THE INTERSECTION OF
Antibiotic Resistance (AR), Antibiotic Use (AU), and COVID-19

for the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria as of November 2021

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Proven prevention efforts should be expanded and sustained.

By 2025: CDC will invest $2.1 billion through the American Rescue Plan to enhance infection prevention and control across U.S. public health and health care.

With U.S. health departments and partners:

- Expand support to healthcare facilities to improve the quality of health care

- Assist healthcare workers in preventing infections, support rapid response to detect and contain infectious organisms

- Engage in innovations to combat infectious disease threats

- Support state-based nursing home and long-term care strike teams

- Address the rise of HAI / AR threats, which increased during the pandemic

Key Takeaways: AR Infections

- Healthcare infection control is critical to fight AR and COVID-19.

  - We continue to see higher rates of hospital-onset infections, including those caused by resistant organisms, and outbreaks of AR infections in COVID-19 units.

  - COVID-19 can create a perfect storm for AR infections in healthcare settings by increasing length of stay, patient volume and acuity, staffing shortages, and antibiotic use, plus creating challenges in implementing infection prevention and control.

- Many types of healthcare-associated infections have gone up dramatically during the pandemic, including MRSA bloodstream infections.

  - Many of the device-associated infections are caused by resistant pathogens.

- Findings highlight continued importance of healthcare infection control as one of the foremost tools needed to address emerging infectious diseases.

Key Takeaways: Antibiotic Use

- **Hospitals:** Increased use of some agents.
  - Overall increases in agents used to treat community acquired pneumonia (azithromycin/ceftriaxone).
  - No national increases in use overall or of broad-spectrum agents.

- **Outpatient:** Significant drop seen in 2020 is on the rise again.
  - Drop appears related to decrease in healthcare utilization in 2020.
  - Antibiotic prescribing decline seen in 2020 has rebounded near pre-pandemic levels.
  - Azithromycin use increases with higher numbers of COVID-19 cases.

- **Nursing Homes:** Increased use of some agents.
  - Increases in agents used to treat community acquired pneumonia (azithromycin/ceftriaxone).
  - Increases were largest early in the pandemic and subsequent increases were smaller, despite COVID-19 waves being larger.

About Data Shown Today

Preliminary data provide the largest snapshot to date about relative burden of AR infections and antibiotic use in U.S. patients with COVID-19.

Hospital data reflect:

- Infection data from **260+ hospitals and 14,000 hospital discharges**
- Antibiotic use data from approx. 750 hospitals
- **2 data systems:** CDC's National Healthcare Safety Network and Premier Healthcare Database

Outpatient data reflect:

- National estimates extrapolated from **92% of retail prescriptions** (IQVIA data)

Nursing home data reflect:

- Pharmacy info based on PharMerica data from **1,900 U.S. nursing homes**

Incidence of HAIs in 2020 and 2021, Compared to 2019

	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2*
CLABSI	–11.8%	27.9%	46.4%	47.0%	44.9%	14.0%
CAUTI	–21.3%	No change	12.7%	18.8%	10.7%	No change
VAE	11.3%	33.7%	29.0%	44.8%	50.5%	27.1%
MRSA	–7.2%	12.2%	22.5%	33.8%	39.3%	8.5%
C. difficile	–17.5%	–10.3%	–8.8%	–5.5%	–15.9%	–13.8%

For most of these infections, the increases seen in 2020 present a strong contrast to success seen prior to the pandemic in reducing the incidence of those infections.

