Impact of Bacterial Infections on Hospitalized COVID-19 Patients

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ASPR Mission

Save Lives and Protect Americans from Health Security Threats
Secondary Microbial Infections During Pandemics

20 outbreaks of MDROs in COVID-19 units between April 2020 and February 2021 (CDC + public health partners)

Deaths from 2009 H1N1 pandemic in the U.S:
1/3 to 1/2 caused by secondary bacterial pneumonia (CDC 2009)

Lab-confirmed hospital-onset bacterial infections increased by 29% in COVID-19 patients (relative to those with flu-like illness)

11%-35% Of lab-confirmed influenza cases exhibit bacterial secondary infection (Klein 2016 Influenza Other Respir. Viruses 10, 394–403.)

Multiple hospital outbreaks during COVID-19 surges:
34 cases of CR-A. baumannii
39 cases of Candida auris

Leading etiologic pathogens of microbial pneumonia:
- Streptococcus pneumoniae
- Haemophilus influenzae
- Staphylococcus aureus (including MRSA)
- Carbapenem-resistant Acinetobacter baumannii
- Candida auris

1 MMWR 2020, 69: 1827-1831
2 MMWR 2020, 70: 56-57
Impact of Bacterial Infections on COVID-19

Emerging Infections Network (EIN)

Managed by the Infectious Diseases Society of America at University of Iowa; funded by the CDC

~2600 infectious disease specialists

Primarily in North America, but also global

EIN Surveys

- How often are you seeing suspected bacterial infections in COVID-19 patients?
- Number of infections?
- Types of infections?
- Infecting pathogen?
- Use of empiric antibiotics?

38 responses from U.S. (red dots), Mexico and India
Rate of Bacterial Infections in COVID-19 Patients is Low

50% of responses stated ICU admission was the trigger for empiric antibiotics.

76% of responses stated bacterial infections were diagnosed when patients were receiving mechanical ventilation.

Survey Responses = 212

Types of Infections
- VAP
- CLABS
- CAUTI
- P. aeruginosa
- S. aureus - MRSA
- Klebsiella
- Candida
- E. coli
- Aspergillus

Major Pathogens (Pulmonary & Non-pulmonary infections)

OCCURRENCE OF INFECTIONS

INFECTION PATHOGEN

- Pulmonary Infection
  - Gram Positive: 26
  - Gram Negative: 27
  - Fungal: 8

- Non-Pulmonary Infection
  - Gram Positive: 23
  - Gram Negative: 15
  - Fungal: 16
22-Question Case Series Survey

108 cases in the United States
3 Main Bacterial Species Identified

- S. aureus (½ MRSA) 26%
- Pseudomonas 16%
- Klebsiella 14%

67% PATIENTS HAD SEPSIS

73 bacterial infections were resolved with antibiotic treatment

14% 10 patients subsequently died

31 bacterial infections were NOT resolved with antibiotic treatment

74% 23 patients died

74% patients had one or more pre-existing condition

Hypertension and coronary artery disease were significant predictors of death

Unresolved bacterial infections were a significant contributor to death
Increasing Incidence of AMR Infections

MDR Gram-negative infections reported in a Maryland hospital in May 2020 (Patel 2021 Emerg Infect Dis)

When surges of COVID-19 patients decreased and normal hospital operations continued, the incidence of AMR outbreaks returned to baseline endemic levels

Carbapenem-resistant *A. baumannii* infections increased during surge of COVID-19 admissions (Perez 2020 CDC MMWR Vol 69)
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