The Intersection of Antibiotic Resistance (AR), Antibiotic Use (AU), and COVID-19

for the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria

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CDC AR Investments Support U.S. through Pandemic

- **500+ experts** in infection prevention and control, HAI, AR, laboratorians responding domestically
- **AR Lab Network in 50 states, several cities, territories** to provide COVID testing and identify AR outbreaks
- Data collection systems, like the National Healthcare Safety Network, **gather COVID-19 and AR data**
- CDC **antibiotic stewardship tools** for frontline workers
- Infection control **experts responding globally** to COVID-19
- Building on foundational innovations for AR **sewage surveillance** to detect COVID-19 in wastewater
- **Leverage antibiotic stockpile** for continuity of TB treatment due to drug shortages

CDC funding 2016-2020:

$373M+
across 59 state & local health departments for detection/prevention

Nearly $115M
to 100+ institutions for innovations, therapeutics and diagnostics

Key Takeaways

- **Healthcare infection control is critical to fighting AR and SARS-CoV-2 infections**
  - No clear evidence that COVID-19 patients are more susceptible to bacterial/fungal infections—similar frequency as patients with influenza-like illness (ILI). **However, we are seeing sporadic outbreaks of AR infections in COVID units & higher rates of hospital onset infections**
  - COVID-19 creates perfect storm for AR infections **in healthcare settings:** length of stay, crowding, sick patients, antibiotic use, infection control issues
- **Antibiotic use fluctuated, appears stable but remains too high**
  - Hospitals: Spiked in early 2020 but flattened as pandemic continued
  - Outpatient, nursing homes: Significant drops from previous years
- Highlights continued importance of infection control and antibiotic stewardship—**both are dependent on the resiliency of these programs**

About Data Shown Today

- **Preliminary data provide the largest snapshot to date** about relative burden of AR infections & antibiotic use 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 & 2+ million hospital discharges**
  - **2 data systems:** National Healthcare Safety Network and Premier Healthcare Database
- Outpatient data reflect:
  - National estimates based on IQVIA data from **92% of retail prescriptions**
- Nursing home data reflect:
  - Pharmacy info based on PharMerica data from **1,900 U.S. nursing homes**

Comparison of Flu & COVID-19 Discharges

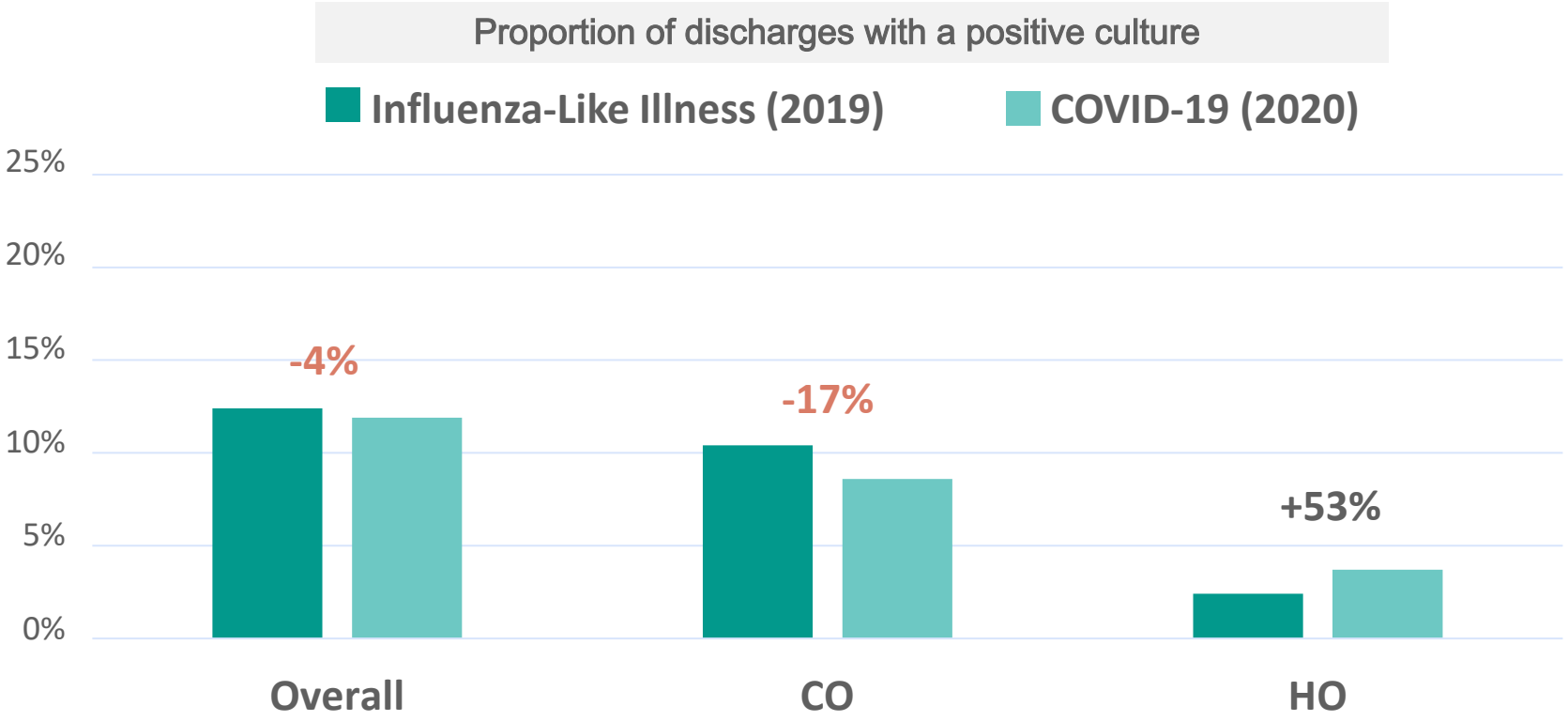
	Patients with Influenza-Like Illness (Jan-March 2019)	Patients with COVID-19 (Jan-June 2020)
Mean length of stay	5.88 days	8.44 days
Discharges with bacterial/fungal culture	55.8%	65.1%
Discharges with a positive culture with a susceptibility result	12.4%	11.9%