*2021 Q2 data are preliminary
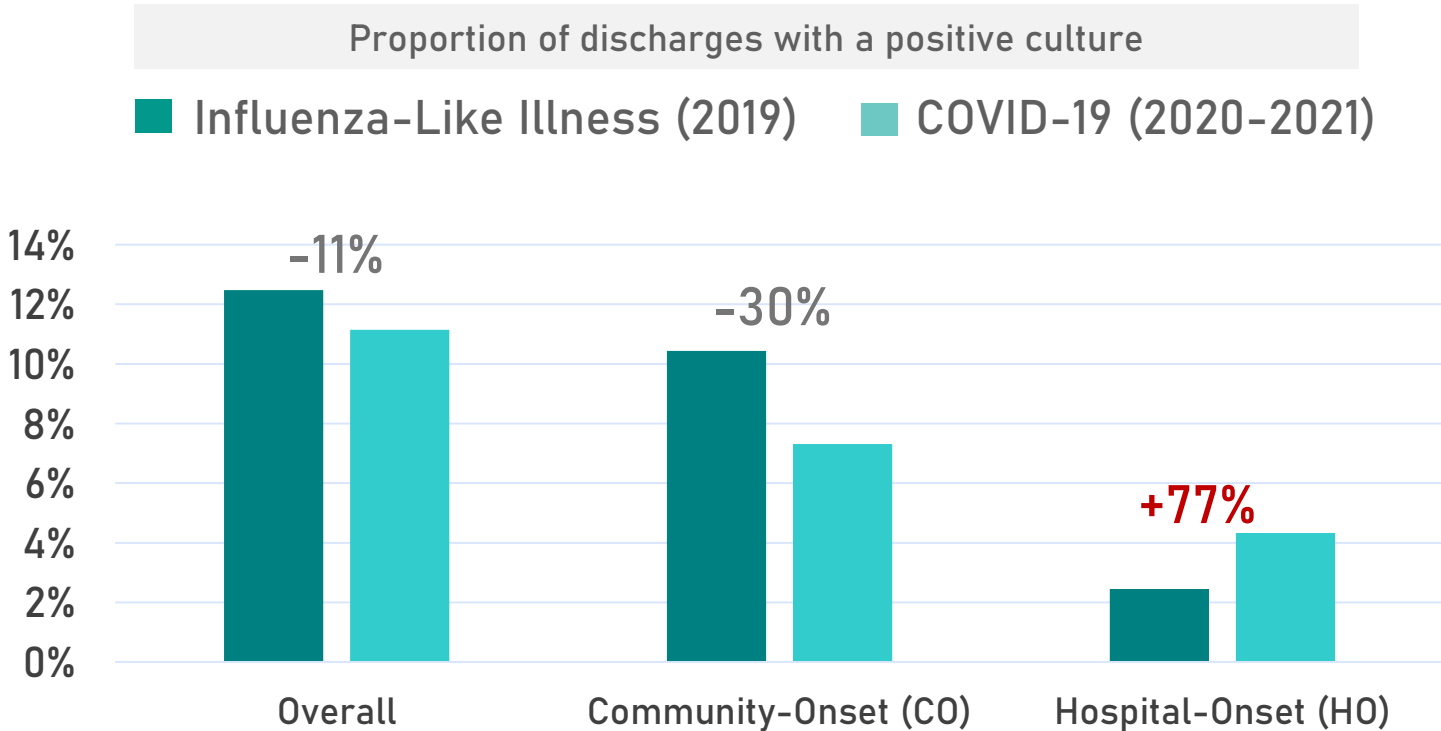
Comparison of Flu & COVID-19 Discharges

	Patients with Influenza-Like Illness (Jan-June 2019)	Patients with COVID-19 (Jan 2020-June 2021)
Mean length of stay	6.1 days	8.2 days
Discharges with bacterial/fungal culture	60.4%	58.5%
Discharges with an AR-positive culture with a susceptibility result	12.5%	11.1%

Influenza-Like Illness Definition: A hospitalization with a discharge during January 1, 2019-June 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 2020-June 2021 or ICD-10-CM code of B97.29 (suspected) with a discharge date March-April 2020, and admission dates February-April 2020

Data collected October 12, 2021

Cultures from Patients with COVID-19 and Influenza-Like Illness (ILI) Grew Organisms at Similar Frequency

Proportion of discharges with a positive culture

■ Influenza-Like Illness (2019)   ■ COVID-19 (2020-2021)

-11%   -30%   +77%

Overall   Community-Onset (CO)   Hospital-Onset (HO)

