



Comparison of Trends in Hospital-Onset Bloodstream Infections (HOBSIs) and Central Line Associated Bloodstream Infections (CLABSIs) across a Three-Hospital Health System in the COVID Era



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Introduction

Hospital-onset bloodstream infection (HOBSI) incidence has been proposed as a complementary quality metric to central line-associated bloodstream infection (CLABSI) surveillance.¹ With the spread of COVID-19, increases in HOBSI and CLABSI rates have been observed.² We sought to understand trends in HOBSI and CLABSI incidence at our health system in relation to the COVID-19 pandemic.

Methods

- Retrospective analysis of HOBSIs and CLABSIs at a three-hospital health system from 2017-2021
- Compared incidence and demographic data for HOBSIs and CLABSIs between pre-pandemic (1/1/17-3/31/20) and pandemic periods (4/1/20-12/31/21)
- Applied Poisson or negative binomial regression models to estimate changes in monthly HOBSI & CLABSI rates
- Compared segmented regression models to exclusively time-dependent models to assess impact of COVID-19

Definitions

Hospital-onset bloodstream infection (HOBSI): Any positive blood culture collected on/after hospital day 3 with
1) no prior positive blood culture in prior 14 days, and
2) not a contaminant per laboratory-generated algorithm partly based on CDC NHSN Common Commensals³

Central Line-Associated Bloodstream Infection (CLABSI): As defined by standardized CDC NHSN definitions³

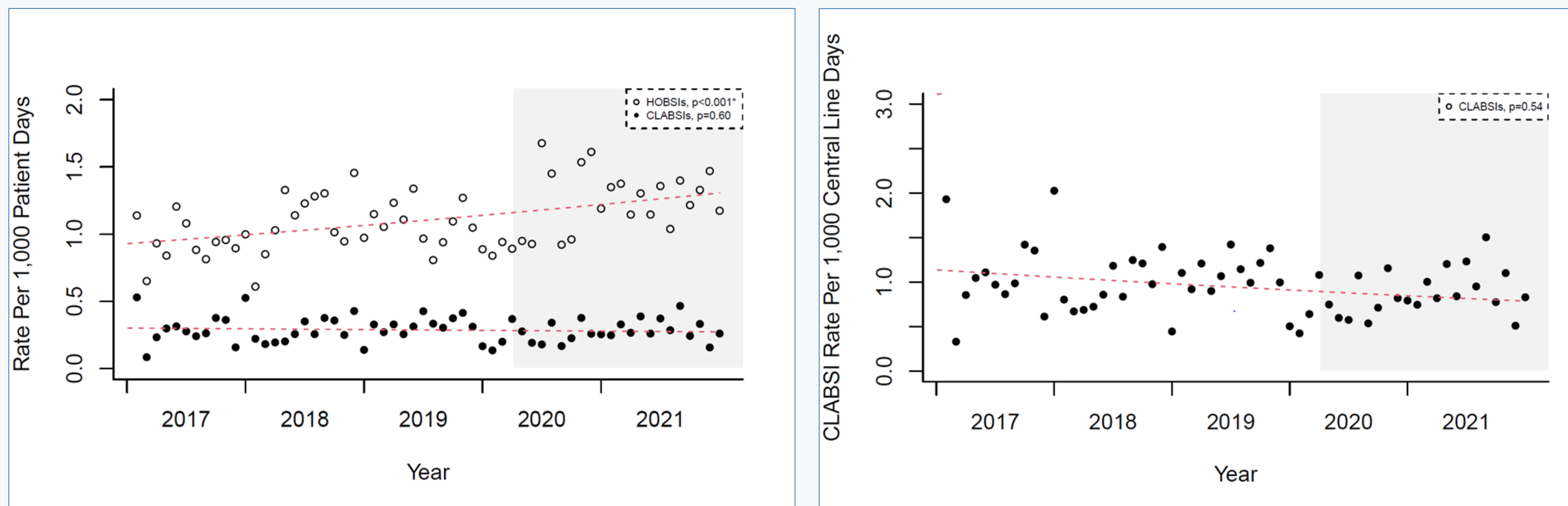


Figure 1: Regression analysis of monthly HOBSI and CLABSI rates over time per 1,000 patient days (left) and CLABSIs per 1,000 central line days (right). Gray areas denote COVID-19 pandemic period (April 2020-December 2021). Provided *p* values refer to the statistical significance of the coefficient of the time variable in each model.

	Hospital-Onset Bloodstream Infections				Central Line-Associated Bloodstream Infections			
	All, n (%)	Pre-Pandemic, n (%)	Pandemic, n (%)	<i>P</i>	All, n (%)	Pre-Pandemic, n (%)	Pandemic, n (%)	<i>P</i>
Total	2390	1436 (60)	954 (40)	-	622	410 (66)	212 (34)	-
Incidence								
Median Monthly Rate Per 1,000 Patient Days	1.08	1.00	1.30	<0.01	0.29	0.29	0.28	0.60
Median Monthly Rate Per 1,000 Central Line Days	N/A	N/A	N/A		0.96	1.01	0.88	0.10
Common Nosocomial Pathogens (7/2017-12/2021)				0.02				0.02
<i>Staphylococcus aureus</i>	306 (13)	154 (11)	152 (16)		68 (11)	37 (9)	31 (15)	
MRSA	107 (4)	61 (4)	46 (5)		30 (5)	16 (3)	14 (7)	
<i>Escherichia coli</i>	227 (9)	122 (8)	105 (11)		28 (5)	19 (5)	9 (4)	
<i>Enterococcus</i> species	218 (9)	113 (7)	105 (11)		78 (12)	43 (10)	35 (17)	
<i>Klebsiella</i> species	246 (10)	142 (10)	104 (11)		36 (6)	31 (8)	5 (2)	
<i>Candida</i> species	175 (7)	103 (7)	72 (7)		76 (12)	48 (12)	28 (13)	
Coagulase-negative <i>Staphylococcus</i> species	162 (7)	91 (6)	71 (7)		81 (13)	46 (11)	35 (17)	
<i>Enterobacter</i> species	142 (6)	77 (5)	65 (7)		31 (4)	16 (4)	15 (7)	
<i>Pseudomonas aeruginosa</i>	114 (5)	60 (4)	54 (6)		23 (4)	12 (3)	11 (5)	
Other	583 (27)	357 (30)	226 (24)		138 (25)	94 (27)	44 (21)	

Table 1: Incidence of hospital-onset bloodstream infections (HO-BSIs) and central line-associated bloodstream infections (CLABSIs) across a three-hospital health system.

Results

- The median monthly HOBSI rate per 1,000 patient days increased in the pandemic period, while CLABSI rates remained stable (**Table 1; Figure 1**)
- Incident cases of HOBSIs and CLABSIs with common nosocomial organisms generally increased (**Table 1**)
- The observed increase in HOBSI incidence was not better described by segmented regression models that included a variable accounting for the onset of COVID-19 (**Figure 1; Handout Table 3**).

Conclusions

- HOBSIs rates did not correlate with CLABSI rates across a three-hospital health system from 2017 to 2021, as rates of HOBSI increased but CLABSI incidence remained unchanged.
- The number of incident cases of HOBSIs and CLABSIs caused by common nosocomial pathogens tended to increase over the study period.
- We could not conclude that the onset of the COVID-19 pandemic was responsible for the observed increase in HOBSI incidence.
- Caution should be used in modeling the effects of the COVID-19 pandemic without time-trended analysis.
- Further evaluation is needed to understand the etiology, epidemiology, and preventability of HOBSI.

References

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