
# The COVID-19 Impact on Antibiotic Stewardship and Antibiotic Resistance

Mandana Naderi, PharmD, BCIDP
University of Arizona College of Pharmacy/AZ Department of Health Services

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# Objectives

- Describe trends in antibiotic use and resistance observed during the COVID-19 pandemic
- Identify appropriate and effective antibiotic stewardship strategies to incorporate during the COVID-19 pandemic

# Clinical Management of COVID-19 Treatment Guidelines

Acute coinfections with bacteria

**We recommend for patients with suspected or confirmed mild COVID-19, against the use of antibiotic therapy or prophylaxis.**

**We recommend for patients with suspected or confirmed moderate COVID-19, that antibiotics should not be prescribed unless there is clinical suspicion of a bacterial infection.**

**We recommend for patients with suspected or confirmed severe COVID-19, the use of empiric antimicrobials to treat all likely pathogens, based on clinical judgment, patient host factors and local epidemiology, and this should be done as soon as possible (within 1 hour of initial assessment if possible), ideally with blood cultures obtained first. Antimicrobial therapy should be assessed daily for de-escalation.**

## Empiric Broad-Spectrum Antimicrobial Therapy

### Recommendations

- In patients with COVID-19 and severe or critical illness, there are insufficient data to recommend empiric broad-spectrum antimicrobial therapy in the absence of another indication.
- If antimicrobials are initiated, the Panel recommends that their use should be reassessed daily in order to minimize the adverse consequences of unnecessary antimicrobial therapy (**AIII**).

| | |
|---|---|
| Reduce the development of antimicrobial resistance | • Utilize de-escalation protocols as soon as patient is clinically stable and there is no evidence of bacterial infection |
| Reduce the development of adverse drug effects | • Expose patient to empiric antimicrobial therapy for the shortest time possible, to prevent nephrotoxicity, cardiac and other side-effects from unnecessary antimicrobial use |
| Promote appropriate antimicrobial prescribing and use during the COVID-19 pandemic *(121)* | • Do not prescribe antibiotics to suspected or confirmed COVID-19 patients with low suspicion of a bacterial infection, to avoid more short-term side-effects of antibiotics in patients and negative long-term consequences of increased antimicrobial resistance |

World Health Organization. COVID-19 Clinical Management: living guidance. Updated Jan 2021.
National Institutes of Health. COVID-19 Treatment Guidelines Pharmacologic Interventions. Updated Oct 2020.

# Antibiotic Use Trends during COVID-19

# Antibiotic Use in COVID-19

- Langford et al. meta-analysis data from 154 studies between December 2019 – May 2020 with 30,623 COVID-19 patients

**74.6%**

**Antibiotic Prescribing Prevalence (95% CI 68.3 – 80.0%)**

**8.6%**

**Prevalence of Bacterial Co-infection from 31 studies (95% CI 4.7-15.2%)**

- Antibiotic prescribing was higher with increasing patient age (OR 1.45 per 10-year increase, 95% CI 1.18-1.77) and higher with increasing proportion of patients requiring mechanical ventilation (OR 1.33 per 10% increase, 95% CI 1.15-1.54)

Langford BJ, So M, Raybardhan S et al. *Clin Microbiol Infect.* Revised Dec 2020

# Antibiotic Use in COVID-19

- Vaughn et al study in 38 Michigan hospitals in 1,705 hospitalized COVID-19 patients from March 13– June 18, 2020

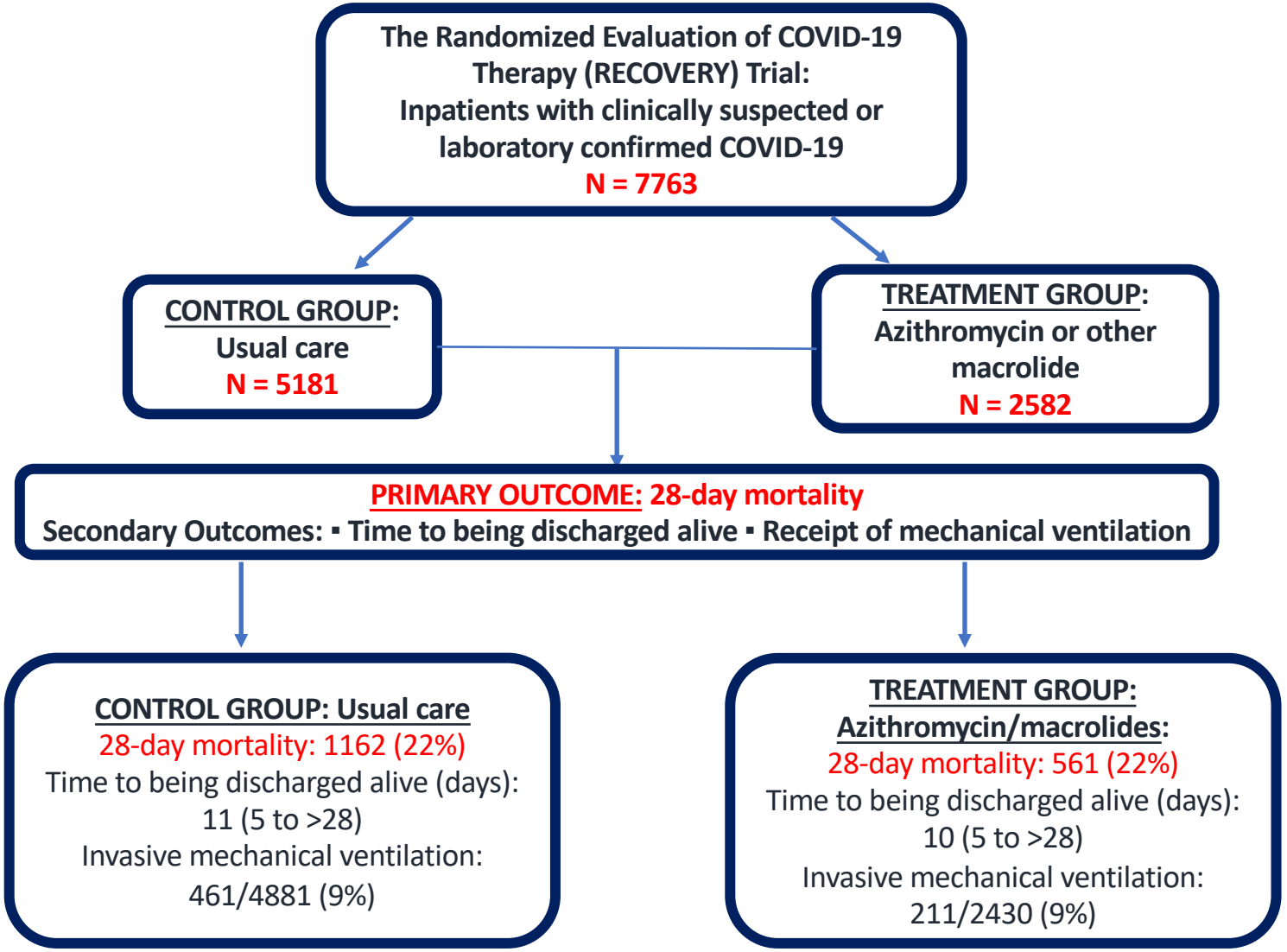
**56.6%** Early empiric antibiotics prescribed