Antibiotic-Resistant Pathogens in Hospitalized Patients: Community-Onset

Rate of community-onset resistant organisms per 10,000 discharges
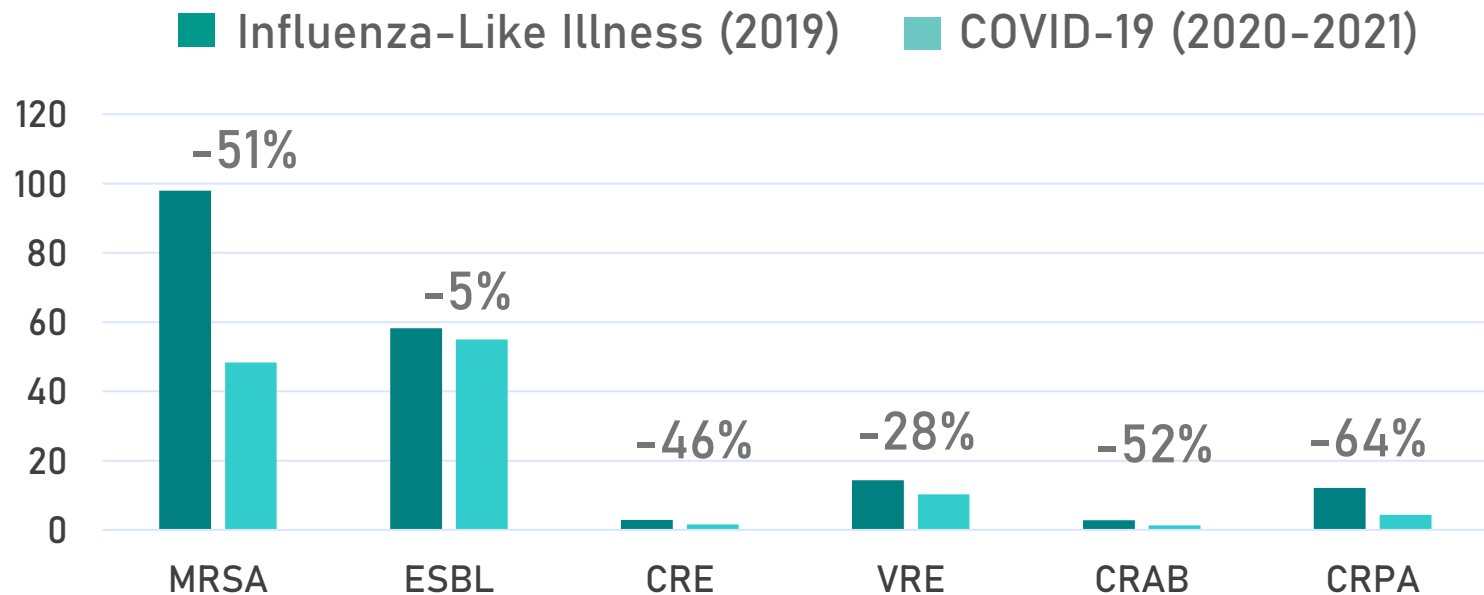
■ Influenza-Like Illness (2019)　　■ COVID-19 (2020–2021)

MRSA: Methicillin-resistant *Staphylococcus aureus*
ESBL: extended-spectrum beta-lactamases

CRE: carbapenem-resistant Enterobacterales
VRE: vancomycin-resistant enterococci

CRAB: carbapenem-resistant *A. baumannii*
CRPA: carbapenem-resistant *Pseudomonas aeruginosa*