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

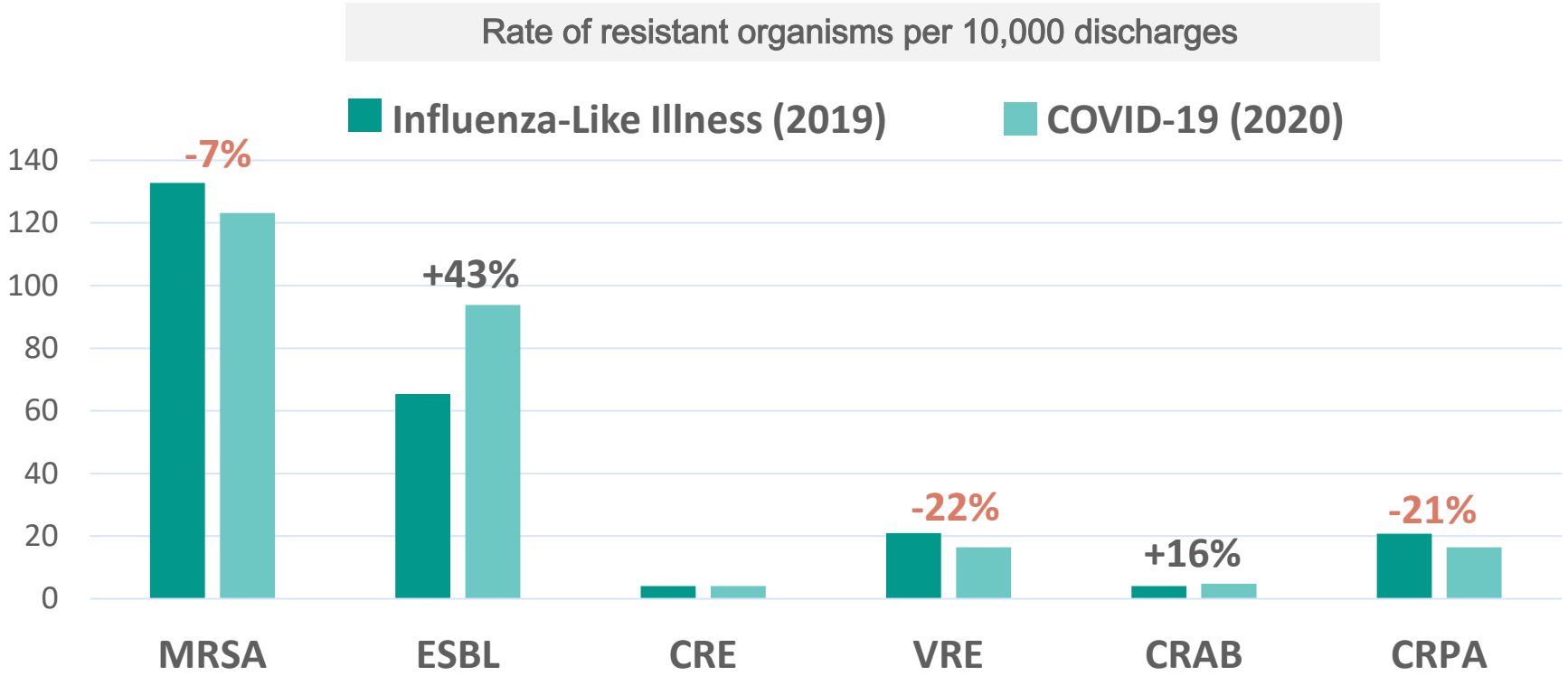
COVID-19 Definition: An ICD-10-CM code of U07.1 (confirmed) with a discharge date April–June 2020 or ICD-10-CM code of B97.29 (suspected) with a discharge date March–June, 2020, and admission dates January–June 2020

Data collected August 24, 2020

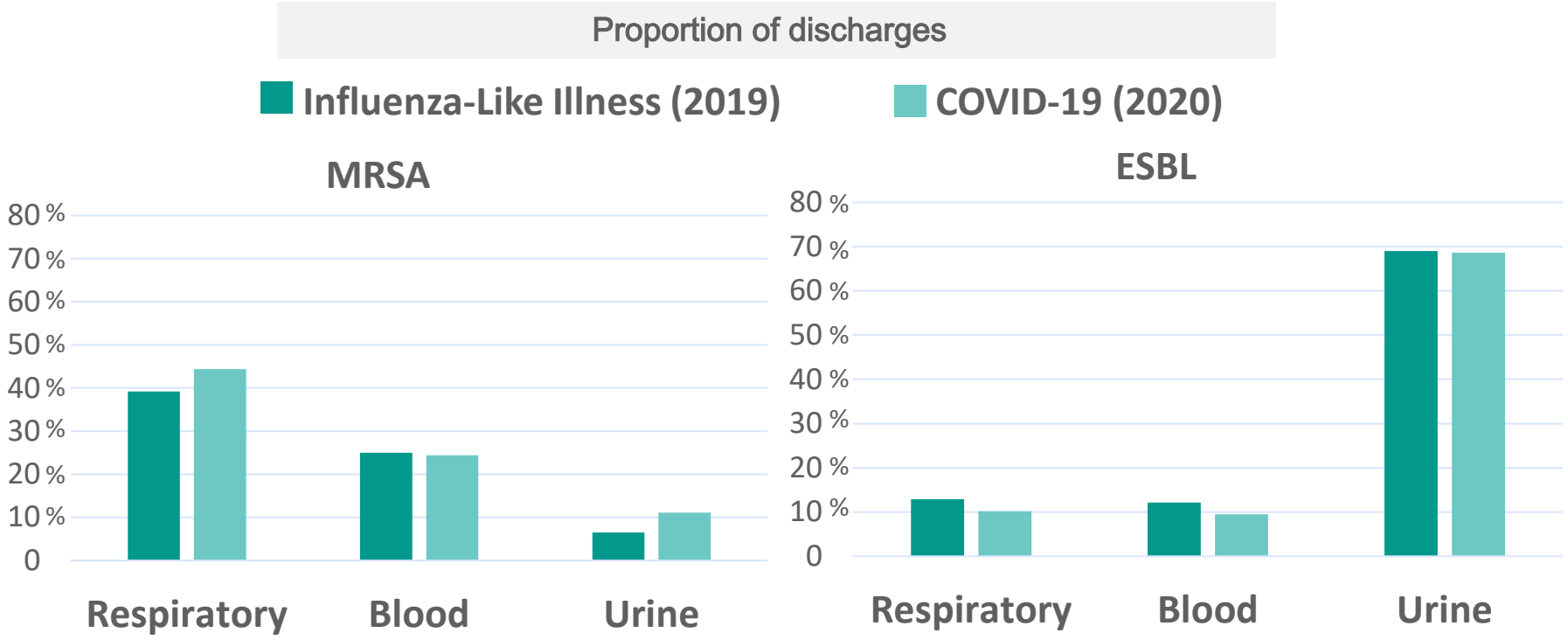
Cultures from Patients with COVID-19 and ILI Grew Organisms at Similar Frequency