**3.5%** Confirmed community-onset bacterial co-infection

**27-84%** Empiric antibiotic use varied among hospitals

Vaughn VM et al. *Clinical Infectious Diseases*, ciaa1239. August 2020.

# Azithromycin Use in COVID-19 Patients




RECOVERY Collaborative Group. *Lancet*. 2021 Feb 13;397(10274):605-612.

# About CDC AU/AR Data Presented Today

- Preliminary data provide the largest snapshot to date about antibiotic use and antibiotic resistance in U.S. COVID-19 patients
- Inpatient data reflect:
  - Infection data from 150+ hospitals and 14,000 hospital discharges
  - Antibiotic use data from 1,100+ hospitals and 2+ million hospital discharges
  - 2 data systems: National Healthcare Safety Network (NHSN) and Premier Healthcare Database

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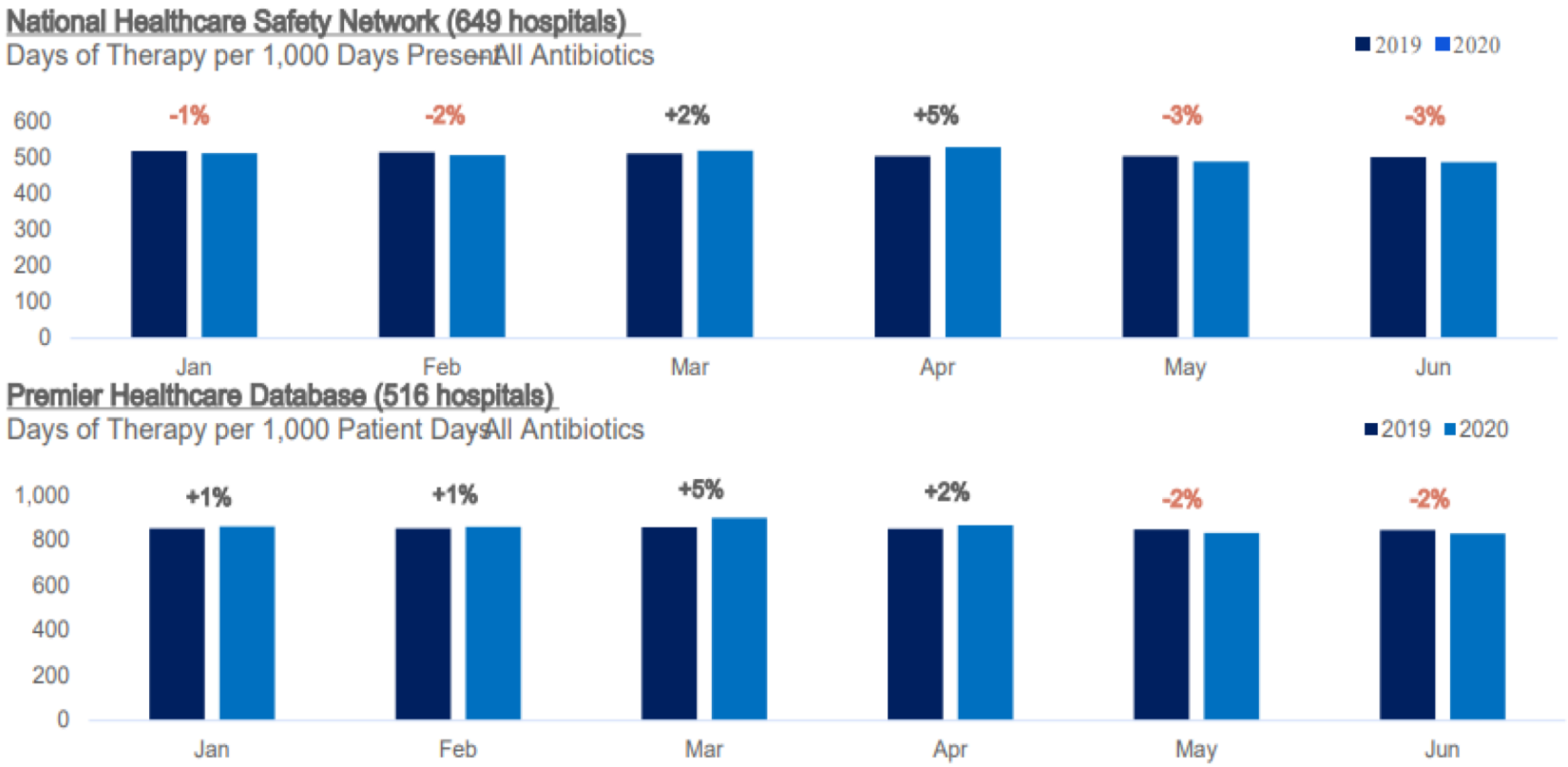
# Hospital Antibiotic Use: All Antibiotics