Antibiotic-Resistant Pathogens in Hospitalized Patients: Hospital-Onset

Rate of community-onset resistant organisms per 10,000 discharges
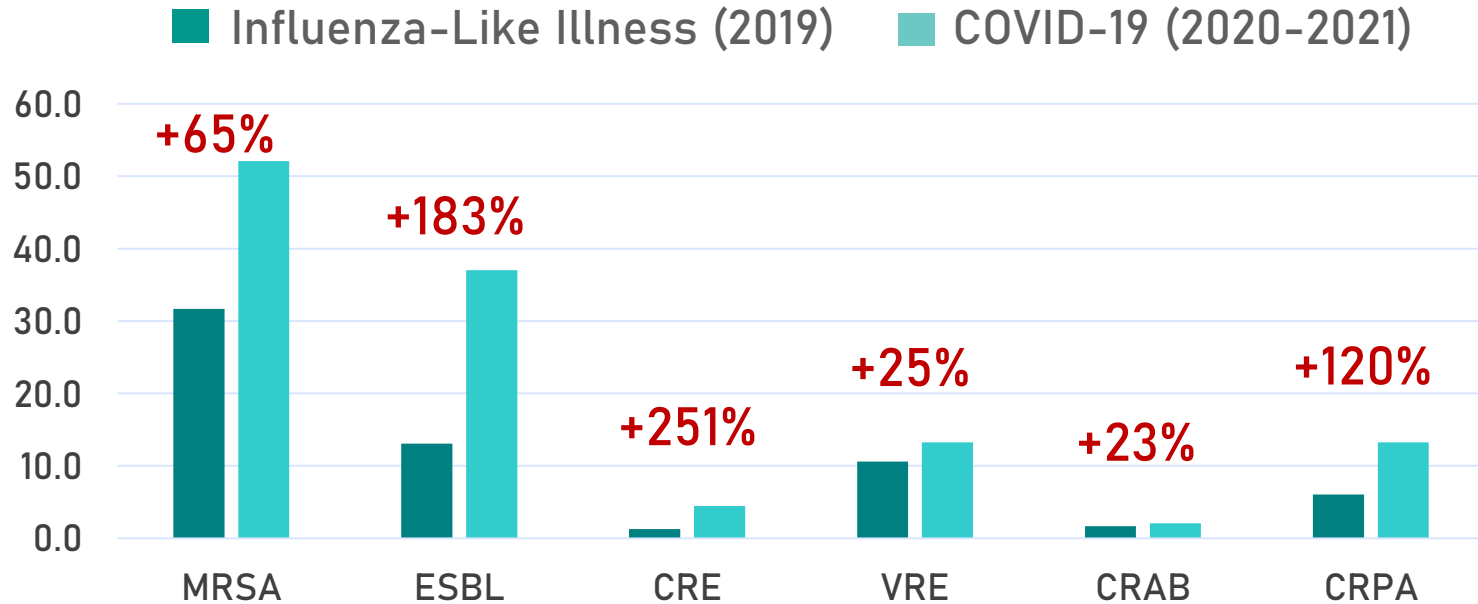
■ Influenza-Like Illness (2019)   ■ COVID-19 (2020-2021)

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# Antibiotic Use During the COVID-19 Pandemic:
HOSPITALS

Aggregate Hospital Antibiotic Use: All Antibacterial Agents, Compared to 2019
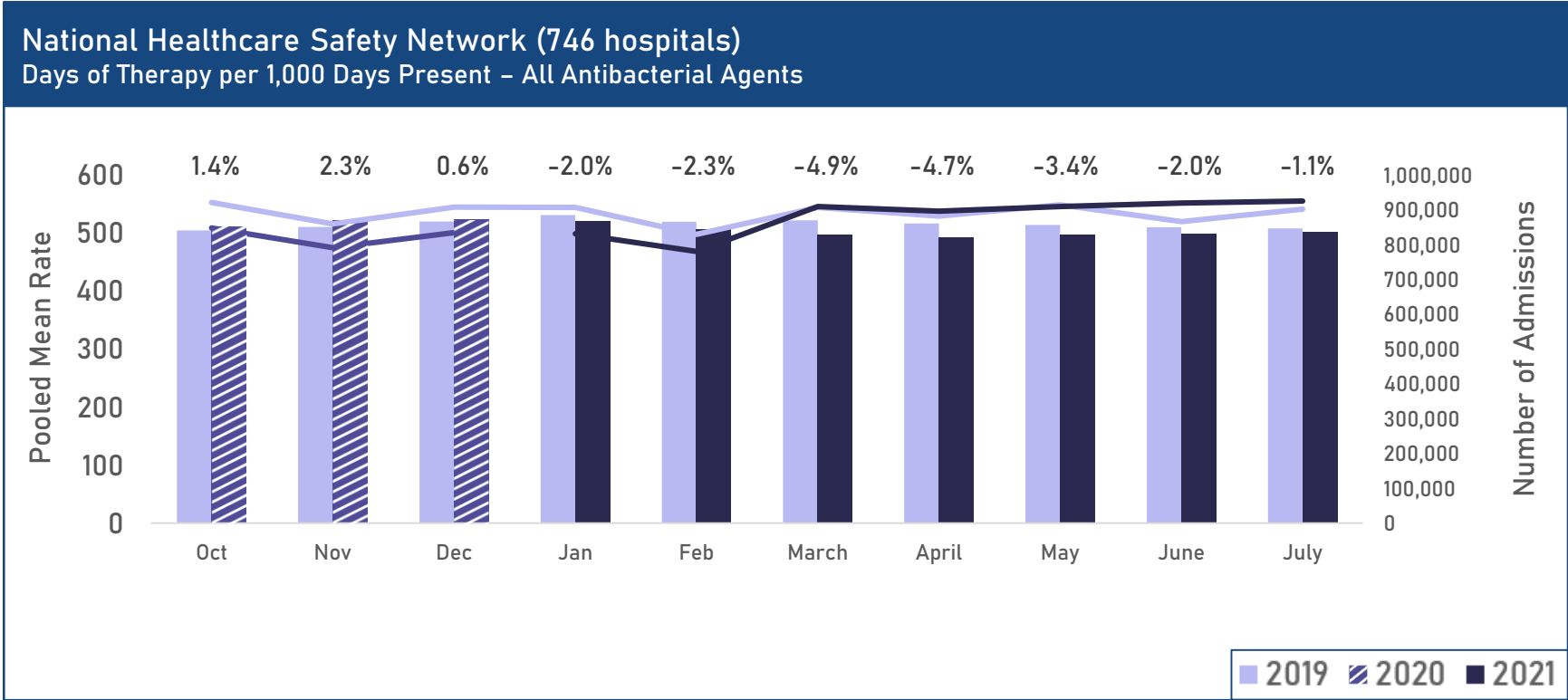
National Healthcare Safety Network (746 hospitals)
Days of Therapy per 1,000 Days Present – All Antibacterial Agents

