



**ASPR**

# **Impact of Bacterial Infections on Hospitalized COVID-19 Patients**

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# ASPR Mission





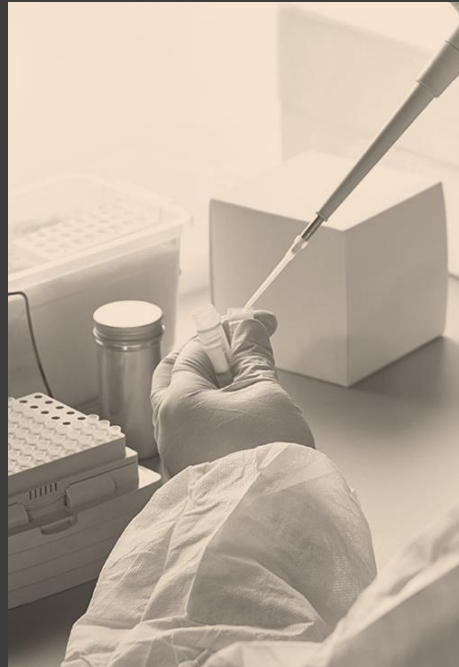
# Secondary Microbial Infections During Pandemics

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

11%-35%

Of lab-confirmed influenza cases exhibit bacterial secondary infection

(Klein 2016 Influenza Other Respir. Viruses 10, 394–403.)



Deaths from 2009 H1N1 pandemic in the U.S:

1/3 to 1/2

caused by secondary bacterial pneumonia (CDC 2009)

Multiple hospital outbreaks during COVID-19 surges:

34 cases of *CR-A. baumannii*<sup>1</sup>  
39 cases of *Candida auris*<sup>2</sup>

Lab-confirmed hospital-onset bacterial infections increased by

29%

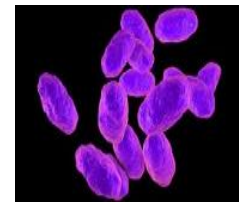
in COVID-19 patients (relative to those with flu-like illness)



## Leading etiologic pathogens of microbial pneumonia:



*Streptococcus pneumoniae*



*Haemophilus influenzae*



*Staphylococcus aureus*  
(including MRSA)



Carbapenem<sup>R</sup>  
*Acinetobacter baumannii*



*Candida auris*

# 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

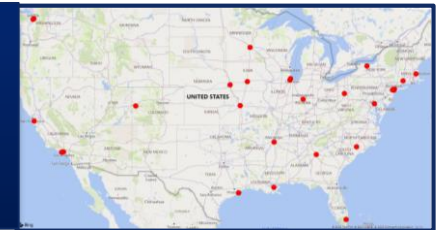


Primarily in North America, but also global

## EIN Surveys

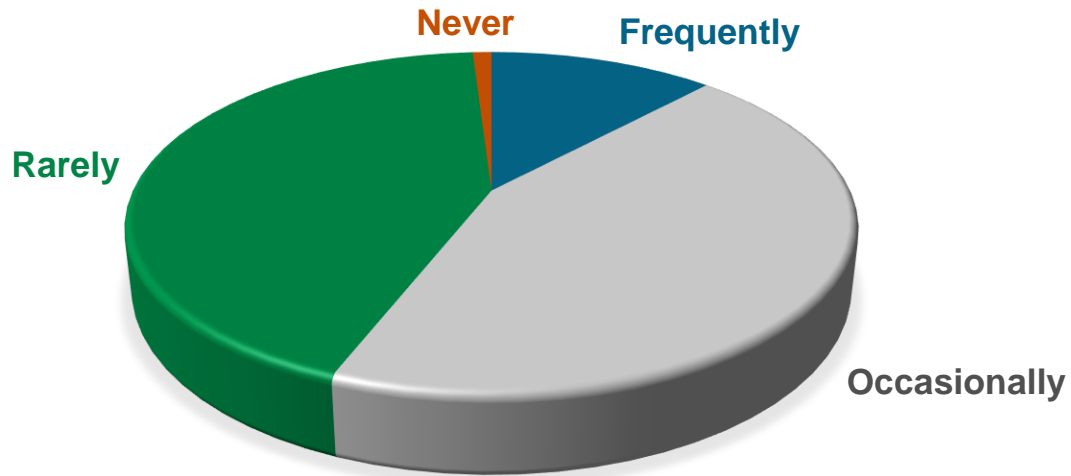
- How often are you seeing suspected bacterial infections in COVID-19 patients?
- Number of infections?
- Types of infections?
- Infecting pathogen?
- Use of empiric antibiotics?