Note: NHSN AU days present denominator counts any portion of a day when a patient was hospitalized and thus is larger than the Premier patient day denominator, which counts 24-hour periods.
Note: 25% drop in hospitalizations for March-June 2020 vs. 2019

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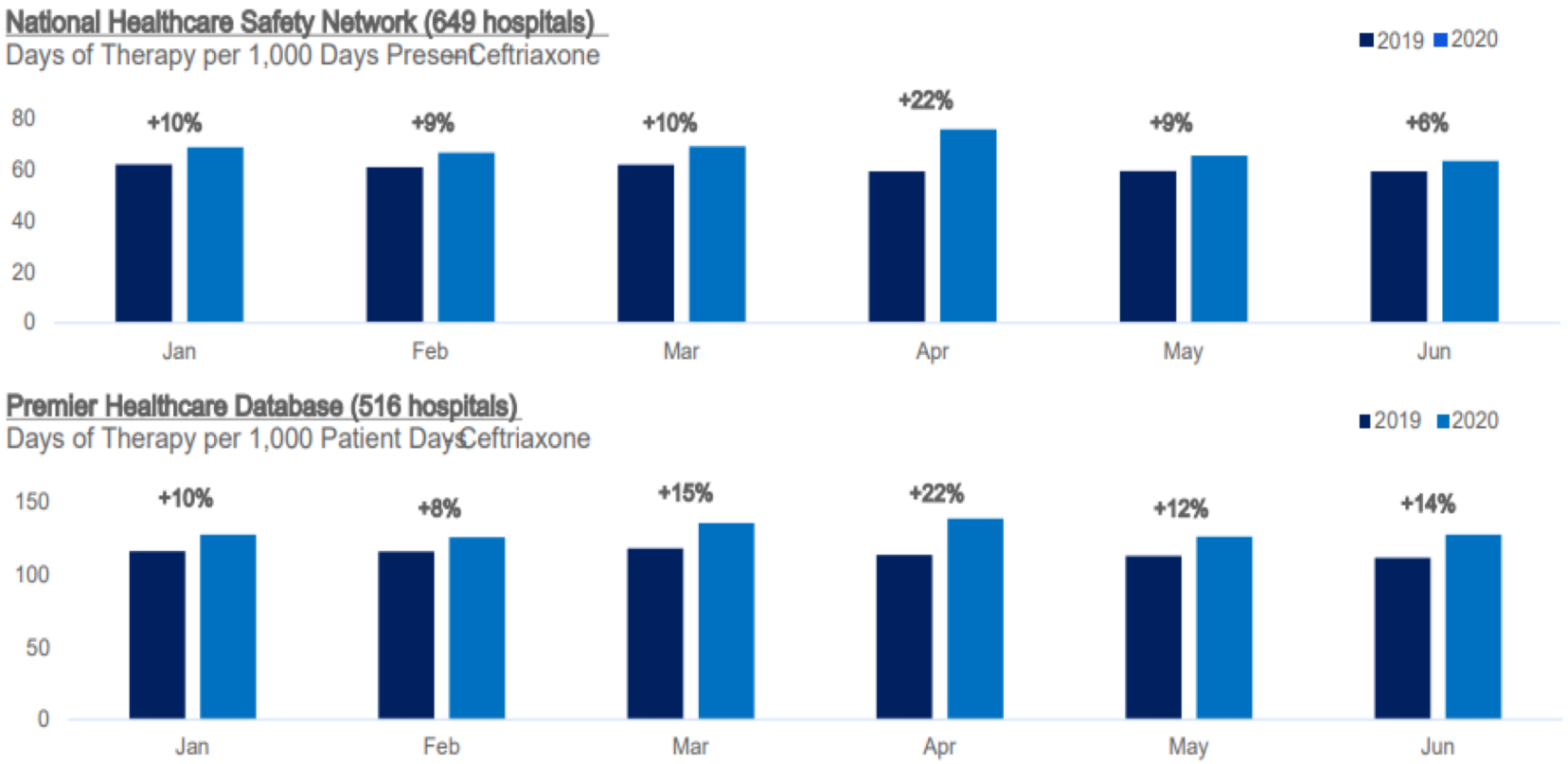
# Hospital Antibiotic Use: Ceftriaxone

