Indications for antibiotic use and rate of bacterial co-infection in patients with COVID-19

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Background

- Differentiating between viral and bacterial pneumonia is an ongoing challenge for clinicians within healthcare.
- Most institutions have created protocols to prevent patients with viral infections from getting unnecessary antibiotics, but treatment of COVID-19 and potential bacterial co-infections made these antimicrobial stewardship practices questionable.
- One meta-analysis compiled 24 studies with 3338 patients and revealed that bacterial co-infection with COVID-19 was only 3.5% with over 70% of patients in the studies receiving antibiotics.[1]

Purpose

- This project was designed as a quality improvement project at Providence Medical Center to study the rate of bacterial co-infection and antibiotic prescribing practices in patients with COVID-19 to improve antimicrobial stewardship measures.

Methods

- A retrospective chart review was performed on 92 patients with 79 of the patients being included in this project.
- Charts were reviewed dating from March of 2020 to September of 2020.
- Patient Information Collected:
  - ❖ Demographic information
  - ❖ COVID-19 exposure History
  - ❖ history of COPD/asthma
  - ❖ Cultures and sensitivities
  - ❖ Antibiotics
  - ❖ Duration of antibiotic therapy
  - ❖ Living facility
  - ❖ White blood cell count trend
  - ❖ Temperature max upon admission
  - ❖ Allergies
  - ❖ If the patient was immunocompromised
  - ❖ If the patient has a previous multidrug resistant organism (MDRO) infection
  - ❖ If the patient had broad spectrum antibiotic use within the last 90 days

1. Langford BJ, et al. Bacterial co-infection and secondary infection in patients with COVID-19: a living rapid review and meta-analysis. Clin Microbiol Infect. 2020 Dec;26(12):1622-1629.
2. Coagulase-Negative Staphylococci. Karsten Becker, Christine Heilmann, Georg Peters. Clinical Microbiology Reviews Oct 2014, 27 (4) 870-926
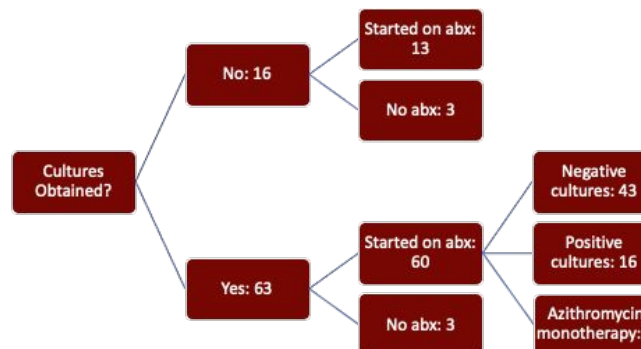
Demographics

Age Range: 26-93 (mean = 66)

34 Male   45 Female

Race	N (%)
African-American	42 (53.2%)
Asian-American	1 (1.3%)
Caucasian	26 (32.9%)
Hispanic	9 (11.4%)
Indian	1 (1.3%)

Results

Data	N (%)
COVID-19 Exposure	
Yes	40 (50.6%)
No or None Noted	39 (49.4%)
Structural Lung Disease	
None	59 (74.7%)
COPD/Asthma	20 (25.3%)
History of MDRO	
Yes	7 (8.9%)
No or None Noted	72 (91.1%)

Flow diagram: Cultures Obtained? → No: 16 (Started on abx: 13; No abx: 3); Yes: 63 → Started on abx: 60 (Negative cultures: 43; Positive cultures: 16; Azithromycin monotherapy: 1); No abx: 3

Discussion

- Of the patients in this project, 43 (61.4%) received antibiotics without a positive culture. This included the 11 (68.8%) patients that received antibiotics with no cultures collected.
- Of the patients that had positive cultures, 3 (3.8%) were considered immunocompromised.
- Positive cultures did include 6 positive blood cultures for coagulase-negative *Staphylococci*, which is usually thought to be a contaminant from skin flora[2], and 6 positive urine cultures of 50,000 to over 100,000 CFUs with no symptom data.
- Positive cultures included any growth of a potential bacterial pathogen from a blood, urine, sputum, or throat culture.
- Though 16 patients had positive cultures, only 2 (2.5%) patients had positive bacterial sputum or respiratory cultures.

Limitations

- This project looked at patients at the beginning of the pandemic in March of 2020 and most healthcare providers were unaware of the rate of bacterial co-infections with COVID-19 pneumonia since it had not been studied.
- This project only looked at a small sample size.

Conclusion and Recommendations

- This project revealed that antimicrobial stewardship practices during the COVID-19 pandemic should be further evaluated and refined to prevent over-prescribing.
- Delaying initiating unnecessary antibiotics in someone suspected of having COVID-19 will lead to fewer side effects, adverse events, and delay resistance to key broad-spectrum agents.

Future Steps

- The hospital's protocol for antibiotic prescribing with suspected COVID-19 cases should be addressed to improve patient care.

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