



Central Line - Associated Bloodstream Infections and Their Increase With the COVID-19 Pandemic at VA in San Antonio, Texas

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ABSTRACT

Background

Coronavirus disease-19 (COVID-19) has been associated with an increase in healthcare-associated infections (HAI). This increase is likely multifactorial (i.e. higher hospitalization rates, COVID-19 and post COVID-19 complications, lower staffing, delayed care). The objective of this study was to determine the association between COVID-19 hospitalization rates and central line-associated bloodstream infections (CLABSI).

Methods

We conducted a retrospective study in acute care unit hospitalizations in a Veterans Affairs (VA) hospital in San Antonio, Texas from October 2017 to December 2021.) CLABSIs were defined by the National Healthcare Safety Network (NHSN) criteria for laboratory confirmed bloodstream infection. Pearson correlation was used to determine correlation of CLABSI and COVID-19 disease hospitalization rates. CLABSI rates were also compared pre-COVID-19 (Oct 2017-Feb 2020) to COVID-19 (Mar 2020-Dec 2021) periods using the chi-square test.

Results

During the study period, a total of 0.69 CLABSIs per 1,000 central line days occurred in the pre-COVID-19 period compared to 1.98 per 1,000 in the COVID-19 period (p=0.004). There was a significant correlation between CLABSI and ICU COVID-19 hospitalization rates (R=0.459; p=0.001) as well as CLABSI and acute care COVID-19 hospitalization rates (R=0.341; p=0.014). During the COVID-19 period only, there continued to be a significant correlation between CLABSI and COVID-19 ICU hospitalization rates (R=0.426; p=0.048).

Conclusions

CLABSI rates significantly increased during the COVID-19 period compared to the pre-COVID-19 period and CLABSI rates were significantly correlated with COVID-19 ICU and acute care hospitalizations. Accounting for this variable allows us to factor in impact of post-COVID-19 related complications and association with CLABSI rate. We urge for careful implementation of HAI prevention strategies during the pandemic. Awareness of anticipated increase is important in allocating resources essential for prevention of HAIs.

PRE - COVID-19

COVID-19 PERIOD

Table 1. Data gathered prior to the onset of the pandemic, years 2017 and 2018

	Oct '17	Nov '17	Dec '17	Jan '18	Feb '18	Mar '18	Apr '18	May '18	Jun '18	July '18	Aug '18	Sep '18	Oct '18	Nov '18	Dec '18
Raw number of CLABSI	0	1	1	0	2	0	0	0	0	0	0	1	1	0	1
Central line days	670	537	417	459	690	532	615	461	564	759	606	565	572	585	632
CLABSI per 1,000 central line days	0.00	0.54	0.42	0.00	1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.57	0.00	0.63
Intensive care COVID-19 hospitalizations per 10,000 BDOC	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acute care COVID-19 hospitalizations per 10,000 BDOC	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CLABSI, central-line associated bloodstream infections; COVID-19, coronavirus disease-19; BDOC, bed days of care

Table 2. Data gathered prior to the onset of the pandemic, years 2019 and 2020

	Jan '19	Feb '19	Mar '19	Apr '19	May '19	Jun '19	July '19	Aug '19	Sep '19	Oct '19	Nov '19	Dec '19	Jan '20	Feb '20
Raw number of CLABSI	1	0	0	0	0	0	0	0	0	2	1	0	0	0
Central line days	624	554	496	471	581	530	612	621	761	527	453	325	421	404
CLABSI per 1,000 central line days	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05	0.45	0.00	0.00	0.00
Intensive care COVID-19 hospitalizations per 10,000 BDOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acute care COVID-19 hospitalizations per 10,000 BDOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CLABSI, central-line associated bloodstream infections; COVID-19, coronavirus disease-19; BDOC, bed days of care

Table 3. Data gathered during the pandemic, years 2020 and 2021

	Mar '20	Apr '20	May '20	Jun '20	July '20	Aug '20	Sep '20	Oct '20	Nov '20	Dec '20	Jan '21	Feb '21	Mar '21	Apr '21	May '21
Raw number of CLABSI	N/A	N/A	0	0	2	6	1	0	1	0	1	2	0	0	0
Central line days	N/A	N/A	84	129	259	419	238	438	375	376	480	353	458	375	594
CLABSI per 1,000 central line days	N/A	N/A	0.00	0.00	0.52	2.51	0.24	0.00	0.38	0.00	0.48	0.71	0.00	0.00	0.00
Intensive care COVID-19 hospitalizations per 10,000 BDOC	0.23	0.47	0.39	1.43	10.25	2.10	1.83	1.68	1.15	4.22	4.55	0.96	0.98	1.08	1.74
Acute care COVID-19 hospitalizations per 10,000 BDOC	0.00	0.80	1.69	15.77	7.44	10.36	0.70	0.63	5.38	17.30	40.88	10.83	4.56	4.50	0.00

CLABSI, central-line associated bloodstream infections; COVID-19, coronavirus disease-19; BDOC, bed days of care

DISCUSSION

- 1970s: CDC : Study on the Efficacy of Nosocomial Infection Control Project (SENIC) - 32 % decrease in nosocomial infections if hospitals implemented certain protocols to infection surveillance and control programs [1].
- 2005-16: A review and analysis of measures to decrease Healthcare-Associated Infections (HAI) and implementation over 11-year span noted that the pooled incidence rate ratio (IRR) associated with interventions for HAI reduction was 0.459 (95% CI, 0.381–0.554) for CLABSI [2].
- 2006: An analysis of Intensive Care Unit (ICU) data provided by approximately 100 ICUs: the Keystone ICU project ; overall median rate decrease from 2.7 infections per 1000 catheter-days at baseline to 0 at 0 to 3 months after implementation of the study intervention and was sustained at 0 during 18 months of follow-up [3].
- These studies highlight the importance of infection prevention techniques and efficacy of such.
- During the pandemic, we were faced with issues in allocation of resources. Isolation precautions for non-COVID patients was impacted by extended use of personal protective equipment (PPE) including gowns, gloves during COVID-19 care. In addition, there was initial concerns of shortage of glycerinated alcohol impacting hand hygiene. With resource allocation towards COVID-19, there was also inability to monitor infection prevention practices and compliance to such [4].
- The National Healthcare Safety network (NHSN) monitors data on healthcare associated infections and reporting indicated that there was an increment in CLABSIs in the third quarter of 2020, as compared to 2019. There was noted to be a 68 % Standardized Infection Ratio (SIR) increment over the same time period in Texas [5].
- Our data reflects significant increase in CLABSI rates with COVID period. This reflects the need to study overall HAI rates carefully and plan ahead in anticipation of higher HAI rates after the COVID peak admissions rates, if not during this occurrence

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