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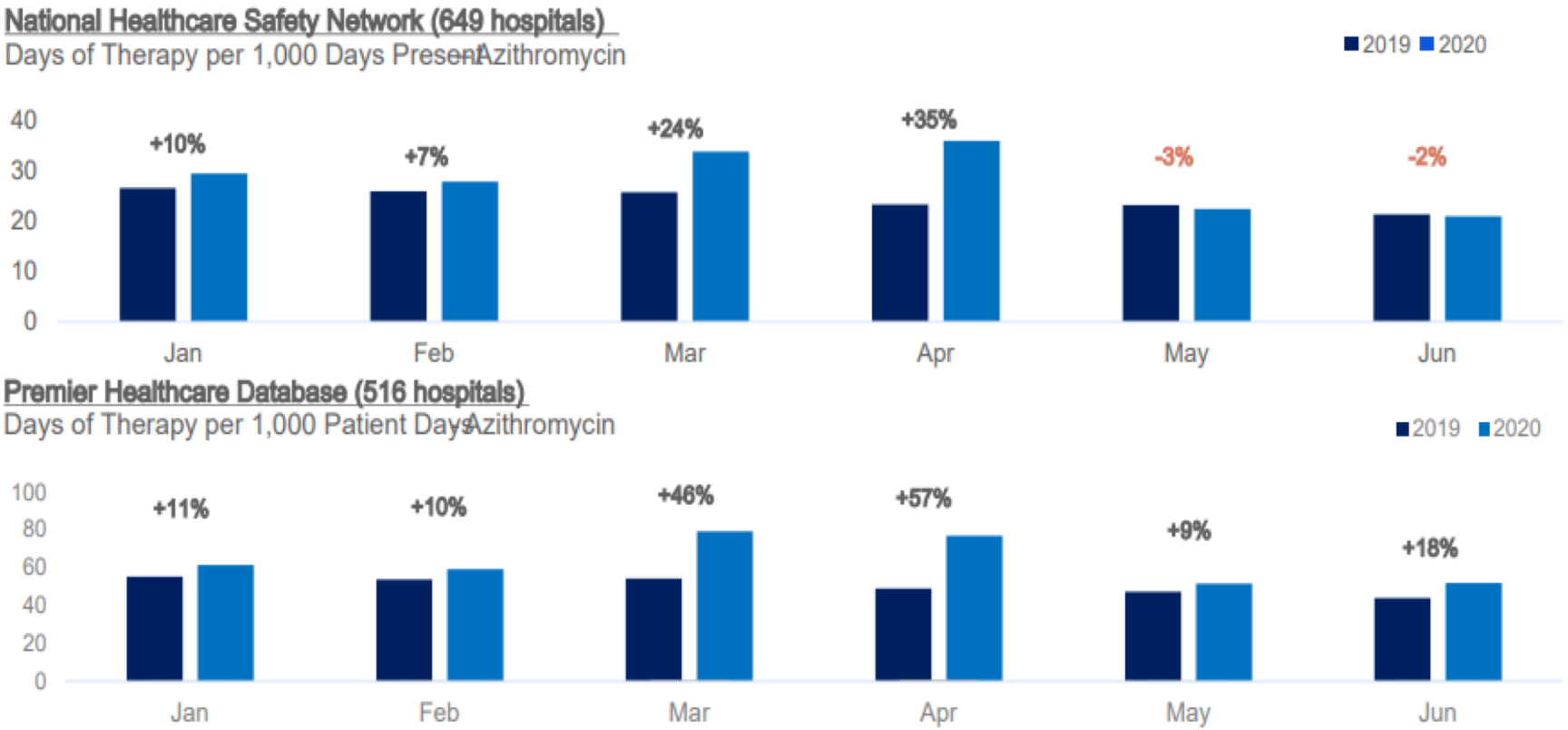
# Hospital Antibiotic Use: Azithromycin

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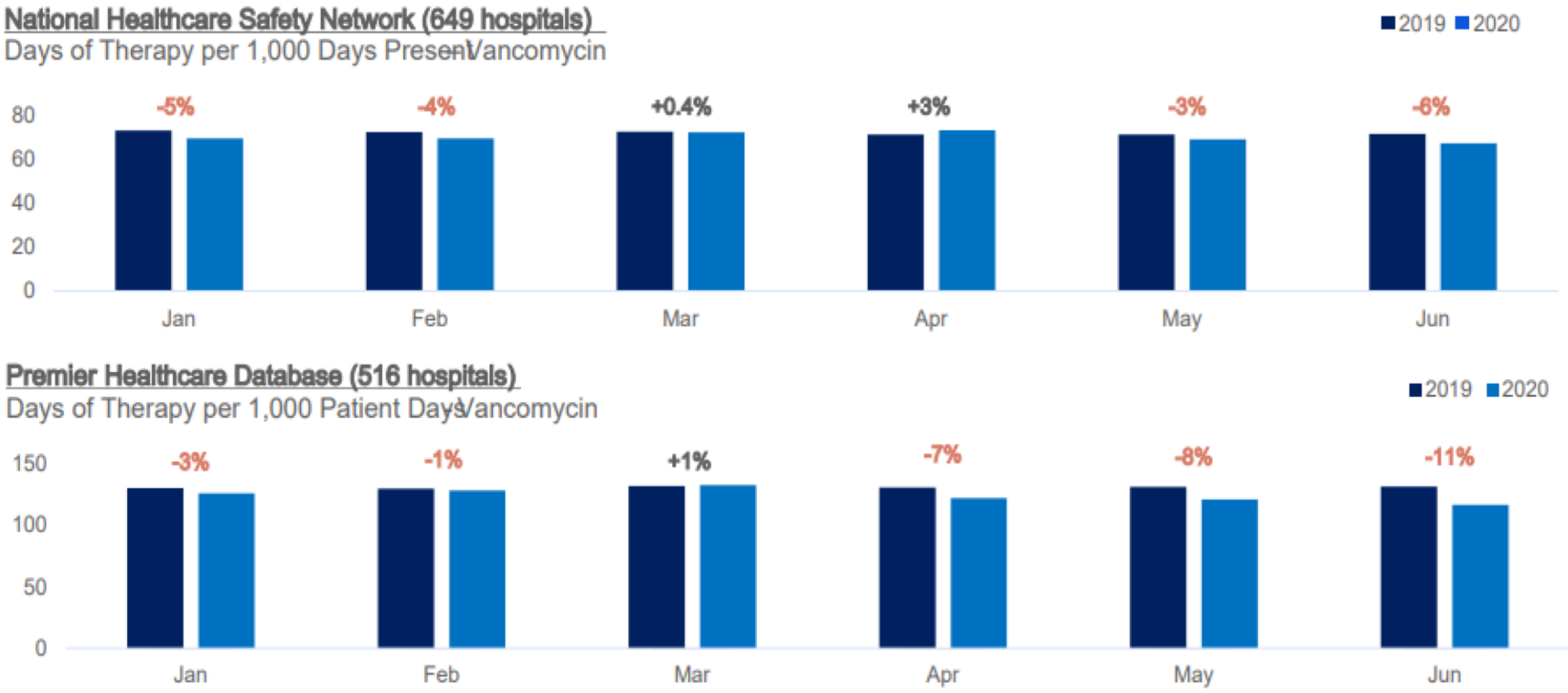
# Hospital Antibiotic Use: Vancomycin