**38** responses from U.S. (red dots), Mexico and India



# Rate of Bacterial Infections in COVID-19 Patients is Low

## OCCURRENCE OF INFECTIONS



Survey Responses = 212

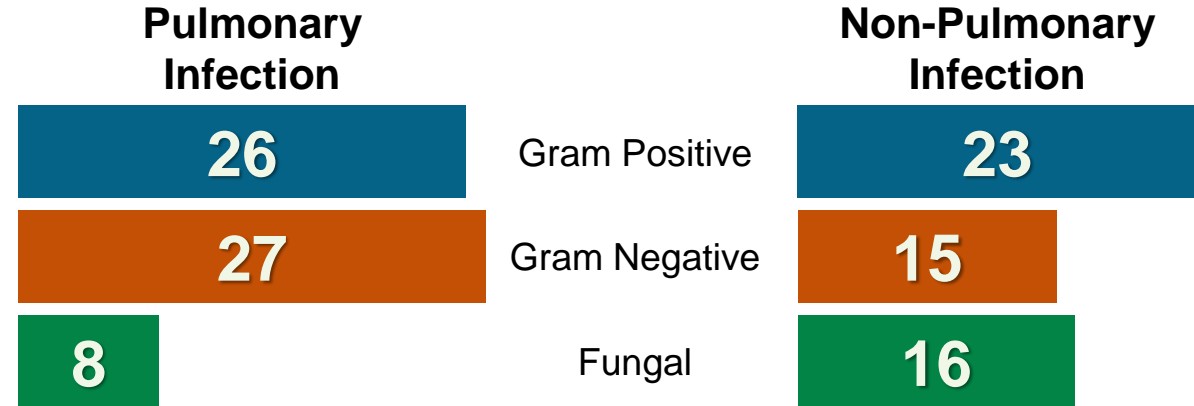
### 50%

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

## INFECTING PATHOGEN



### Types of Infections

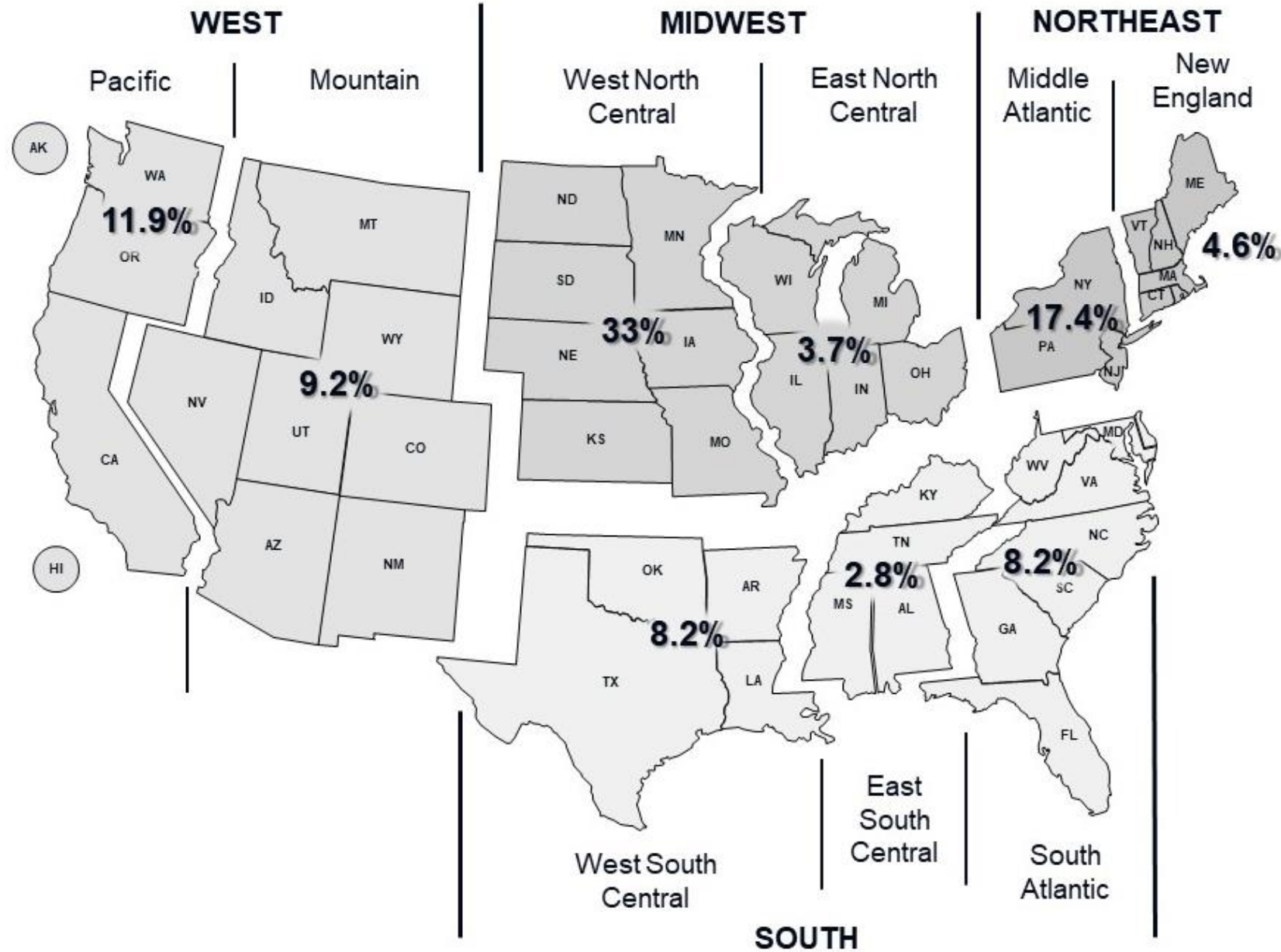
VAP  
CLABSI  
CAUTI

### Major Pathogens (Pulmonary & Non-pulmonary infections)

|                            |                   |                    |
