Summer 6-16-2022

Quality Improvement in a Hospital Setting: Central Line-Associated Bloodstream Infections at an Acute Care Hospital in South Texas

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BACKGROUND

Central line-associated infections (CLABSI) are life-threatening nosocomial infections that are associated with significant increase in healthcare expenditure, prolonged stays, and risk of mortality.

It is defined by the National Healthcare Safety Network (NHSN) as a laboratory confirmed infection in patients with a central line that has been in placed for 2 or more days prior to positive blood culture.

It is estimated that 30,100 CLABSIs occur annually in intensive care units and wards across acute care facilities in the United States with a mortality rate anywhere between 4-20%.

AIMS

To identify outcome trends and risk factors that contribute to incidence of central line-associated infections in an 866-bed hospital in South Texas

MATERIALS AND METHODS

A retrospective chart review was conducted on 38 patients who met the NHSN criteria for CLABSI during the period of January 2021 to March 2022 in order to identify risk factors and patient characteristics that may have contributed to increase CLASBI incidence during this period. Patient characteristics such as COVID-19 status, organism isolated, and mortality rate was examined. Mortality was defined as subjects expiring during the length of the hospital stay.

Additionally, CLABSI rate was calculated for ICU related infection and hospital wide infection for each calendar year. The CLABSI rate was calculated per 1,000 central line days by dividing the number of CLABSIs by the total number of central line days and multiplying the result by 1,000.

Figure 1. Seven-day moving average number of COVID-19 cases, emergency department visits, hospital admissions, and deaths – United States, * December 1, 2020-January 15, 2022

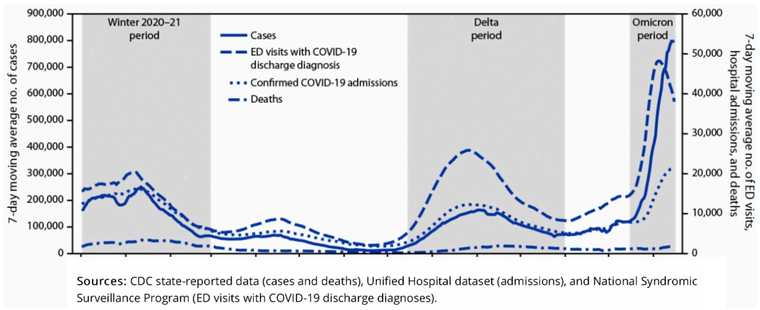


Figure 2. Incidence of CLABSI at South Texas Hospital from January 2021 to March 2022

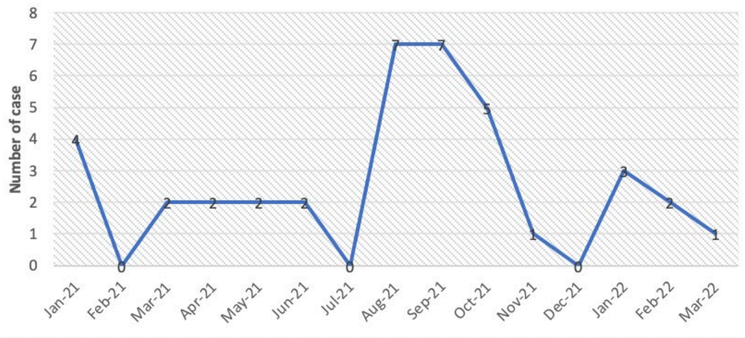


Figure 3.