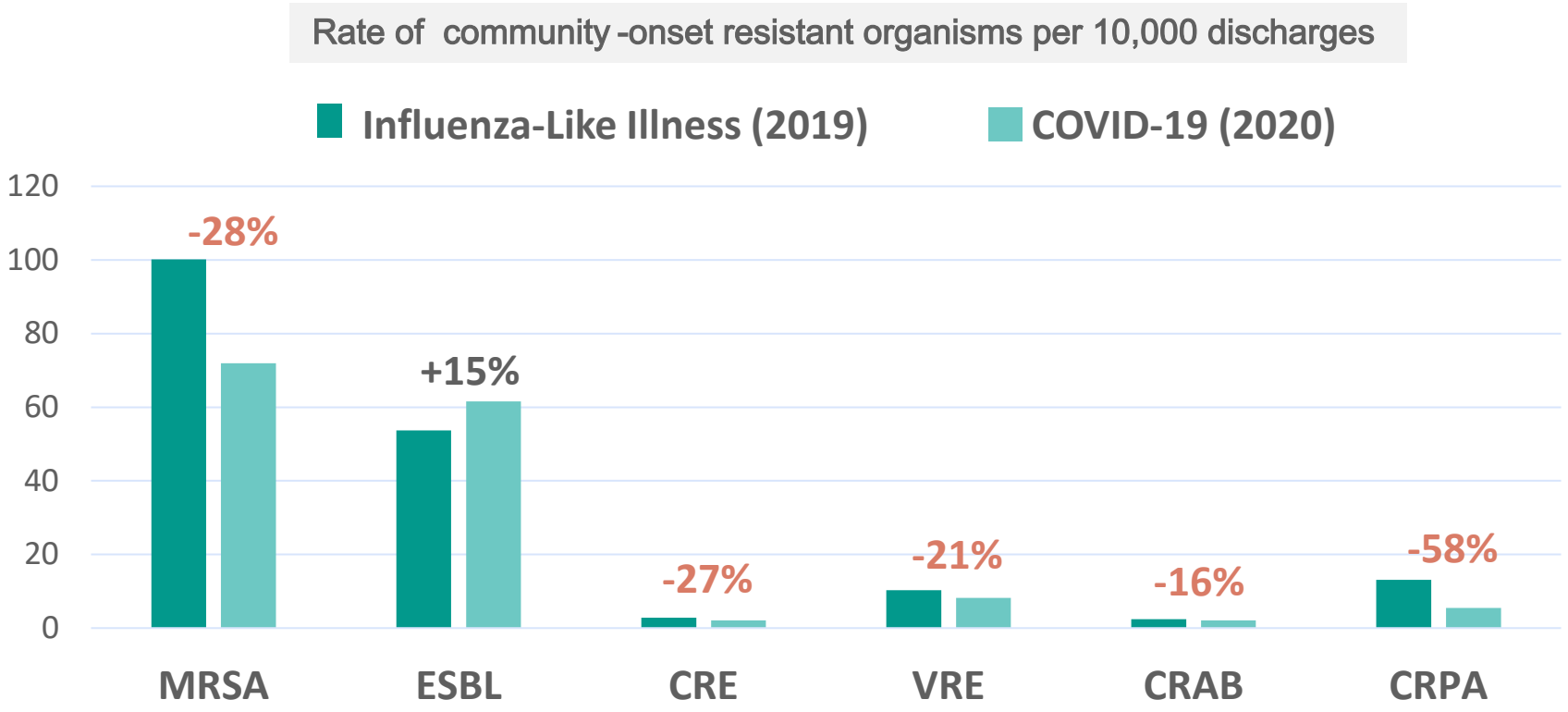
Antibiotic-Resistant Pathogens in Hospitalized Patients: Overall



