# Antimicrobial Stewardship in the COVID-19 Era

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# Objectives

- Upon completion of this educational activity, you will be able to:
  - Describe the impact of COVID-19 on antimicrobial resistance and antimicrobial stewardship practices
  - Identify opportunities for antibiotic de-prescribing in patients with COVID-19

# Why Antimicrobial Stewardship Programs?

- Antimicrobial Stewardship Programs: focus on preventing resistance

- Core antimicrobial stewardship activities
  - Prospective audit and feedback
  - Formulary restriction/preauthorization
  - Antibiotic "timeouts"
  - Engagement with microbiology and infection prevention
  - Guideline development
  - Education

Mazdeyasna H, et al. *Curr Infect Dis Rep* **22**, 23 (2020)

# Antibiotic Prescribing in COVID-19

- High rates of antimicrobial prescribing despite low rates of bacterial co-infection
  - Michigan hospitals –
    - 56.6% received early antibiotics
    - 3.5% had confirmed community onset bacterial infections
  - NYC –
    - 70% started on empiric antibiotics
    - 3%-8% had confirmed community onset bacterial infections
  - London ICU –
    - 100% started on empiric antibiotics
    - 6% had confirmed community onset bacterial infections

Vaughn VM, et al. *Clin Infect Dis* 2021;72:10
Kubin CJ, et al. *Am J Health-Sys Pharm* 2021;78:8
Stevenson DR, et al. *Clin Infect Dis* 2021;72:11