Note: NHSN AU days present denominator counts any portion of a day when a patient was hospitalized. % indicates percent difference in pooled mean rates by year.
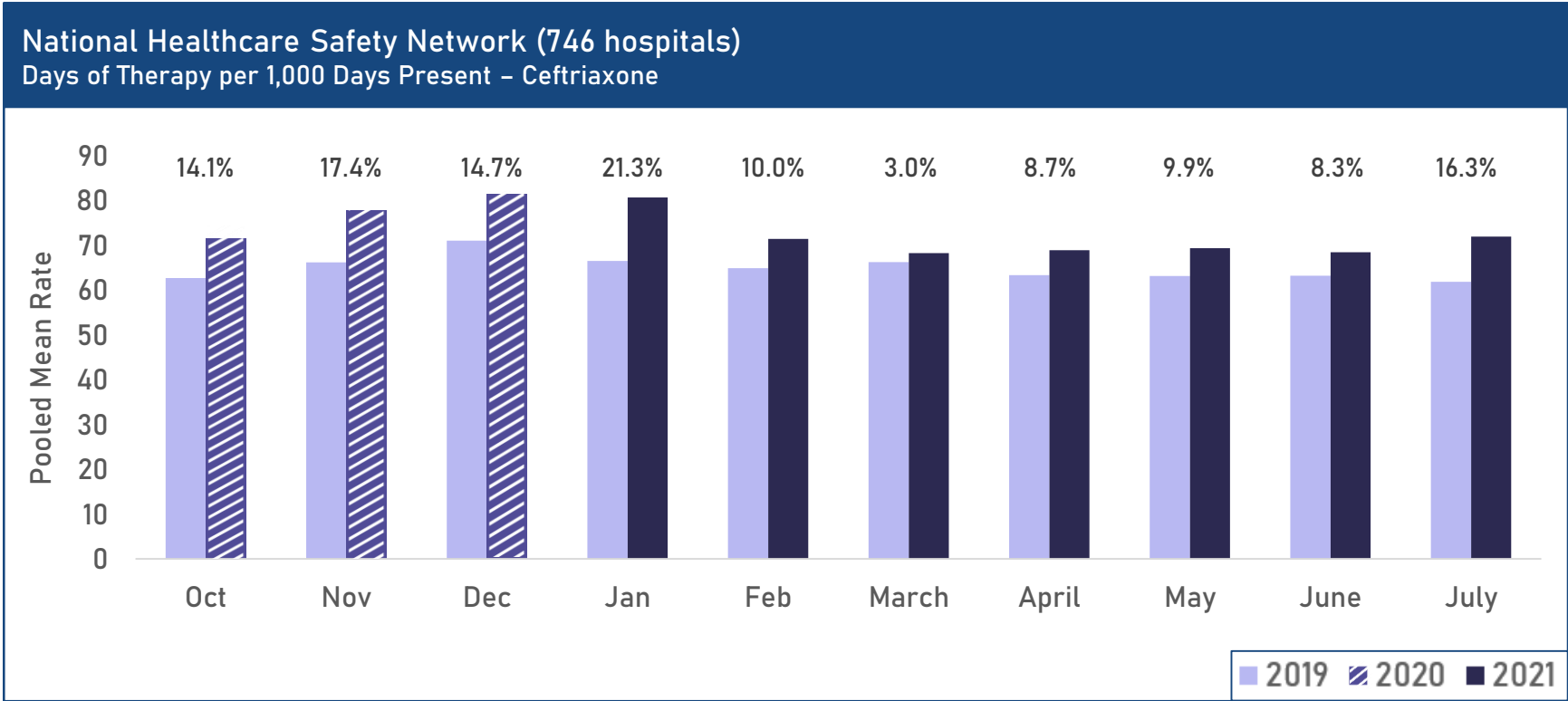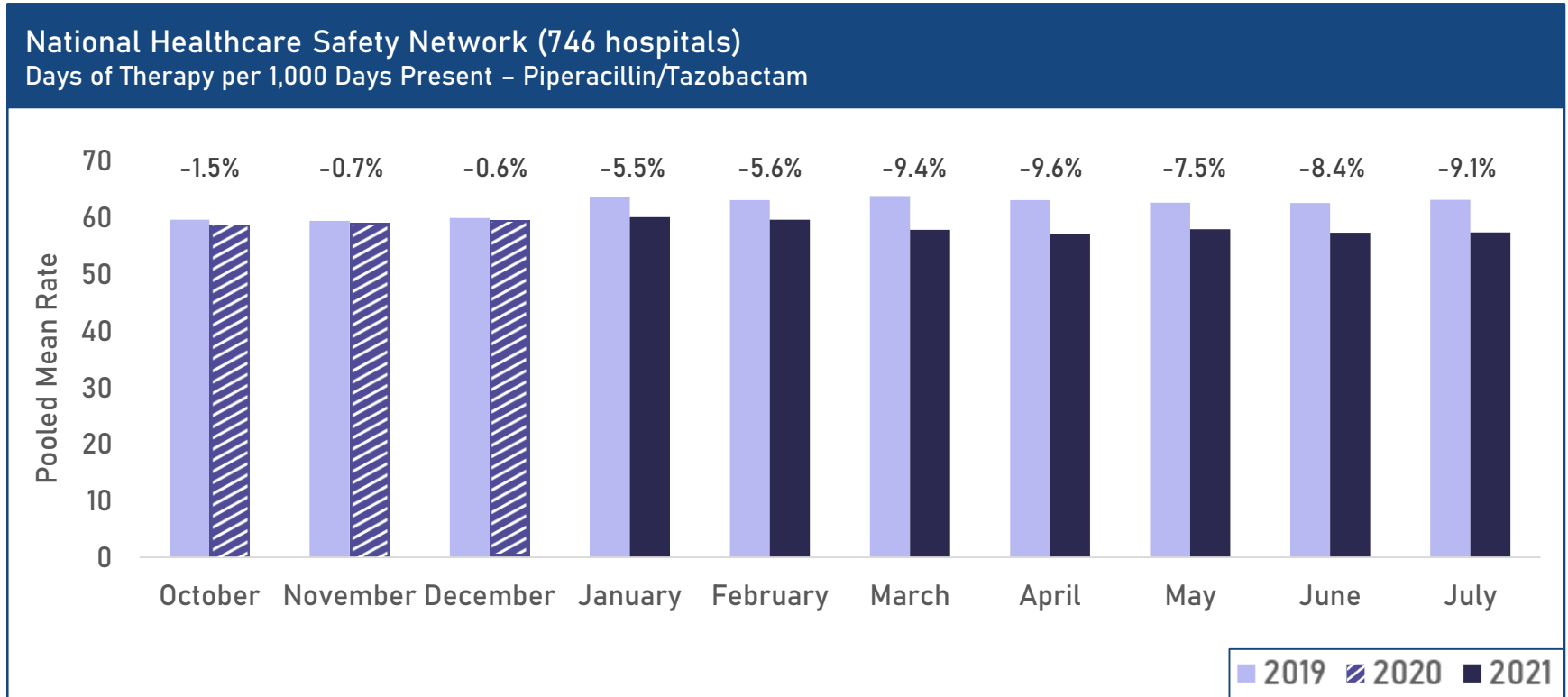
Aggregate Hospital Antibiotic Use: Azithromycin, Compared to 2019