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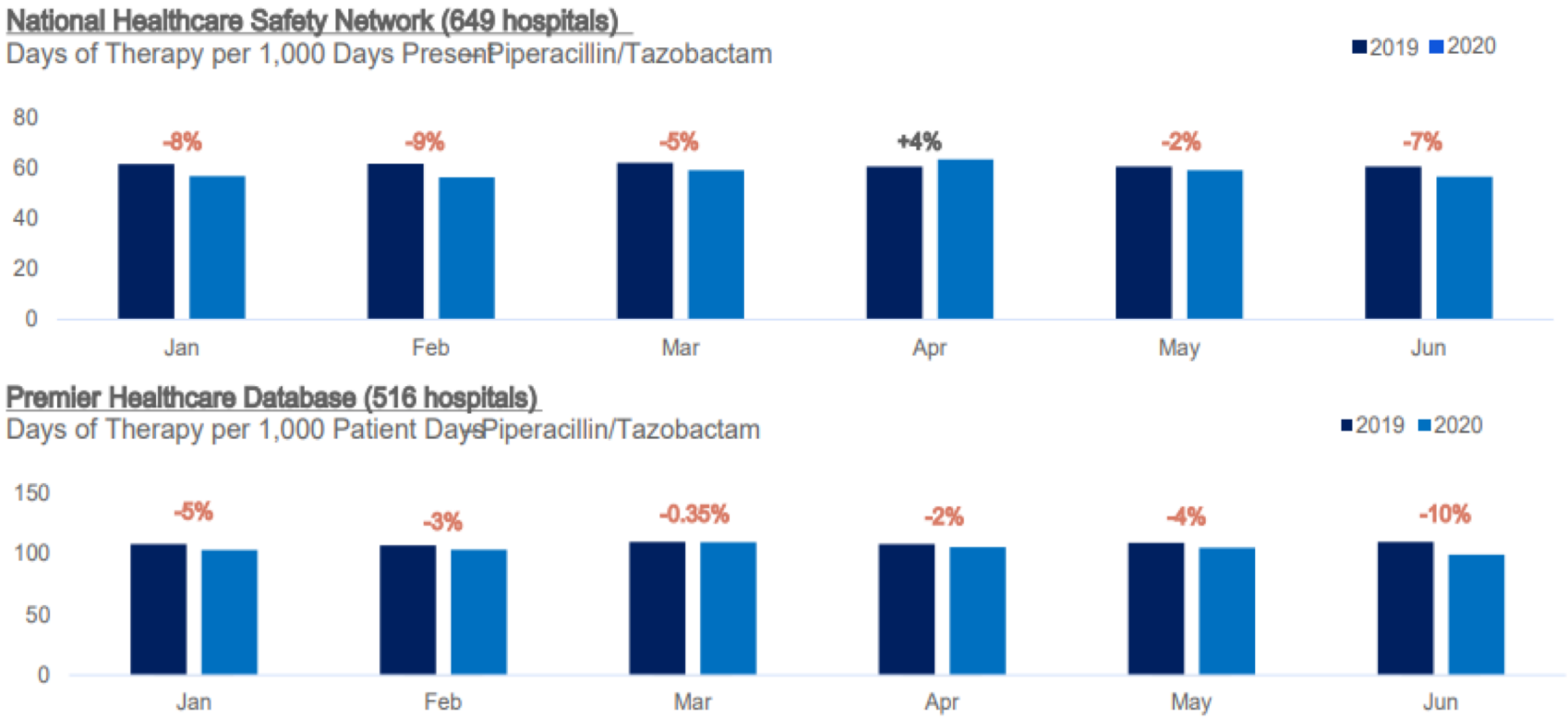
# Hospital Antibiotic Use: Piperacillin/tazobactam

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# What about *C. difficile* Infection (CDI)?

- Luo et al observed that in their NYC hospital, there was no difference in the CDI standardized infection ratio (SIR) during the COVID-19 pandemic compared to 2019 (p= 0.69)
  - Did not find a difference in HA-CDI despite a trend toward increased high risk antibiotic exposures (p= 0.06)