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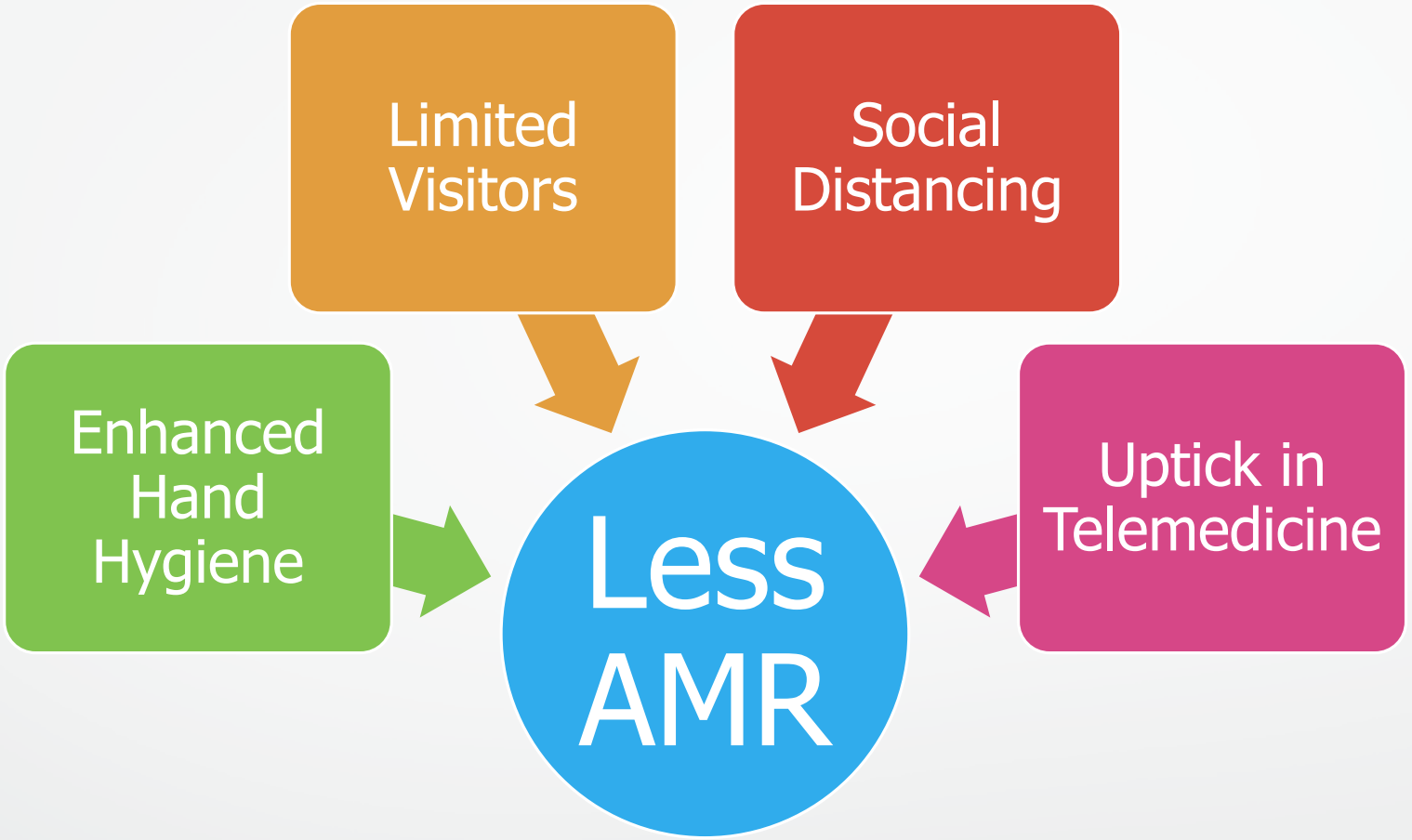
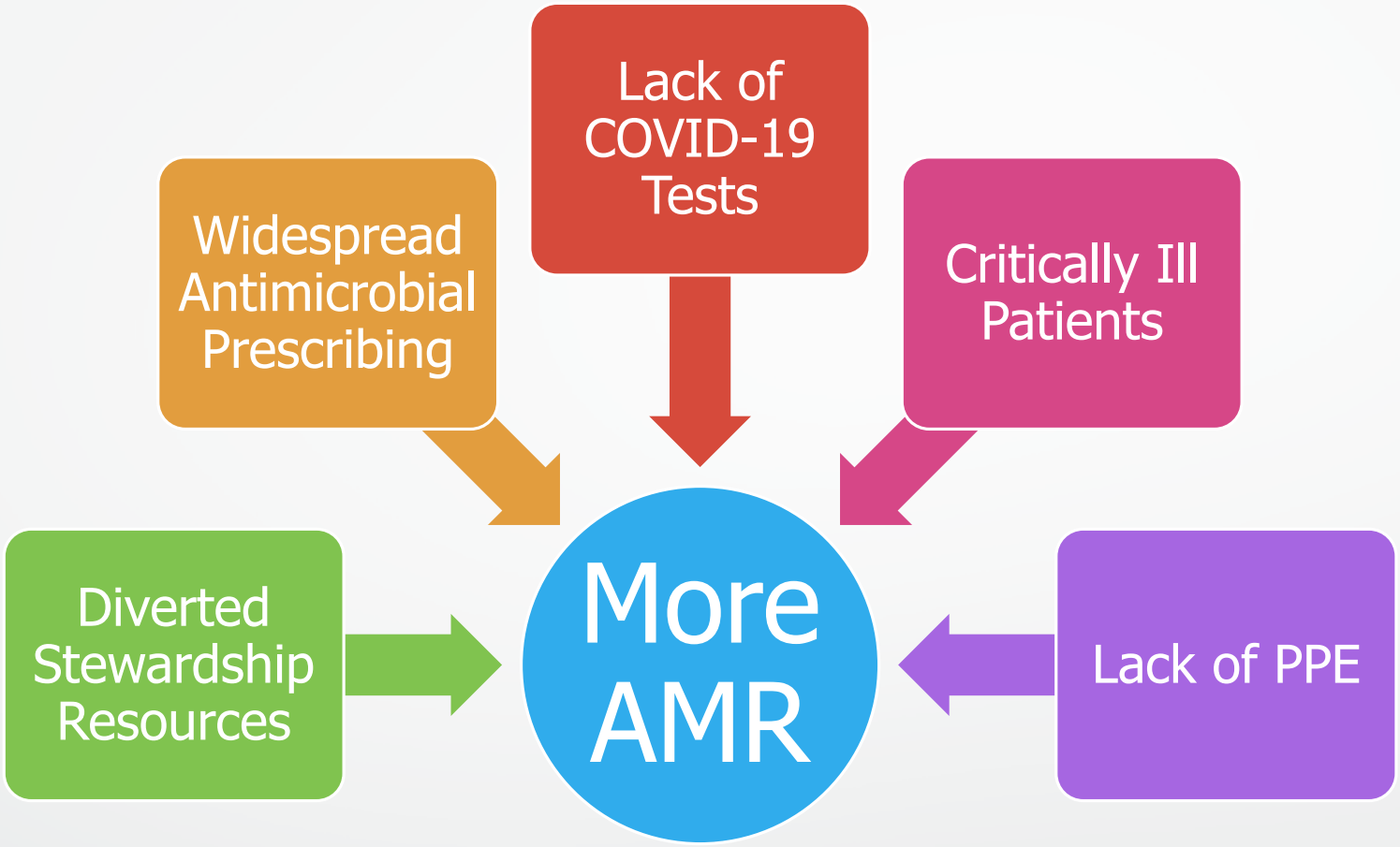
# The Good