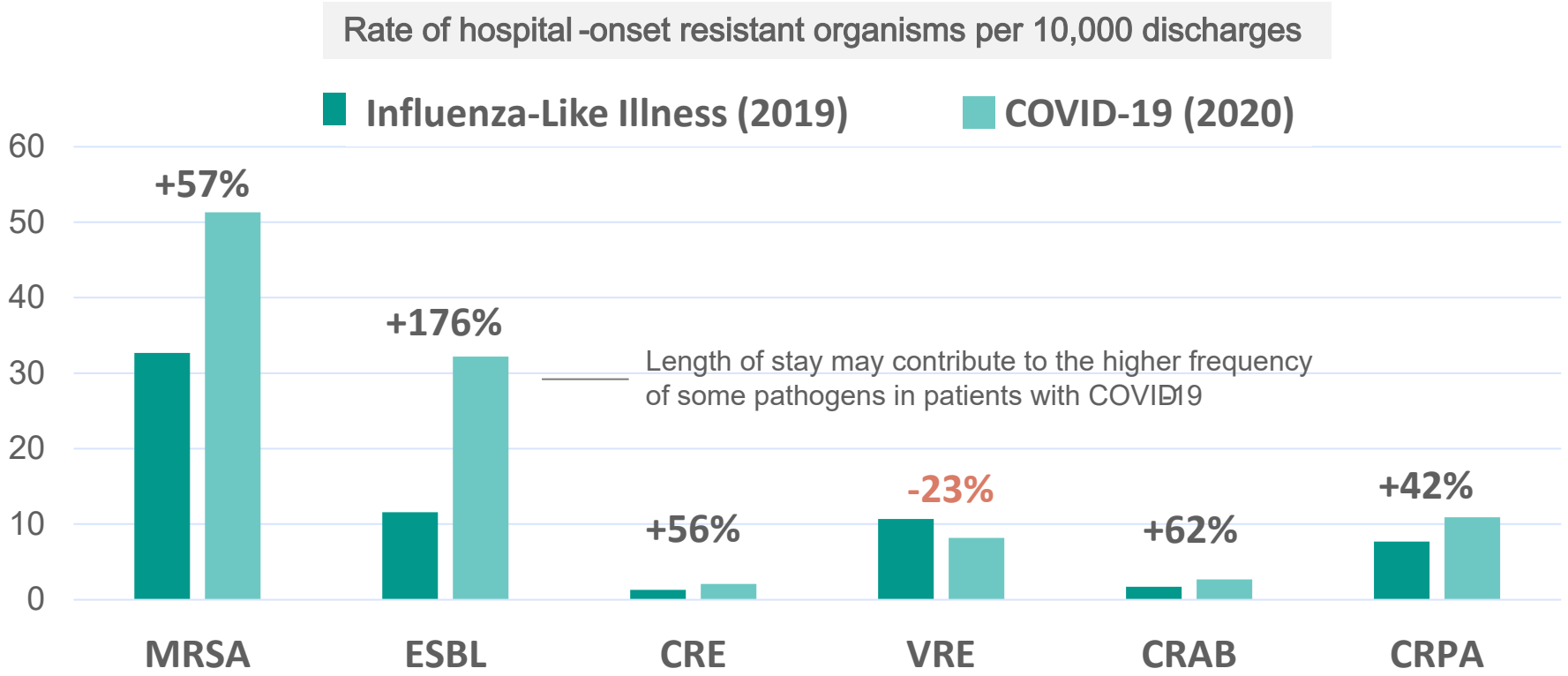
Specimen Types: Overall



Antibiotic-Resistant Pathogens in Hospitalized Patients: Community-Onset



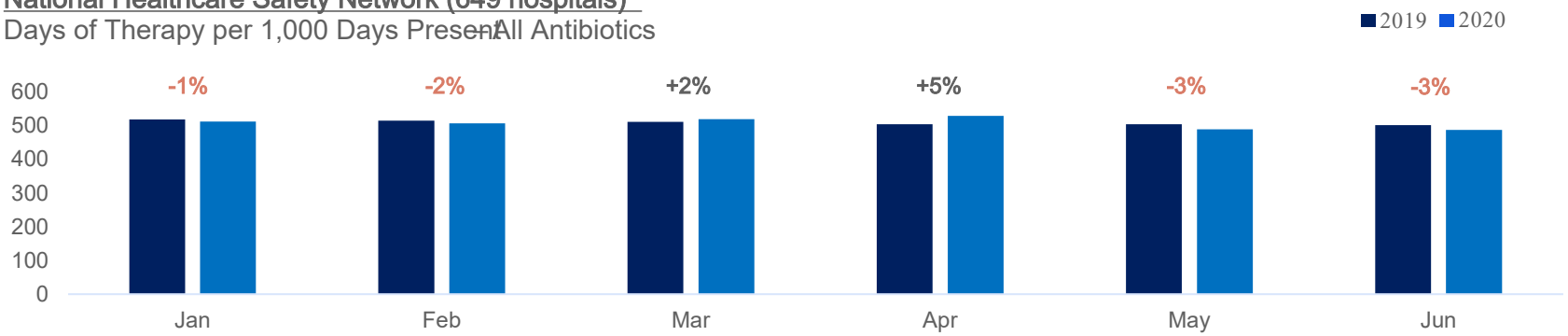
Antibiotic-Resistant Pathogens in Hospitalized Patients: Hospital-onset



Hospital Antibiotic Use: All Antibiotics

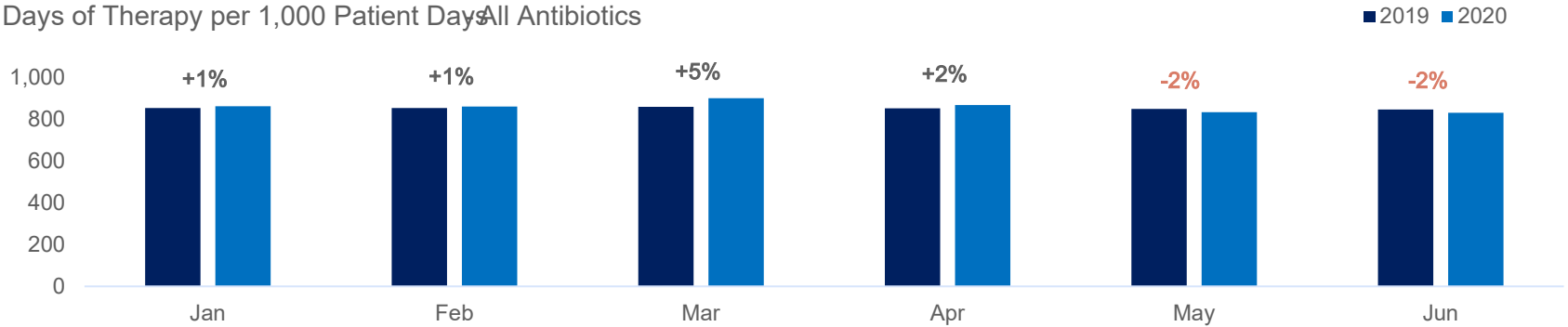
National Healthcare Safety Network (649 hospitals)

Days of Therapy per 1,000 Days Present: All Antibiotics



Premier Healthcare Database (516 hospitals)

Days of Therapy per 1,000 Patient Days: All Antibiotics



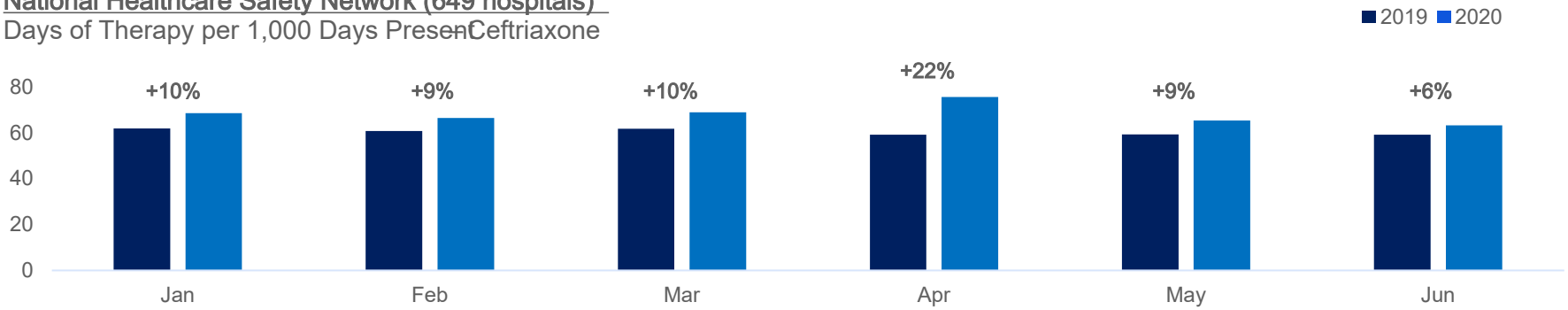
Note: NHSN AU days present denominator counts any portion of a day when a patient was hospitalized and thus is larger than the Premier patient day denominator, which counts 24-hour periods. **Preliminary unpublished analysis, please do not reproduce.**