|----------------------------|-------------------|--------------------|
| <i>P. aeruginosa</i>       | <i>Klebsiella</i> | <i>E. coli</i>     |
| <i>S. aureus</i> -<br>MRSA | <i>Candida</i>    | <i>Aspergillus</i> |

# 22-Question Case Series Survey

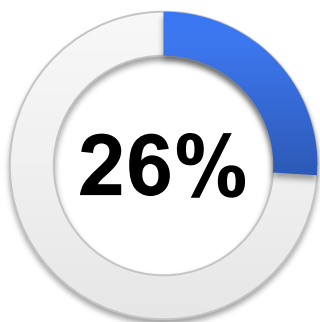
**108**  
cases in the  
United States



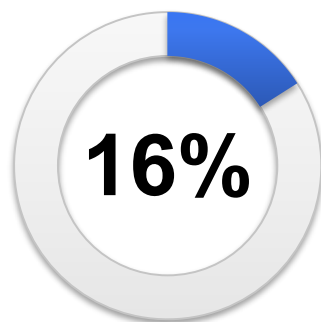


# 22-Question Case Series Survey

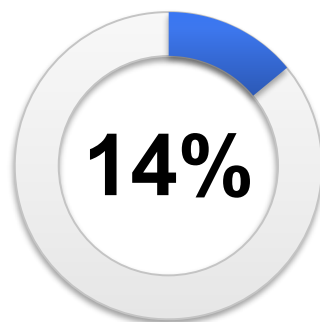
## 3 Main Bacterial Species Identified



*S. aureus*  
( $\frac{1}{2}$  MRSA)