Jesús Rodríguez-Baño J, *Trans R Soc Trop Med Hyg* 2021;115:10

# The Bad

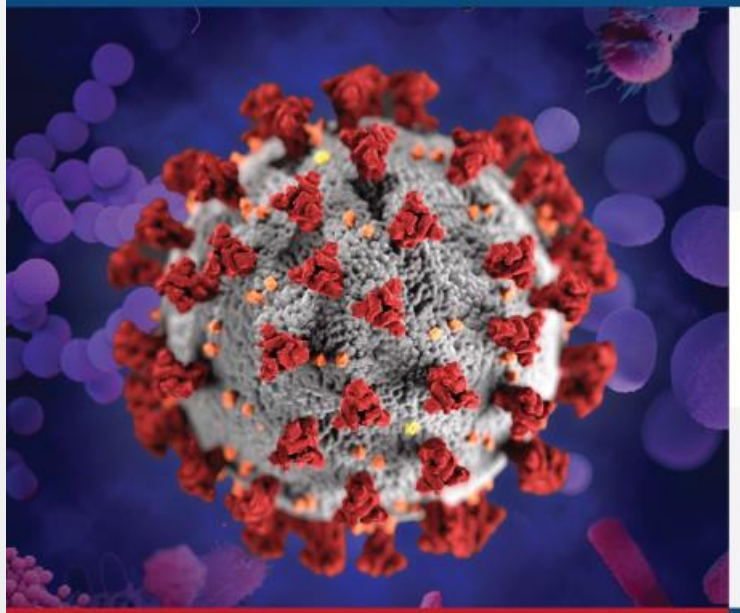



Jesús Rodríguez-Baño J, *Trans R Soc Trop Med Hyg* 2021;115:10

# The Ugly - 2022 CDC Special Report

## COVID-19 CREATED A PERFECT STORM

The U.S. lost progress combating antimicrobial resistance in 2020



**↑15%** Antimicrobal-resistant infections and deaths increased in hospitals in 2020.

**~80%** Patients hospitalized with COVID-19 who received an antibiotic March-October 2020.

Delayed or unavailable data, leading to resistant infections spreading undetected and untreated.

**INVEST IN PREVENTION.**

**Setbacks to fighting antimicrobial resistance can and must be temporary.**

CDC. COVID-19: U.S. Impact on Antimicrobial Resistance, Special Report 2022. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2022

# 2022 CDC Special Report

**Available data show an alarming increase in resistant infections starting during hospitalization, growing at least 15% from 2019 to 2020.**

- Carbapenem-resistant *Acinetobacter* (↑78%)
- Antifungal-resistant *Candida auris* (↑60%)*
- Carbapenem-resistant Enterobacterales (↑35%)
- Antifungal-resistant *Candida* (↑26%)
- ESBL-producing Enterobacterales (↑32%)
- Vancomycin-resistant Enterococcus (↑14%)
- Multidrug-resistant *P. aeruginosa* (↑32%)
- Methicillin-resistant *Staphylococcus aureus* (↑13%)

CDC. COVID-19: U.S. Impact on Antimicrobial Resistance, Special Report 2022. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2022

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# Light at the End of the Tunnel

- Faster COVID-19 tests
- COVID-19 vaccines and therapeutics
- Renewed interest in infectious diseases
- Strengthening HAI/AR Program (SHARP)


**Kentucky Antimicrobial Stewardship Innovation Consortium**

KYMDRO.org/KASIC

# Opportunities for Antimicrobial Stewardship

- Co-infection
  - COVID-19 AND other infection concurrently
    - Community acquired pneumonia
- Secondary infection
  - Develops after initial COVID-19
    - Hospital-acquired pneumonia/ventilator-associated pneumonia

# Bacterial Co-infection

- 47 year female presents to ED in summer of 2020 with cough, shortness of air, fever, and body aches for a couple of days
  - Tmax: 103.1° F
  - HR: 103 BMP
  - 2 L nasal cannula
  - Other vitals within normal limits
- Chest x-ray: Bilateral infiltrates suggesting multifocal pneumonia
- Chest CT: bilateral ground glass opacities with mild reactive hilar and mediastinal lymphadenopathy – high likelihood of COVID-19
- COVID test: Pending
- Ceftriaxone 1 g Q24H IV + azithromycin 500 mg Q24H IV

# Bacterial Co-infection

- Patient is admitted and the next the day a NP swab for SARS-CoV-2 returns positive and a procalcitonin is 0.11 ng/mL.