Note: 25% drop in hospitalizations for March-June of 2020 vs 2019

Hospital Antibiotic Use: Ceftriaxone

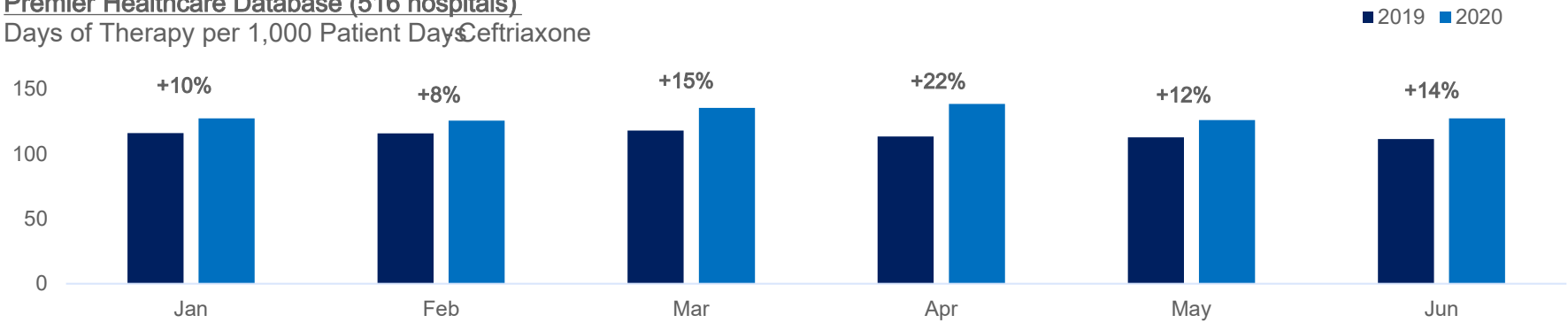
National Healthcare Safety Network (649 hospitals)

Days of Therapy per 1,000 Days Present: Ceftriaxone



Premier Healthcare Database (516 hospitals)

Days of Therapy per 1,000 Patient Days: Ceftriaxone



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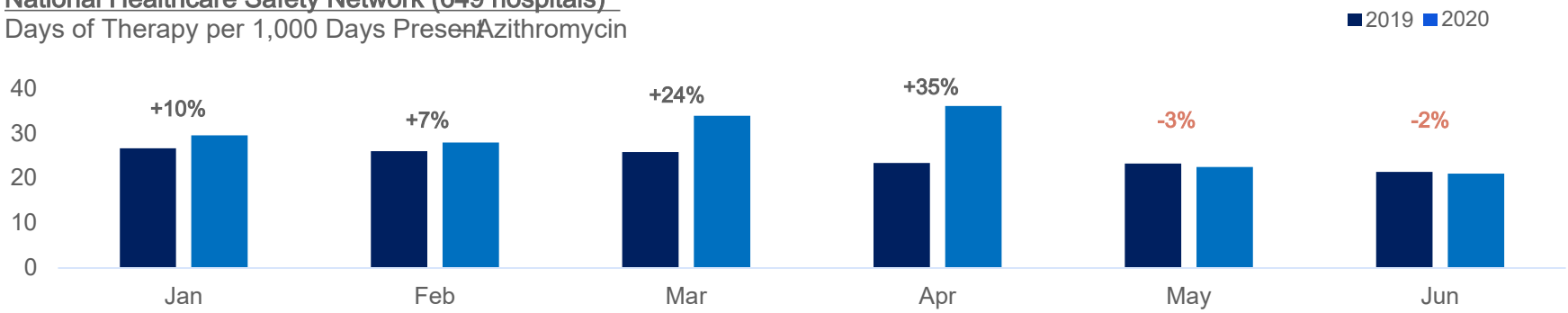
Hospital Antibiotic Use: Azithromycin

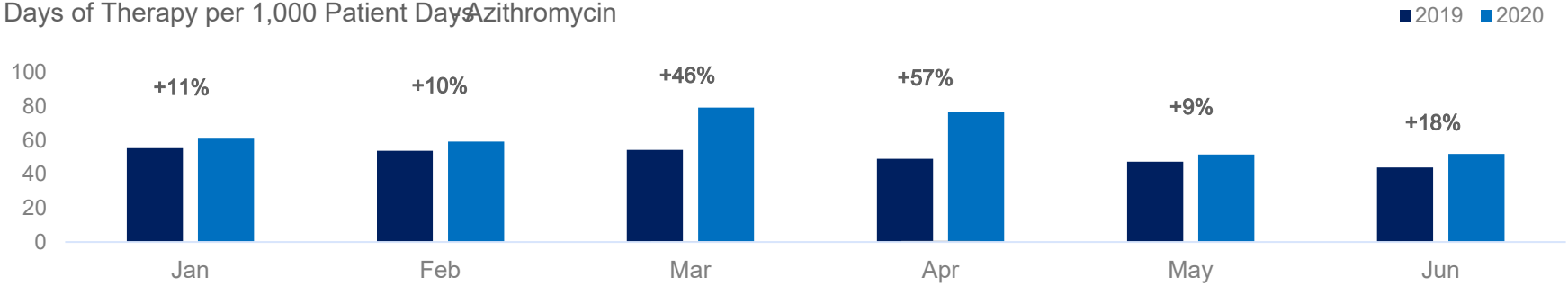
National Healthcare Safety Network (649 hospitals)

Days of Therapy per 1,000 Days Present: Azithromycin



Premier Healthcare Database (516 hospitals)