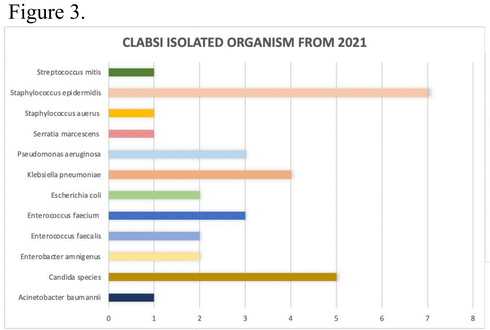
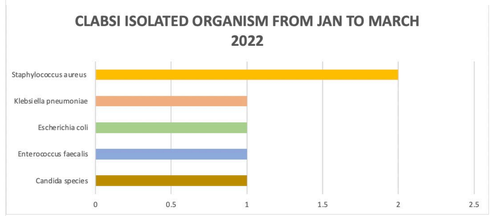


Figure 4.



RESULTS

From January to December 2021, there was a total of thirty-two CLABSI across all units. The CLABSI rate for the ICU was 1.88 and 1.76 hospital-wide per 1,000 line days in 2021. Sixteen of the thirty-two cases (50%) were COVID-19 positive with 59% of the infections occurring between August and October (Figure 2). The most isolated organism was Staphylococcus epidermis followed by Candida species (Figure 3). Overall mortality rate for CLABSI in 2021 was 56% (18/32). Further analysis revealed a mortality rate for COVID-19 positive patients with CLABSI in 2021 to be 87.5% and for COVID-19 negative patients with CLABSI to be 25%.

From January to March 2022, there was a total of six CLABSIs cases. The incidence rate for the ICU was 1.27 and 1.09 hospital-wide per 1,000 line days. Three of the six (50%) cases were COVID-19 positive. The most isolated organism was Staphylococcus aureus (Figure 4). Overall mortality rate for CLABSI in 2022 from January to March is 50%. Further breakdown showed a mortality rate for COVID-19 positive patients with an associated central line blood stream infection to be 66.7% and for COVID-10 negative patients with an associated CLABSI to be 33.3%.

CONCLUSIONS

In conclusion, the COVID-19 pandemic has had a significant impact on incidence of central-line associated blood stream infection at this 866-bed hospital in South Texas. The trend of CLABSI cases within this hospital system from January 2021 to March of 2022 closely follows the incidence of COVID-19 cases reported in the United States by the CDC (Figure 1 and Figure 2). The sharp increase in incidence between August and October of 2021 at VBMC strongly coincides with the COVID-19 Delta wave. Factors that contributed to this include high hospital census as well as increased nurse turnover during this timeframe. Additionally, during this time, there was an increased incidence of coagulase-negative Staphylococcus infection. This potentially suggests increased risk of central-line infections secondary to sub-optimal aseptic practices due to inadequate training and nurse shortages. Mortality rate for COVID-19 positive patients with CLABSI infections were found to be higher than in COVID-19 negative patients for all time frames examined. Overall, this study has demonstrated the need to implement continuous monitoring and regular feedback on performance in order to address shortcomings that may negatively impact health outcomes for hospitalized patients.

FUTURE DIRECTION

Retrospective chart review of CLABSI prior to the COVID-19 pandemic needs to be performed in order to run statistical analysis to determine the association between the COVID-19 pandemic with CLABSI events.

REFERENCES

Iuliano AD, Brunkard JM, Boehmer TK, et al. Trends in Disease Severity and Health Care Utilization During the Early Omicron Variant Period Compared with Previous SARS-CoV-2 High Transmission Periods — United States, December 2020–January 2022. MMWR Morb Mortal Wkly Rep 2022;71:146–152. DOI: http://dx.doi.org/10.15585/mmwr.mm7104e4.

Fakih MG, Bufalino A, Sturm L, et al. Coronavirus disease 2019 (COVID-19) pandemic, central-line–associated bloodstream infection (CLABSI), and catheter-associated urinary tract infection (CAUTI): The urgent need to refocus on hardwiring prevention efforts. *Infection Control & Hospital Epidemiology*. 2022;43(1):26-31. doi:10.1017/ice.2021.70

National Healthcare Safety Network (NHSN) patient safety component manual. Centers for Disease Control and Prevention website. https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf. Updated 2020. Accessed December 23, 2020.