- Antimicrobial stewardship opportunity?

# Bacterial Co-infection

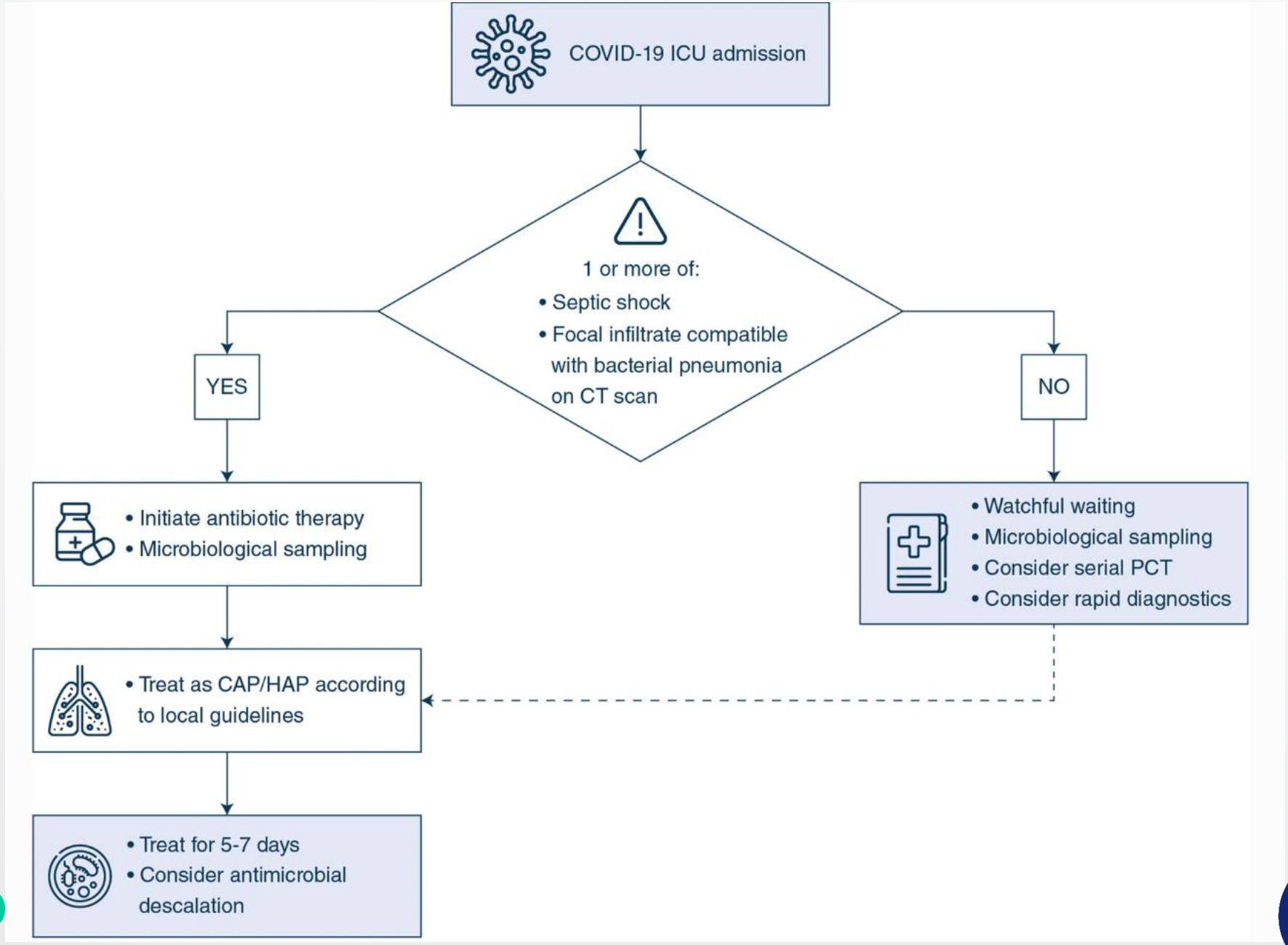
- Bacterial co-infection rate is < 10%
- National Institute of Health
  - Recommend against empiric broad-spectrum antibiotics in patients with severe or critical COVID-19
  - Consider in specific situations
    - Lobar infiltrate on chest x-ray
    - Leukocytosis
    - Elevated serum lactate level
    - Shock
    - Microbiological data