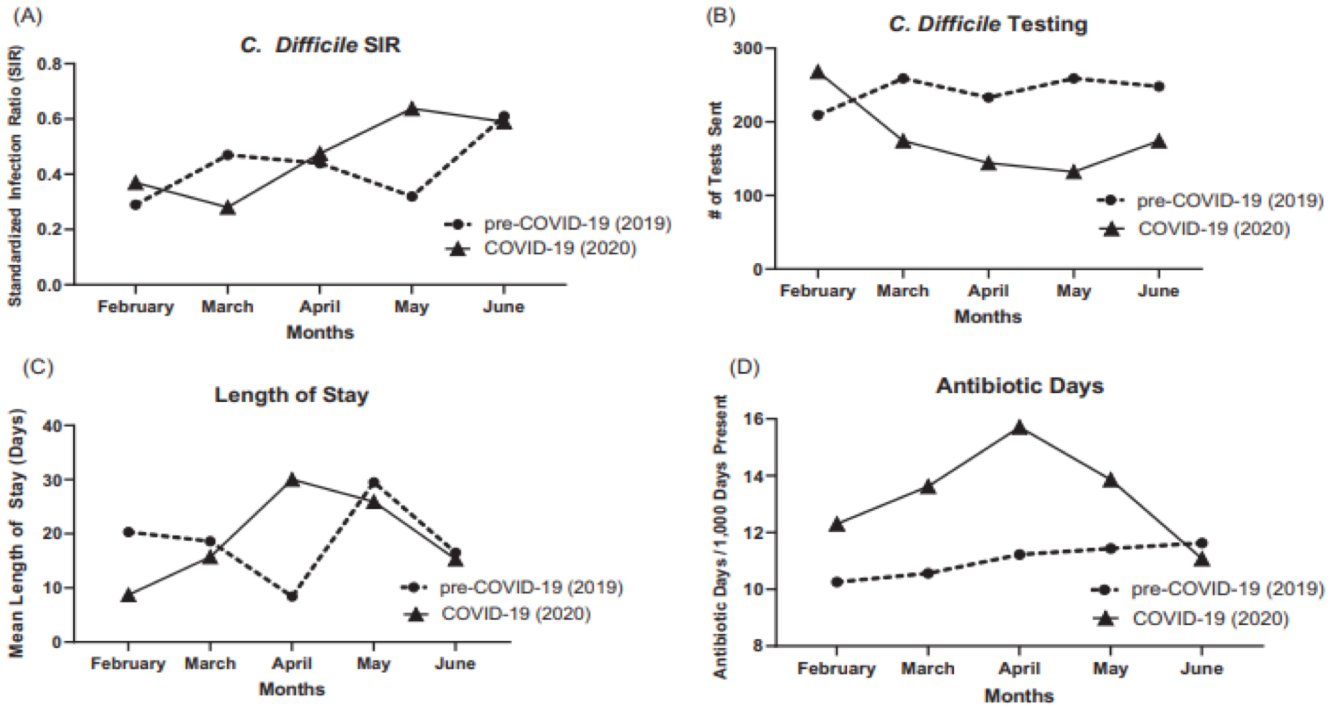
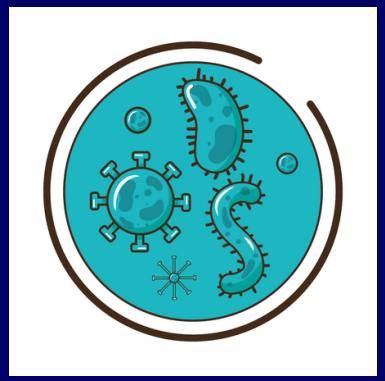



**Fig. 1.** Comparisons between standardized infection ratios (A), *C. difficile* testing (B), length of stay (C) and high-risk antibiotic days (D) between our COVID-19 (2020) and pre-COVID-19 (2019) cohort.

Luo Y et al. *Infect Control Hosp Epidemiol*. 2020;1-2.

# Antimicrobial Resistance Trends during COVID-19



# MDRO's Getting some Press…

The New York Times

## *With All Eyes on Covid-19, Drug-Resistant Infections Crept In*

The spread of other dangerous germs is surging — a result, in part, of the chaotic response to the pandemic.

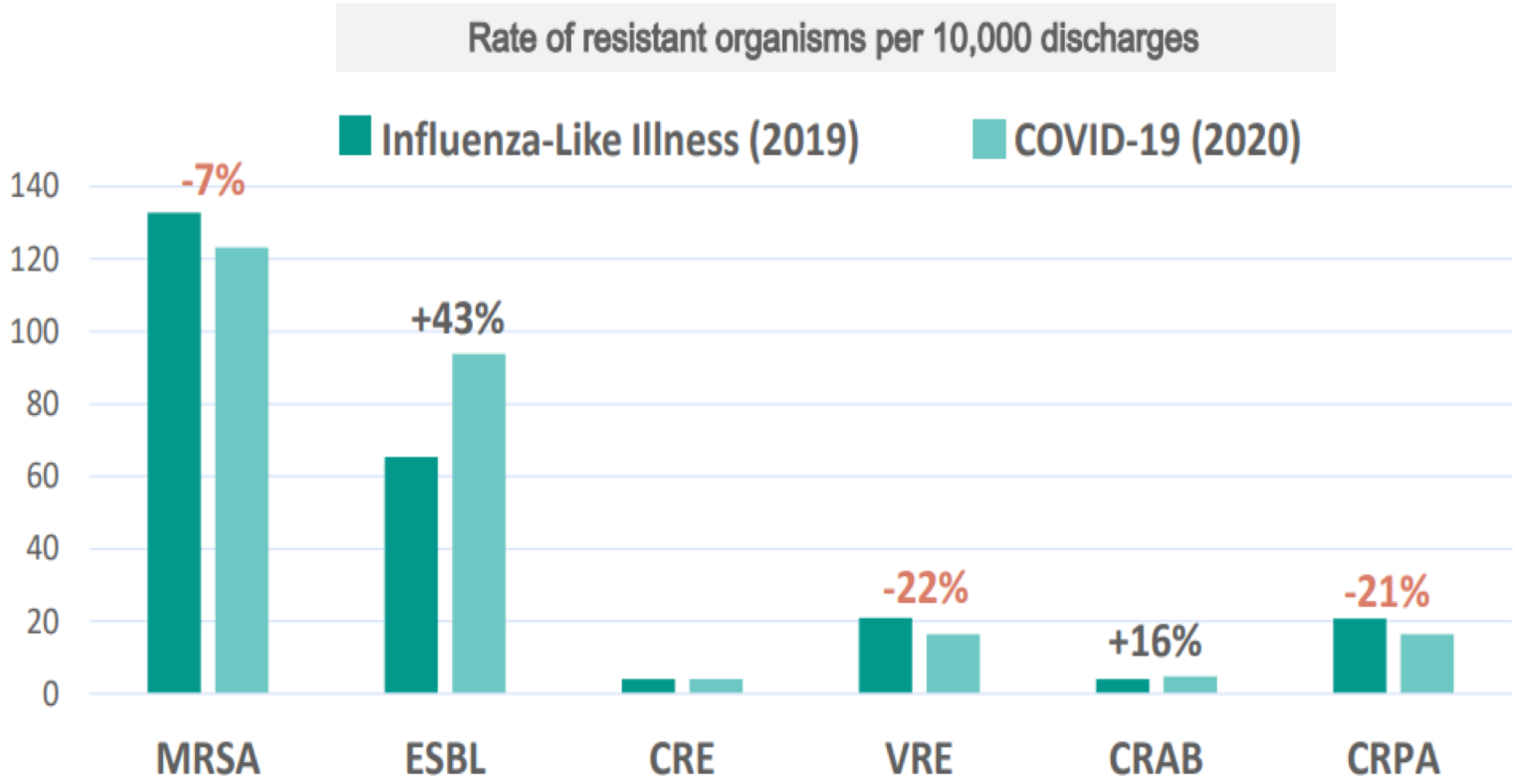
These bacteria and fungi, like Covid-19, prey on older people, the infirm and those with compromised immune systems. They can cling tenaciously to clothing and medical equipment, which is why nursing homes and hospitals before the pandemic were increasingly focused on cleaning rooms and changing gowns to prevent their spread.