Days of Therapy per 1,000 Patient Days: Azithromycin



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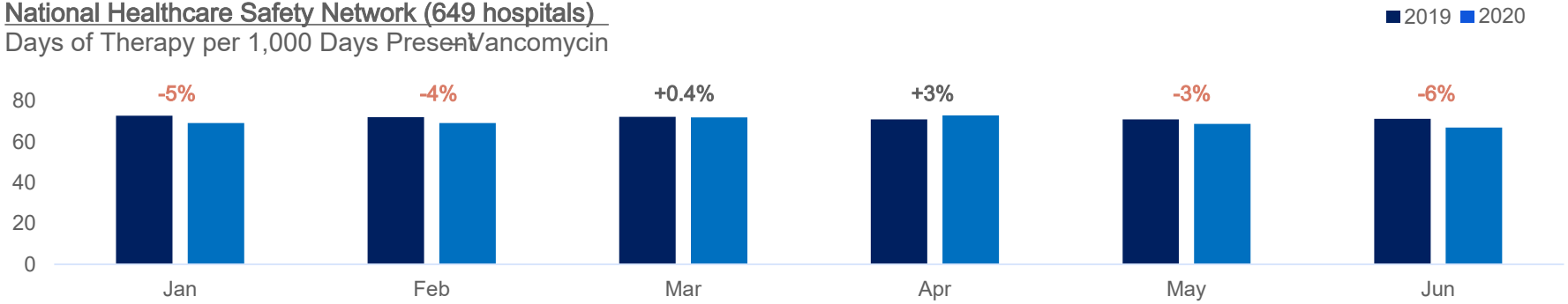
Hospital Antibiotic Use: Vancomycin

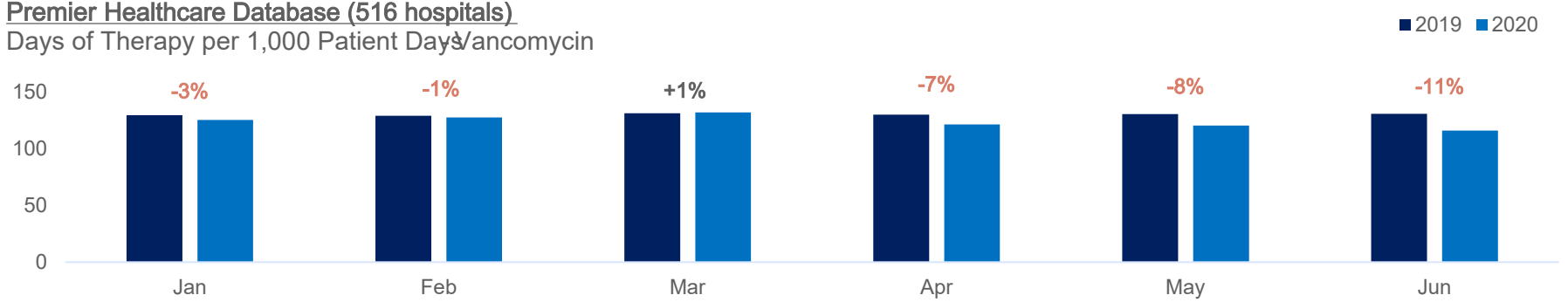
National Healthcare Safety Network (649 hospitals)

Days of Therapy per 1,000 Days Present: Vancomycin



Premier Healthcare Database (516 hospitals)

Days of Therapy per 1,000 Patient Days: Vancomycin



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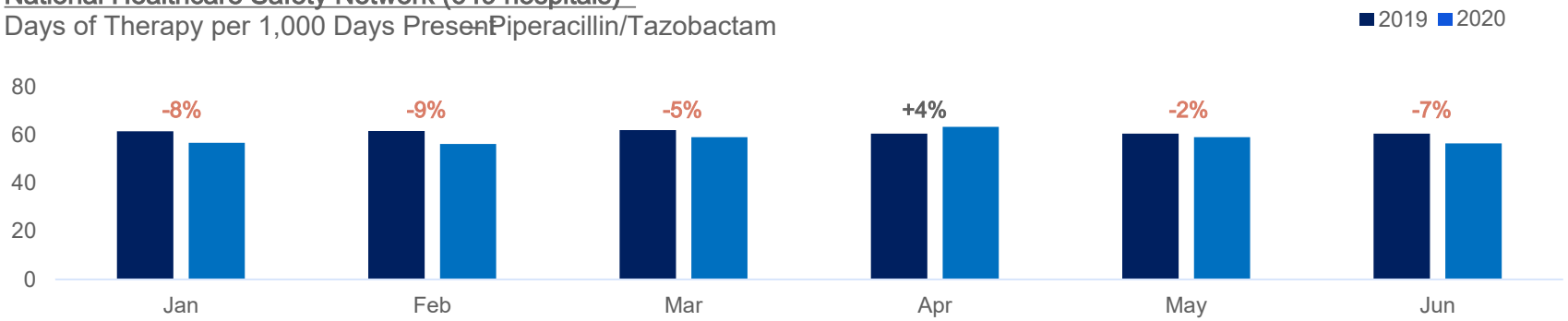
Note: 25% drop in hospitalizations for March-June of 2020 vs 2019

Hospital Antibiotic Use: Piperacillin/Tazobactam

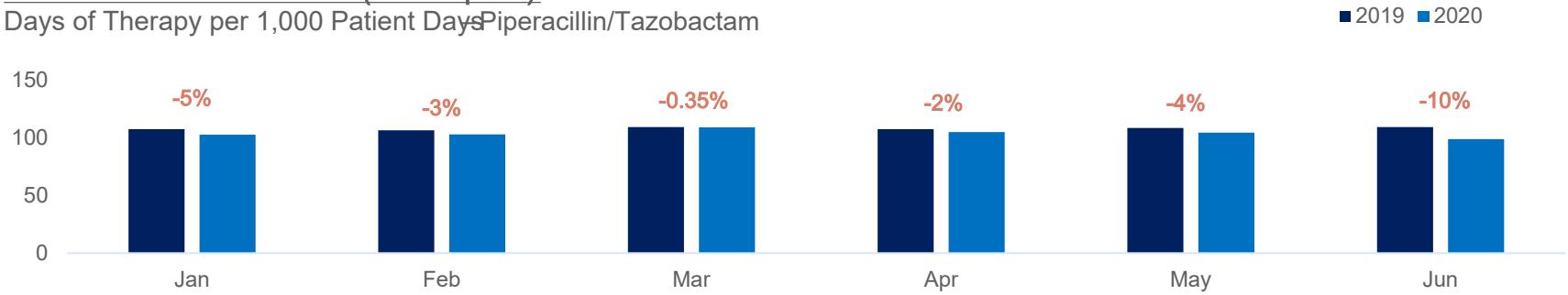
National Healthcare Safety Network (649 hospitals)

Days of Therapy per 1,000 Days Present: Piperacillin/Tazobactam



Premier Healthcare Database (516 hospitals)