COVID-19 Treatment Guidelines Panel. Available at https://www.covid19treatmentguidelines.nih.gov/. Accessed [Aug 25, 2022]
Evans L, Rhodes A, Alhazzani W, et al. *Intensive Care Med*. 2021;47(11):1181-1247.
Metlay JP, Waterer GW, Long AC, et al. *Am J Respir Crit Care Med.* 2019;200(7):e45-e67.
Moore SE, Wilde AM, Bohn BC, et al. *Infect Control Hosp Epidemiol*. 2021;1-3.

# Procalcitonin in COVID-19

- Generally elevated in bacterial infections and not in viral infections
- Can be misleading in patients with COVID-19 – May be elevated in absence of bacterial co-infection
- High negative predictive value
  - 95.4%, 95.1% in a study of 2,443 patients, using 0.25 ng/mL and 0.5 ng/ml, respectively
  - Low procalcitonin should guide antibiotic de-prescribing
- Procalcitonin not recommended to aid in decision to initiate antibiotics

May M, et al. *Antimicrob Agents Chemother* 2021;65:e02167-20
Barlam TF, et al. *Infect Control Hosp Epidemiol* 2022



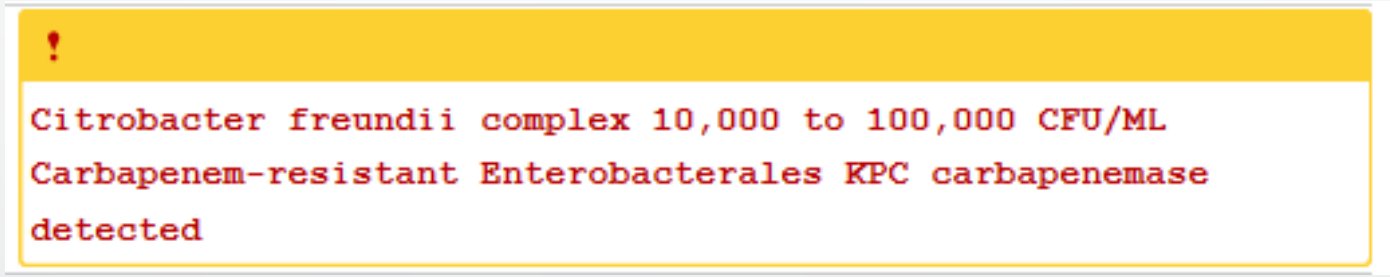

De Waele JJ, et al. *Intensive Care Med* 2021;**47**, 104–106

# Bacterial Co-infection

- Antimicrobial stewardship recommendation to stop antibiotics on day 2
- Discharged after a 7 day hospitalization
- No recorded infection related readmission
- No recorded *C. difficile* infection or infection due to drug-resistant bacteria since

# Secondary Infection

- Transferred for ECMO after three week hospitalization prior to admission for severe COVID. Through ~ first month of hospitalization patient had 0 antibiotic free days and antibiotics included 19 days of cefepime and 14 days of meropenem
- BAL cultures with MRSA and *Enterobacter cloacae* (cefepime-susceptible)



# Secondary Infection - Opportunities

- Obtaining appropriate cultures
- De-escalation
  - Positive cultures
  - Negative cultures
    - No MRSA and/or No *Pseudomonas* = Stop vancomycin and anti-pseudomonal
    - Difficult in critically ill – suggest step-wise approach
- Defining durations of therapy early
  - Adding stop dates
- "Monitoring off antibiotics"

Metlay JP, Waterer GW, Long AC, et al. *Am J Respir Crit Care Med.* 2019;200(7):e45-e67.
Musgrove MA, Kenney RM, Kendall RE, et al. *Open Forum Infect Dis.* 2018 Jul 10;5(7):ofy162.
Kalil AC, Metersky ML, Klompas M, et al. *Clin Infect Dis*. 2016;63(5):e61-e111.