National Healthcare Safety Network (746 hospitals)
Days of Therapy per 1,000 Days Present – Azithromycin
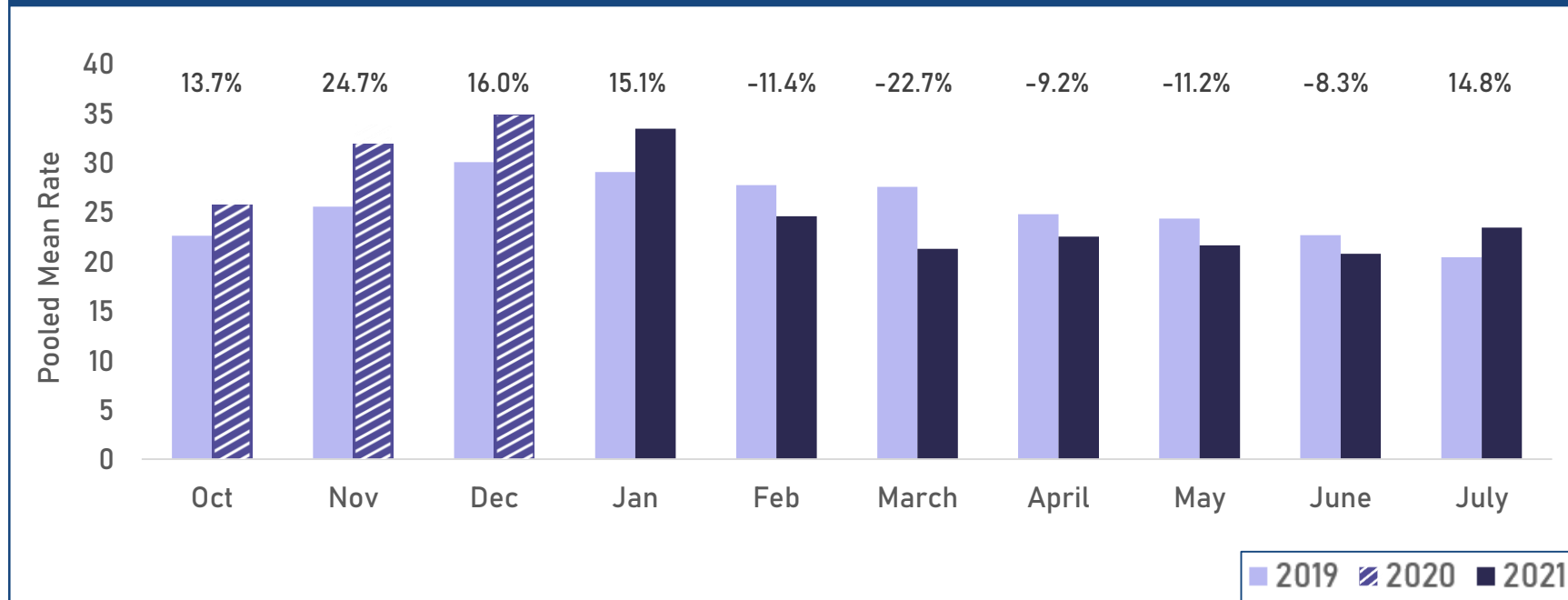
Note: NHSN AU days present denominator counts any portion of a day when a patient was hospitalized. % indicates percent difference in pooled mean rates by year.