That emphasis all but slipped away amid an all-consuming focus on the coronavirus. In fact, experts warn, the changes in hygiene and other practices caused by the Covid-19 fight are likely to have contributed to the spread of these drug-resistant germs.

Another possible contributor has been the heavy and regular use of steroids to treat Covid-19. These drugs help alleviate the virus's most dangerous symptoms but can leave the immune system compromised in a way that allows other germs to more easily infiltrate the body.

Ritchel M. *New York Times*. Jan 2021.

# Antibiotic-Resistant Pathogens in Hospitalized Patients: Overall

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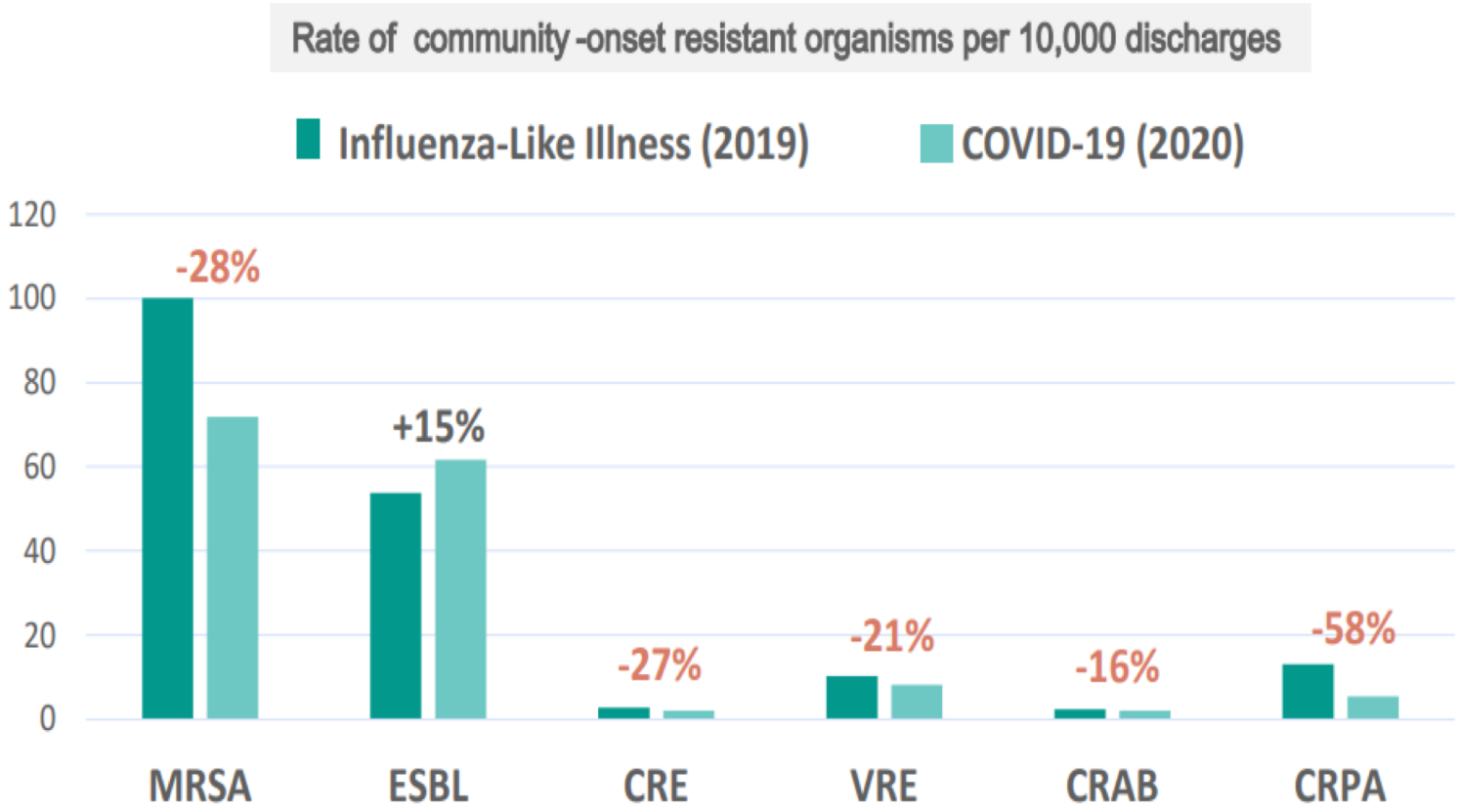
# Antibiotic-Resistant Pathogens in Hospitalized Patients: Community Onset