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# Preparing for the Next Pandemic

*Infection Control & Hospital Epidemiology* (2022), 1–12
doi:10.1017/ice.2022.194

SHEA

**SHEA White Paper**

## SHEA statement on antibiotic stewardship in hospitals during public health emergencies

Tamar F. Barlam MD, MSc[1,2], Mayar Al Mohajer MD, MBA[3,4], Jaffar A. Al-Tawfiq MD[5,6], Antonie J. Auguste MD, MPH[7,8], Cheston B. Cunha MD[9,10], Graeme N. Forrest MBBS[11], Alan E. Gross PharmD[12], Rachael A. Lee MD, MSPH[13,14], Susan K. Seo MD[15,16], Kathryn N. Suh MD, MSC[17], Stacy Volk PharmD[18] and Joshua K. Schaffzin MD, PhD[19,20]

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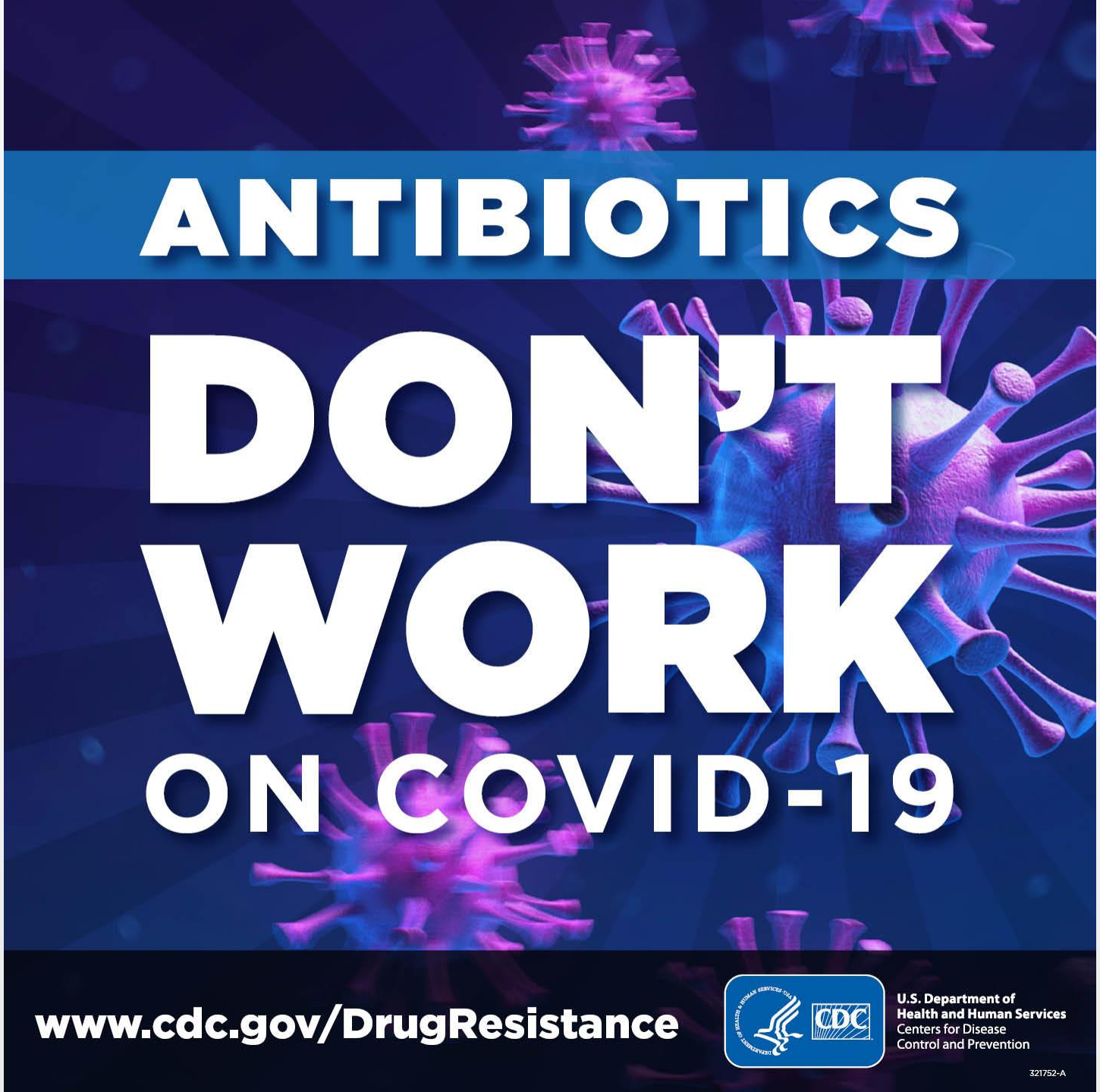
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ON COVID-19
www.cdc.gov/DrugResistance
U.S. Department of
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Centers for Disease
Control and Prevention
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