Days of Therapy per 1,000 Patient Days: Piperacillin/Tazobactam



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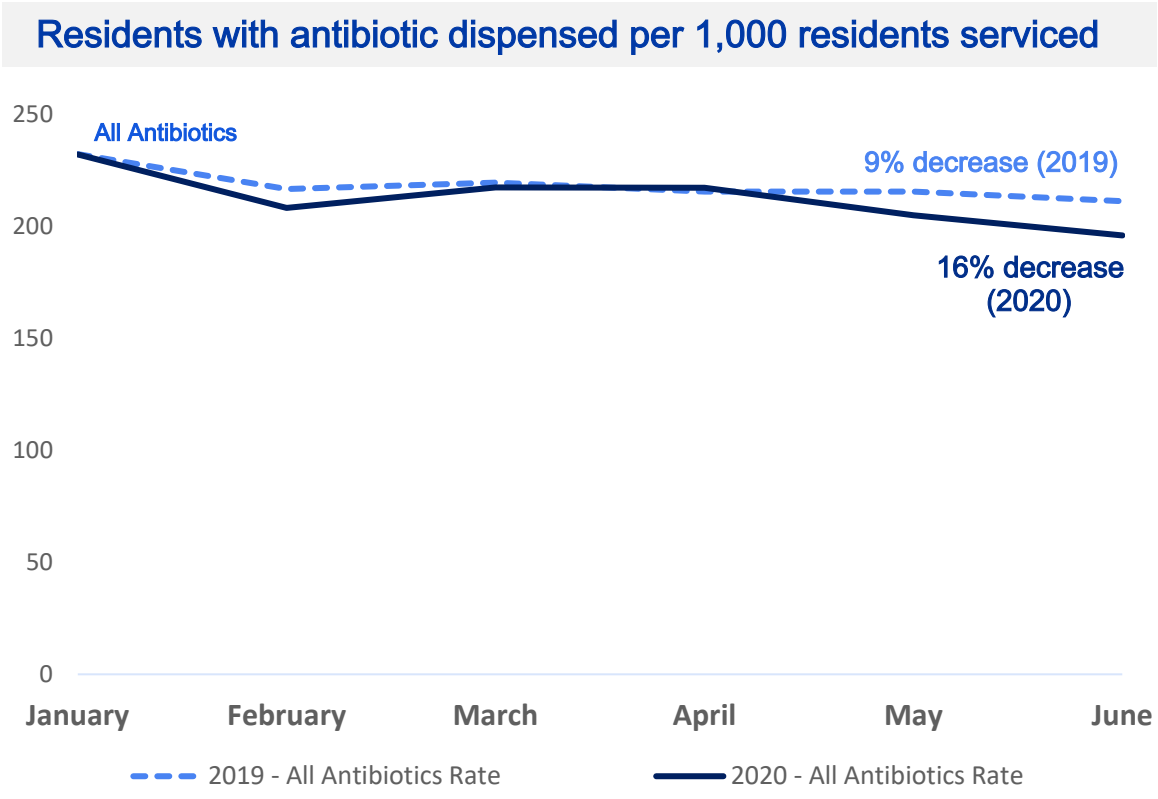
Note: 25% drop in hospitalizations for March-June of 2020 vs 2019

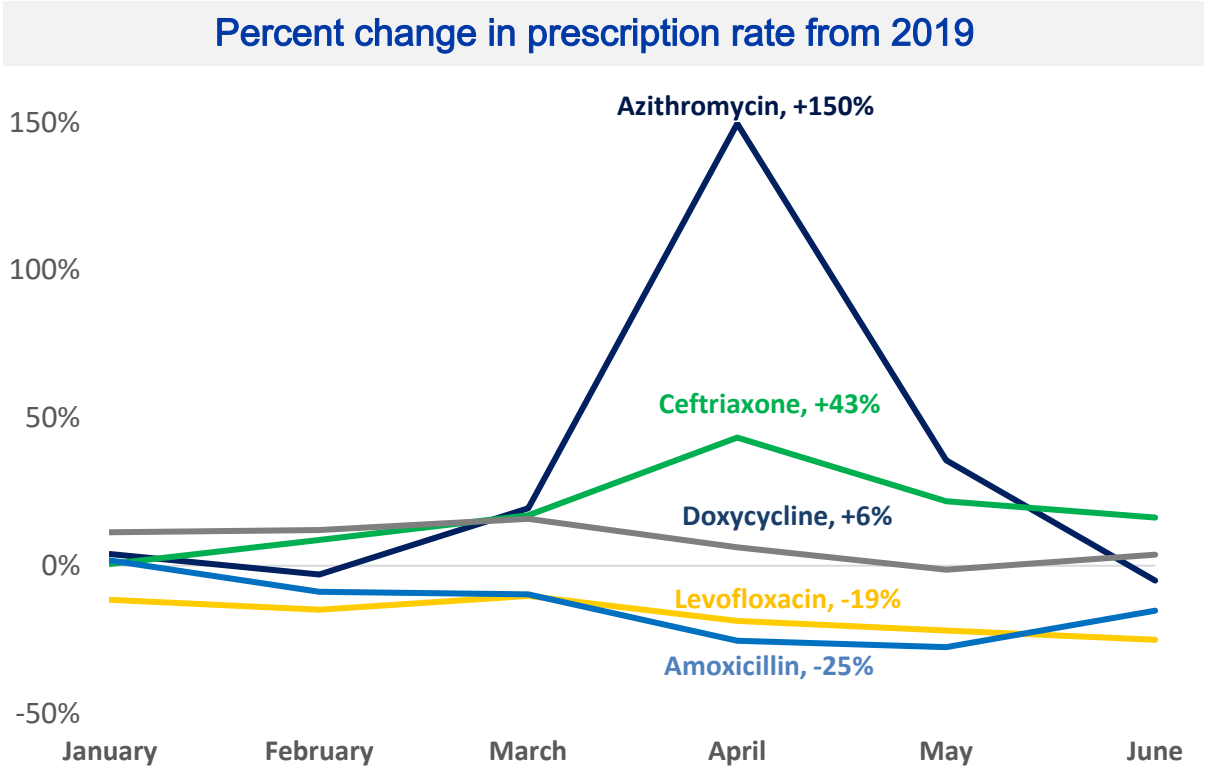
Decrease in Nursing Home Antibiotic Dispense Rates

- Long-term care pharmacy prescription dispense data from over 1,900 nursing homes
- Overall, antibiotic use rates **decreased 16%** during January-June 2020, compared with 9% decrease in 2019
- **Antibiotic use declined more than expected** for seasonal declines

