	87	18.7
Gender						
Male	14	58.3	212	48.1	226	48.6
Female	9	37.5	229	51.9	268	51.2
Marital Status						
Married	11	45.8	202	45.8	213	45.8
Not Married	12	50.0	239	54.2	251	54.0
Admission Status						
Admitted via ED	17	70.8	333	75.5	350	75.3
Not Admitted via ED	6	25.0	108	24.5	114	24.5
ICU Admission Status						
Admitted to ICU	19	79.2	88	20.0	107	23.0
Not Admitted to ICU	4	16.7	353	80.0	357	76.8
Discharge Disposition						
Home	4	16.7	338	76.6	342	73.5
SNF/Rehab	9	37.5	69	15.6	78	16.8
Other Hospital			12	2.7	12	2.6
Other			4	0.9	4	0.9
Expired	10	41.7	18	4.1	28	6.0

Figure 1. Differences in Patient Characteristics by CLABSI Group

### Significant Findings

Clinical Characteristics	CLABSI		No CLABSI		Total	
	n	%	n	%	n	%
CLABSI Status						
CLABSI	24	100			24	5.2
No CLABSI			441	100	441	94.8
CL Lumens						
1	2	8.3	18	4.1	20	4.3
2	5	20.8	20	4.5	35	5.4
3	14	87.5	23	5.2	37	8.0
4			3	0.7	3	0.6
CDI Status						
CDI Positive	4	16.7	19	4.3	23	4.9
CDI Negative	19	79.2	422	95.7	441	94.8
Neutropenia Status						
Neutropenia			8	1.8	8	1.7
No Neutropenia	23	100	433	98.2	456	98.1
Leukopenia Status						
Leukopenia			39	8.8	39	8.4
No Leukopenia	23	100	402	91.2	425	91.4

Figure 2. Differences in Clinical Characteristics by CLABSI Group

### Results

- Patients positive for CLABSI are more likely to be admitted to the ICU and die during the hospital stay.
- Of those discharged alive, patients were more likely to be discharged to a skilled nursing facility and less likely to be discharged home when positive for CLABSI.
- Patients with CLABSI experienced longer hospital lengths of stay, ICU lengths of stay, and higher direct treatment costs.
- Clostridium difficile infections were more prevalent in patients with CLABSI compared to patients without CLABSI.

### Conclusions and Implications

- Knowing a patient has a higher risk of CLABSI may change nursing practice to reduce the incidence of CLABSIs, improving patient mortality and minimizing additional treatment costs.
- Reducing clostridium difficile spore exposure may prevent cross-contamination of central lines, further reducing the incidence of CLABSI.
- Study limitations may include lack of data integrity due to the following: missing data due to lack of physician orders for diagnostic testing; untimely diagnostic specimen collection; inaccurate, untimely, or missing Epic documentation; and coding from billing records.
- A larger, more diverse sample may yield more CLABSI cases, and more accurately reflect the patient and clinical characteristics associated with CLABSI.

### References

- Chopra, V., Ratz, D., Kuhn, L., Lopus, T., & Chenoweth, C. (2014). PICC-associated bloodstream infections: Prevalence, patterns, and predictors. *The American Journal of Medicine*, 127, 319-328.
- Pongruangporn, M., Ajenjo, C., Russo, A., McMullen, K., Robinson, C., Williams, R., & Warren, D. (2013). Patient and device-specific risk factors for peripherally inserted ventral venous catheter-related bloodstream infections. *Infection Control and Hospital Epidemiology*, 34 (2), 184-189.

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