Abstract # 2018

# 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 Commensals[3]

Central Line-Associated Bloodstream Infection (CLABSI): As defined by standardized CDC NHSN definitions[3]

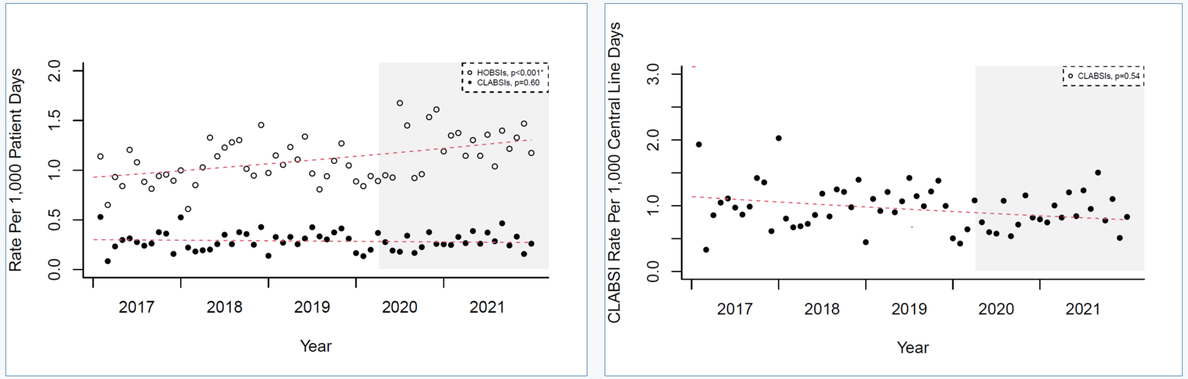


**Figure 1:** Regression analysis of monthly HOBSI and CLABSI rates over time per 1,000 patient days (left) and CLABSIs per 1,000 central line days (right). Gray areas denote COVID-19 pandemic period (April 2020-December 2021). Provided *p* values refer to the statistical significance of the coefficient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

| | Hospital-Onset Bloodstream Infections | | | | Central Line-Associated Bloodstream Infections | | | |
|---|---|---|---|---|---|---|---|---|
| | All, n (%) | Pre-Pandemic, n (%) | Pandemic, n (%) | *P* | All, n (%) | Pre-Pandemic, n (%) | Pandemic, n (%) | *P* |
| **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** |
| *Staphylococcus aureus* | 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) | |
| *Escherichia coli* | 227 (9) | 122 (8) | 105 (11) | | 28 (5) | 19 (5) | 9 (4) | |
| *Enterococcus* species | 218 (9) | 113 (7) | 105 (11) | | 78 (12) | 43 (10) | 35 (17) | |
| *Klebsiella* species | 246 (10) | 142 (10) | 104 (11) | | 36 (6) | 31 (8) | 5 (2) | |
| *Candida* species | 175 (7) | 103 (7) | 72 (7) | | 76 (12) | 48 (12) | 28 (13) | |
| Coagulase-negative *Staphylococcus* species | 162 (7) | 91 (6) | 71 (7) | | 81 (13) | 46 (11) | 35 (17) | |
| *Enterobacter* species | 142 (6) | 77 (5) | 65 (7) | | 31 (4) | 16 (4) | 15 (7) | |
| *Pseudomonas aeruginosa* | 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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3. Center for Disease Control, National Healthcare Safety Network. Patient safety component manual. Center for Disease Control; 2022 Jan.