

The Prevalence of Co-Infections in Hospitalized Patients with COVID-19



WAYNE STATE
School of Medicine

Siri S. Sarvepalli¹, Said El Zein MD², Pranatharthy Chandrasekhar²

¹Wayne State University School of Medicine, Detroit, MI

²Internal Medicine, Wayne State University, Detroit Medical Center, Detroit, MI

INTRODUCTION

The Coronavirus disease 2019 (COVID-19) pandemic emerged in early 2020 and significantly altered the landscape of healthcare delivery. As of January 2021, more than 24 million cases and over 400,000 deaths have been reported in the United States alone. With the absence of a cure, treatment of hospitalized patients with COVID-19 has been particularly challenging. Physicians often treat hospitalized patients with COVID-19 infection empirically with broad spectrum antibiotics on admission due to concerns of missing an underlying and treatable co-infection. In this study we aim to determine the rate of co-infections in hospitalized patients with SARS-CoV-2 infection.

METHODS

We conducted a retrospective study which included all patients who had a nasopharyngeal swab sample positive for SARS-CoV-2 infection at the Detroit Medical Center during April 2020. Out of 409 patients with SARS-CoV-2 infection detected by the Cepheid Real-Time Polymerase Chain Reaction (RT-PCT) test, 390 had sputum or blood cultures ordered during their hospitalization. The results of each culture were examined, and the isolated organisms and date of the culture positivity were documented. Negative cultures and those showing normal flora or potential contaminants were merged into the negative category. Moreover, we analyzed results of non-culture tests such as urine legionella antigen, urine pneumococcal antigen, and influenza A and B PCR.

RESULTS

Cultures Obtained During Hospitalization *	
Positive blood or respiratory culture; N (%)	68/390 (17)
Positive blood culture; N (%)	30/296 (10)
Positive respiratory culture; N (%)	38/94 (40)
Days between admission and positive respiratory culture; Median (range)	11 (1-39)
Number of positive respiratory cultures within 3 days of admission	12 (31)
Days between admission and positive blood culture; Mean (range)	1 (1-45)
Number of positive blood cultures within 3 days of admission	21 (70)
Non-Culture Testing	
Urine legionella antigen; N (%)	0/126 (0)
Urine pneumococcal antigen; N (%)	4/125 (3.1)
Influenza A or B PCR; N (%)	0/221 (0)
Most Commonly Isolated Organisms ^	
Respiratory cultures	Total N = 61
<i>Staphylococcus aureus</i> ; N (%)	18 (29)
<i>Klebsiella pneumoniae</i> ; N (%)	10 (16)
<i>Pseudomonas aeruginosa</i> ; N (%)	10 (16)
<i>Proteus mirabilis</i> ; N (%)	6 (9)
<i>Acinetobacter baumannii</i> ; N (%)	4 (6.5)
<i>Aspergillus</i> spp.; N (%)	3 (5)
Other; N (%)	10 (16)
Blood cultures	Total N = 36
<i>Staphylococcus aureus</i> ; N (%)	4 (11)
<i>Klebsiella pneumoniae</i> ; N (%)	4 (11)
<i>Candida</i> spp; N (%)	7 (19)
<i>Proteus mirabilis</i> ; N (%)	2 (5)
<i>Pseudomonas aeruginosa</i> ; N (%)	3 (8)
Other; N (%)	16 (44)

* Patients with no cultures obtained were excluded. Negative cultures or cultures deemed as contaminants or normal flora were merged into the negative category

^ Some patients had more than 1 organism isolated at the same time or at different times during the admission; Total N = total number of isolated organisms

DISCUSSION

Based on our findings, respiratory co-infections appear to be uncommon on initial presentation to the hospital in patients with COVID-19 infections. Secondary respiratory infections during hospitalization are more common (median 11 days to positive respiratory culture). Although only 10% of the total blood cultures obtained during hospitalization returned positive, around 70% of those (21 out of 30) were positive on admission. Based on our data, urine pneumococcal and urine legionella antigens appear to have no role in the evaluation of secondary bacterial infections in patients with SARS-CoV-2 infection. A larger sample size is needed to determine the predictors of positive blood or respiratory cultures within 3 days of admission to the hospital to better guide management. Recent literature showing a paucity of secondary infections in patients admitted with SARS-CoV-2 support our conclusions.

CONCLUSION

Community acquired co-infections in patients hospitalized with SARS-CoV-2 appear to be uncommon based on our study. When a co-infection is suspected in critically ill patients, physicians should obtain respiratory and blood cultures before initiating empiric therapy. Empiric antibiotic therapy on admission does not appear to be warranted in the majority of patients.