*Pseudomonas*



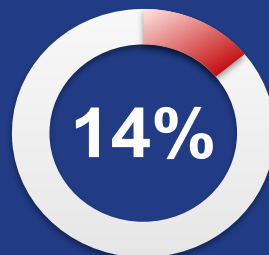
*Klebsiella*

**67%**

**PATIENTS HAD SEPSIS**

**73**

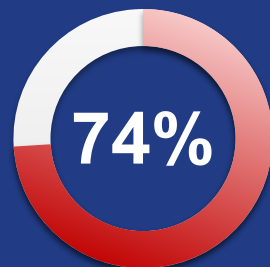
bacterial infections were resolved with antibiotic treatment



*10 patients subsequently died*

**31**

bacterial infections were NOT resolved with antibiotic treatment



*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**

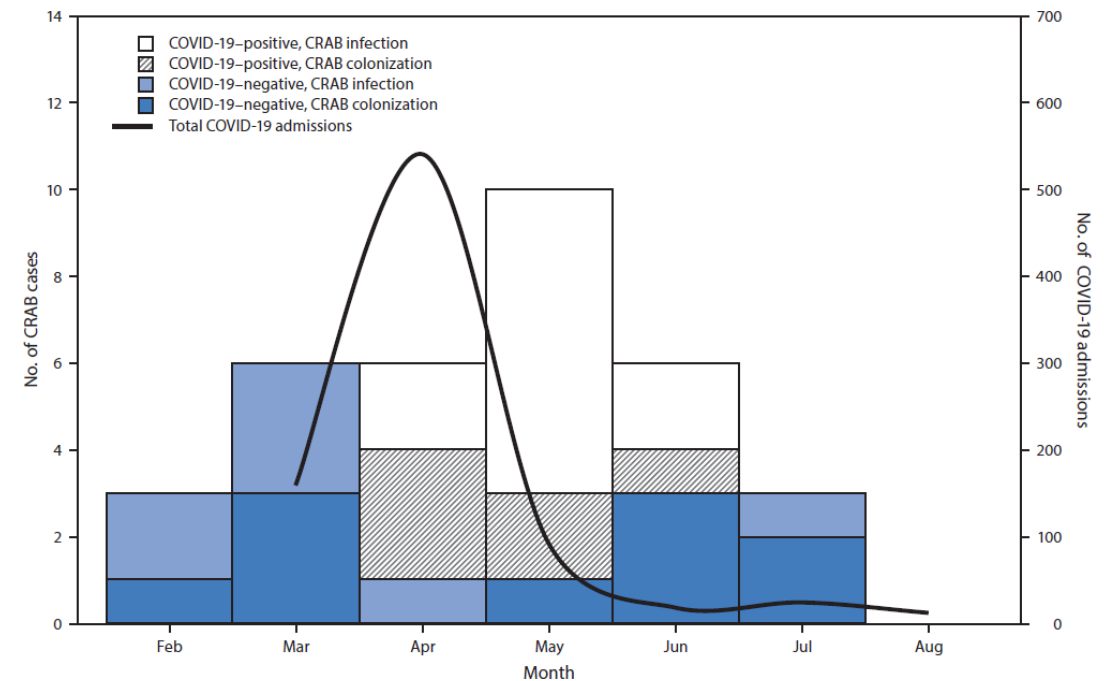
# Increasing Incidence of AMR Infections

# 10x

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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