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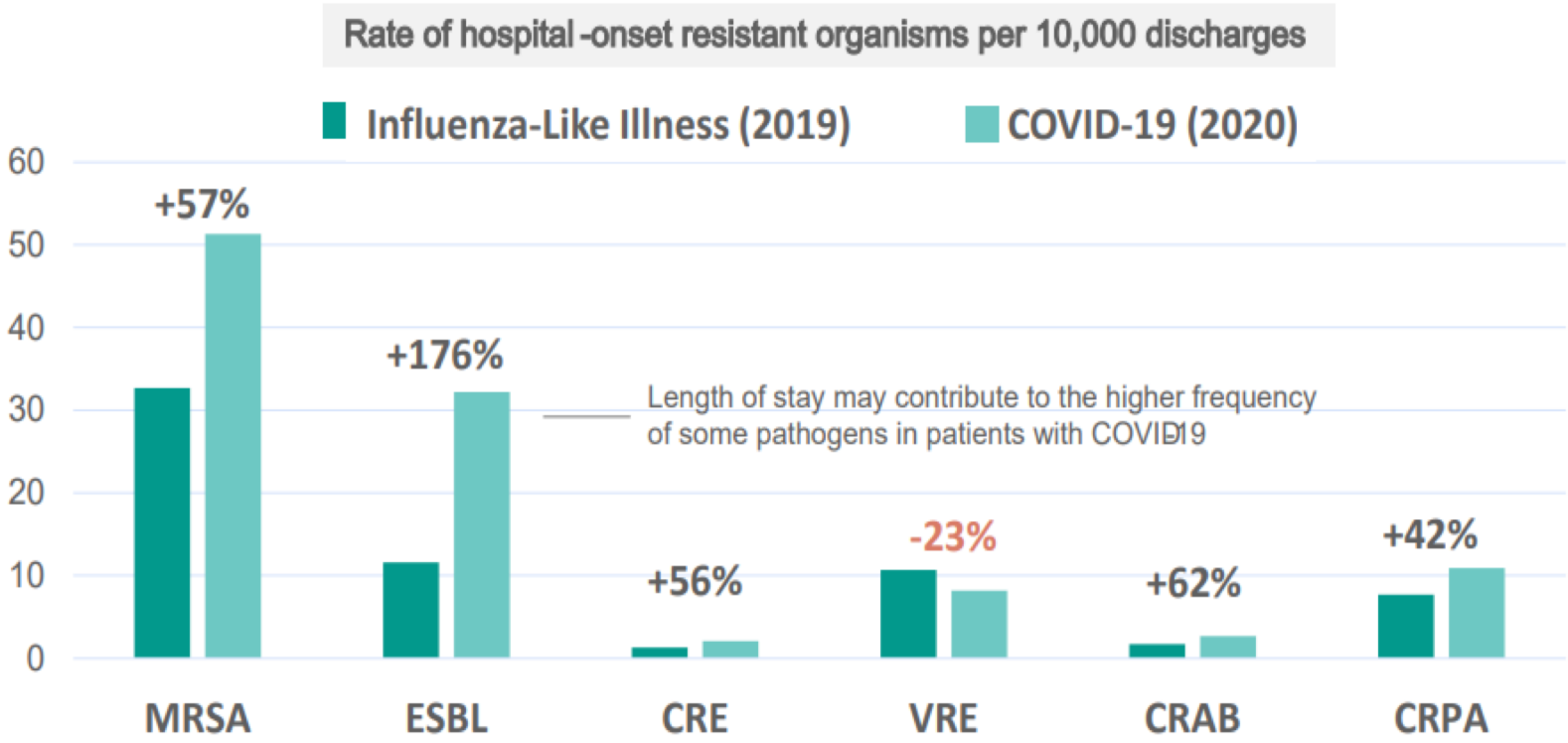
# Antibiotic-Resistant Pathogens in Hospitalized Patients: Hospital Onset

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# Comparison of Flu and COVID-19 Discharges

| | Patients with Influenza-Like Illness (Jan-March 2019) | Patients with COVID-19 (Jan-June 2020) |
|---|---|---|
| Mean length of stay | 5.88 days | 8.44 days |
| Discharges with bacterial/fungal culture | 55.8% | 65.1% |
| Discharges with a positive culture with a susceptibility result | 12.4% | 11.9% |

**Influenza-Like Illness Definition:** A hospitalization with a discharge during January 1, 2019-March 30, 2019, and any of the following ICD-10-CM codes: B97.89, H66.9, H66.90, H66.91, H66.92,H66.93, J00, J01.9, J01.90, J06.9, J09.X, J10.X, J11.X, J12.89, J12.9, J18, J18.1, J18.8, J18.9, J20.9, J40, R05, R50.9

**COVID-19 Definition:** An ICD-10-CM code of U07.1 (confirmed) with a discharge date April–June 2020 or ICD-10-CM code of B97.29 (suspected) with a discharge date March–June, 2020, and admission dates January–June 2020

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# Antibiotic Stewardship Strategies in COVID-19

**Educate providers about how to identify signs and symptoms of severe COVID-19 and those of a superimposed or co-infection with a bacterial or fungal disease**

- Findings that increase the concern for bacterial superinfection:  rise in leukocyte counts, lobar consolidation or evidence of necrotizing infection on chest imaging, and recurrence of fever after initial temperature decrease
- Fungal superinfection (with Aspergillus) is a concern, but the incidence has not been defined
- Risk factors for fungal superinfection include steroid use, invasive catheters and prolonged mechanical ventilation

Getahun H et al. *Bull World Health Organ.* 2020;98:442–442A.
CDC and IDSA. Co-infection and Antimicrobial Stewardship website. Updated Jan 2021.

# Antibiotic Stewardship Strategies in COVID-19

**Eliminate unnecessary antibiotic use via daily de-escalation**

**Evaluate the need for medical devices and invasive catheters that increase the chances of developing healthcare-associated infections and the urge to utilize antibiotics**

**Identify and implement strict infection prevention and control measures**

Getahun H et al. *Bull World Health Organ.* 2020;98:442–442A.

# Key Takeaways

- Healthcare infection control and antimicrobial stewardship are critical components for our fight against antibiotic resistance and COVID-19 infections
- Unclear whether COVID-19 patients are more susceptible to bacterial or fungal infections, however, AR infection outbreaks have been observed in some hospitals (ex: *C. auris* in Florida, CRAB in New Jersey)
- Long-term studies are needed to assess the impact of the increase in antibiotic use during COVID-19 pandemic on the hospital flora, and how this might affect future nosocomial infection and antimicrobial resistance trends worldwide