

IVAC Plus in the Time of COVID-19: An Imperfect Metric?

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Introduction

Ventilator-associated events (VAEs) are a new surveillance strategy for monitoring complications in acute and intensive care settings. The National Healthcare Safety Network (NHSN) replaced traditional ventilator-associated pneumonia (VAP) surveillance with VAE surveillance in 2013. The VAE with the highest threshold of criteria to fulfill is called IVAC Plus PVAP (IVAC+), or infection related ventilator associated complication plus possible ventilator associated pneumonia. Prior to the COVID-19 pandemic, the incidence of IVAC+ was decreasing;¹ however, as the number of COVID-19 hospitalizations increased, so did the number of IVAC+. Our goal was to investigate if there was a relationship between these two occurrences and consider the utility of this monitoring strategy.

Abstract

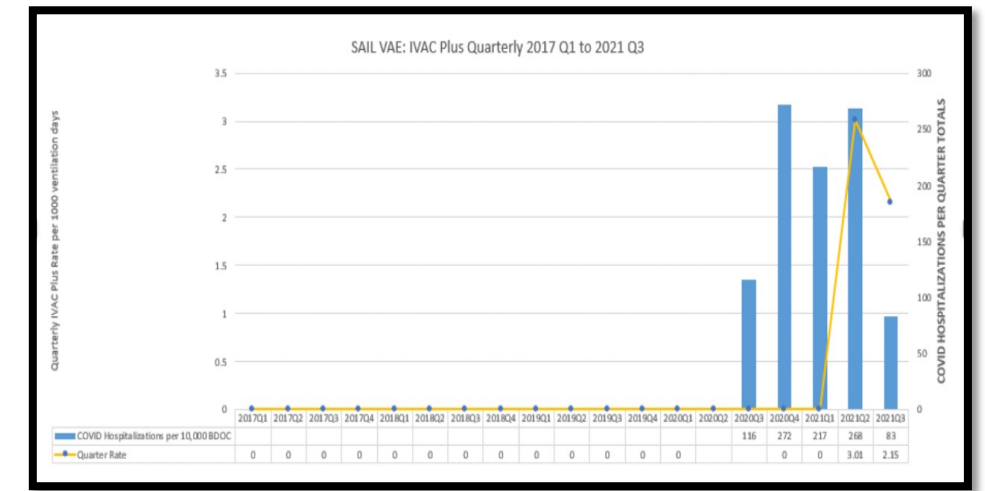
This study evaluated if there was a relationship between COVID-19 hospitalizations and IVAC+. Monthly acute and intensive care COVID-19 hospitalization rates were correlated with IVAC+ using Pearson correlations. Our results showed that COVID-19 hospitalizations were significantly associated with IVAC+ rates and both intensive care and acute care COVID-19 hospitalizations were correlated with IVAC+. IVAC+ cases rose significantly after COVID-19. COVID-19 disease inherently meets many of the IVAC+ criteria and although recommended safety bundles were followed for each IVAC+ case, they still met NHSN criteria despite these measures.

Methods

This was a retrospective study at the Audie Murphy VA Hospital (ALMVA) from October 2017 to December 2021. ALMVA is a level 1A facility with 232 beds and an active bone marrow transplant program in San Antonio, Texas. This study included acute care COVID-19 hospitalizations per 10,000 bed days of care and IVAC+ per 1000 ventilator days. Monthly acute and intensive care COVID-19 hospitalization rates were correlated with IVAC+ rates using Pearson correlation for the overall study period and in the subgroup of COVID pandemic months (Mar 2020-December 2021).

Results

1. During the overall study period, COVID-19 hospitalization rates were significantly associated with IVAC+ rates: acute care correlation 0.86 ($p < 0.01$) and intensive care correlation 0.33 ($p=0.04$).
2. During the COVID-19 pandemic months, acute care COVID-19 hospitalizations but not intensive care COVID-19 hospitalizations, were correlated with IVAC+ (correlation 0.90, $p < 0.01$ and correlation 0.21, $p=0.53$, respectively).
3. There were 0 IVAC+ before the pandemic months and this rose to 14 during the pandemic (0 per 1000 ventilator days and 3.05 per 1000 ventilator days, respectively).
4. All but 2 cases of IVAC+ had COVID-19, and only one COVID-19 negative patient with VAE survived.



Conclusions

The natural history of COVID-19 disease has presented challenges for IVAC+ monitoring. COVID-19 can cause persistent fevers and worsening oxygenation, and antibiotic use is common during periods of clinical deterioration. These factors can fulfill criteria for IVAC+. In this study, each IVAC+ case was traced for safety bundle compliance. These bundles were followed, along with conservative fluid management, low tidal volume ventilation, and sedation breaks. Patients met NHSN criteria for IVAC+ despite these measures and most had COVID-19. Given the common occurrence of IVAC+ in COVID-19 patients, futures studies are needed to define if IVAC+ are preventable in this population and whether IVAC+ surveillance has value among COVID-19 patients.

References

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