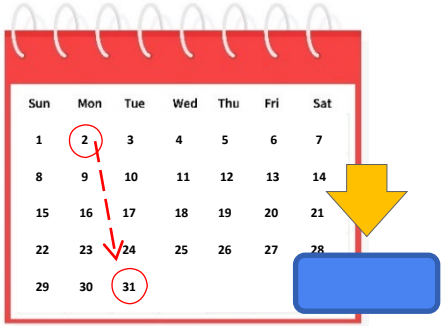


Higher Rates of Antibiotics Commonly Used for Respiratory Infections in Nursing Homes

- **Antibiotics higher** in April 2020 than 2019
  - Azithromycin
  - Ceftriaxone
  - Doxycycline
- **Antibiotics lower** in April 2020 than 2019
  - Levofloxacin
  - Amoxicillin



Early Published Data to Give Context to Outpatient Use



Emergency department **visits declined 41%-64%** during January-April 2020[1] and **42% year over year[2]**

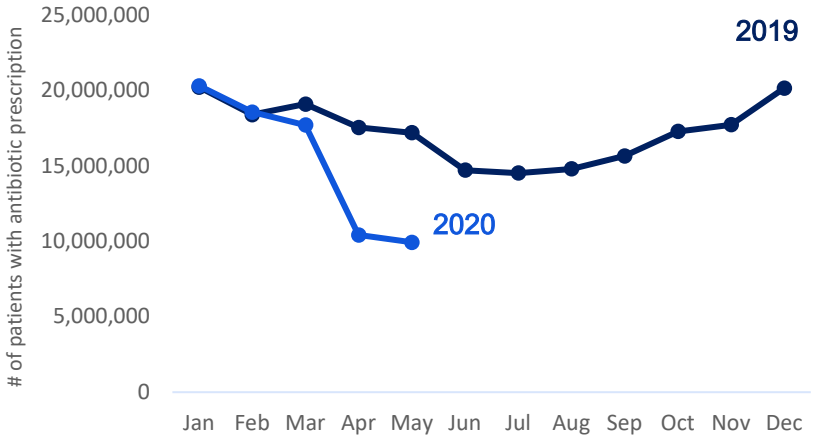
A convenience sample of 50,000+ outpatient providers shows **visits down 60% by the end of March** compared with its first week but have rebounded.[3]

1. Jeffery, M. M., et al. (2020). "Trends in Emergency Department Visits and Hospital Admissions in Health Care Systems in 5 States in the First Months of the COVID-19 Pandemic in the US." JAMA Intern Med
2. Hartnett KP, Kite-Powell A, DeVies J, et al. Impact of the COVID-19 Pandemic on Emergency Department Visits — United States, January 1, 2019–May 30, 2020. MMWR Morb Mortal Wkly Rep 2020;69:699–704. DOI: http://dx.doi.org/10.15585/mmwr.mm6923e1external icon
3. Mehrotra, A., et al. (2020, June 2020). "The Impact of the COVID-19 Pandemic on Outpatient Visits: Practices Are Adapting to the New Normal." from https://www.commonwealthfund.org/publications/2020/jun/impact-covid-19-pandemic-outpatient-visits-practices-adapting-new-normal

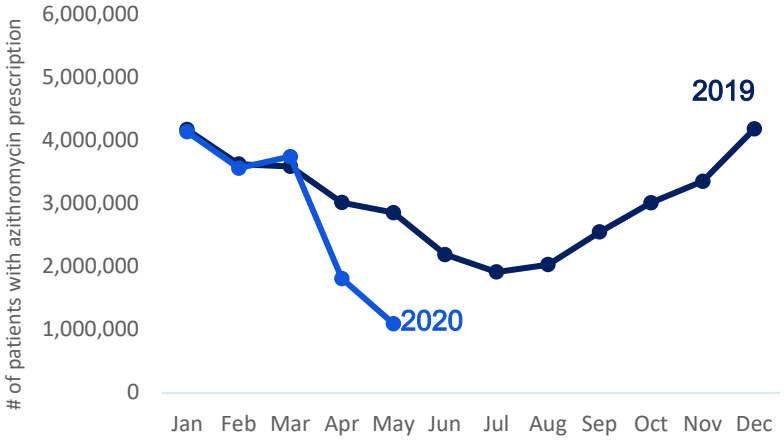
Outpatient Antibiotic Prescriptions Down

- National estimates projected from a sample covering 92% of all retail prescriptions
- Largest beyond seasonally-expected decreases in penicillins (mostly amoxicillin), then macrolides, cephalosporins, and beta-lactam agents
- Azithromycin prescribing in NY & NJ higher than seasonally-expected in March & April

Patients with antibiotic prescriptions dispensed from retail pharmacies for **all antibiotics decreased 42%** May 2019-May 2020



Patients with **azithromycin prescriptions decreased 62%** during May 2019-May 2020



Other Impacts from COVID-19

- Antibiotic **drug shortages,** with specific challenges for TB, STD
- Potential increased risk for MDR transmission and drop in surveillance cultures creates **challenges for MDRO outbreak identification and response**
- Closure of STD clinics, limited **healthcare access** during the pandemic might create long-term health issues
- Significant declines in **AR data reporting & lab surveillance** as staff are redirected
- Increased use of immune support could increase risks (e.g., **steroids and new therapeutics**)

96% of STD clinics experienced *SIGNIFICANT* or *COMPLETE* DISRUPTION

QUARTER 2 PULSENET submissions

>50%

More AR & COVID-19 Studies Coming from CDC

- Academic collaborations to better understand COVID-19 & **secondary infections**
- **International collaborations** to explore bacterial/fungal infections in COVID-19 patients in South America and Asia
- Deeper dive on **fungal infections** & COVID-19
- Evaluating **antibiotic use data** in COVID-19 patients in low- to middle-income countries
- Publications & additional studies from **preliminary data presented today including ongoing work on the increasing risk of ESBLs**

Future Implications for AR & COVID-19

- Continued emphasis of **healthcare infection prevention and control** in infectious disease transmission **cannot be overestimated**
  - Spread of pathogens can be contained and outbreaks can be prevented but we must ensure ongoing robust infection control training, continuity of PPE supply, support for frontline healthcare providers
- **Support greater resiliency in antibiotic resistance and antibiotic use programs** in healthcare and state/local health departments
  - Without resiliency, critical work will not happen as new threats emerge
- Continued gathering and analysis of AR and AU data from multiple sources like presented today is critically important as it allows resilience when some systems are impacted and provides a fuller picture of impact.

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Dawn Sievert
Minn Soe
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Sharon Tsay
Maroya Walters
Amy Webb
Hannah Wolford
Hsiu Wu

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

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- **Antibiotic use fluctuated, appears stable but remains too high**
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