Aggregate Hospital Antibiotic Use: Ceftriaxone, Compared to 2019

National Healthcare Safety Network (746 hospitals)
Days of Therapy per 1,000 Days Present – Ceftriaxone

	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July
%	14.1%	17.4%	14.7%	21.3%	10.0%	3.0%	8.7%	9.9%	8.3%	16.3%

Legend: 2019, 2020, 2021

Y-axis: Pooled Mean Rate

Note: NHSN AU days present denominator counts any portion of a day when a patient was hospitalized. % indicates percent difference in pooled mean rates by year.

Aggregate Hospital Antibiotic Use: Piperacillin/Tazobactam, Compared to 2019

National Healthcare Safety Network (746 hospitals)
Days of Therapy per 1,000 Days Present – Piperacillin/Tazobactam

Pooled Mean Rate

−1.5%	−0.7%	−0.6%	−5.5%	−5.6%	−9.4%	−9.6%	−7.5%	−8.4%	−9.1%
October	November	December	January	February	March	April	May	June	July

Legend: 2019, 2020, 2021

Note: NHSN AU days present denominator counts any portion of a day when a patient was hospitalized. % indicates percent difference in pooled mean rates by year.

Antibiotic Use During the COVID-19 Pandemic:
OUTPATIENT

National Monthly Outpatient Antibiotic Prescription Trends

Antibiotic prescriptions dispensed from retail pharmacies

August 2021

25% year-over-year increase

5% month-over-month increase (compared with 3% MOM decrease in August 2020)

COVID-19 pandemic

Y-axis: Number of Antibiotic Prescriptions — 0; 5,000,000; 10,000,000; 15,000,000; 20,000,000; 25,000,000; 30,000,000

X-axis: Sep-18, Nov-18, Jan-19, Mar-19, May-19, Jul-19, Sep-19, Nov-19, Jan-20, Mar-20, May-20, Jul-20, Sep-20, Nov-20, Jan-21, Mar-21, May-21, Jul-21
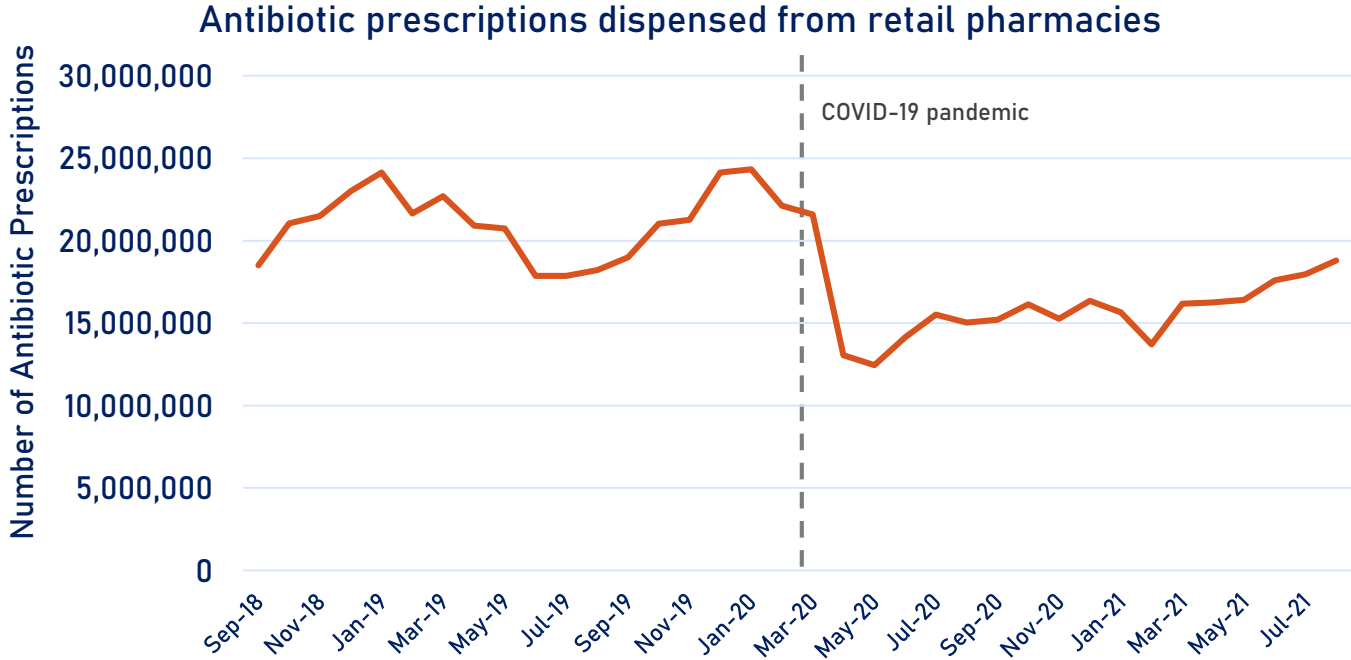
Source: IQVIA National Prescription Audit
Last update: October 8, 2021

National Monthly Outpatient Azithromycin Prescription Trends
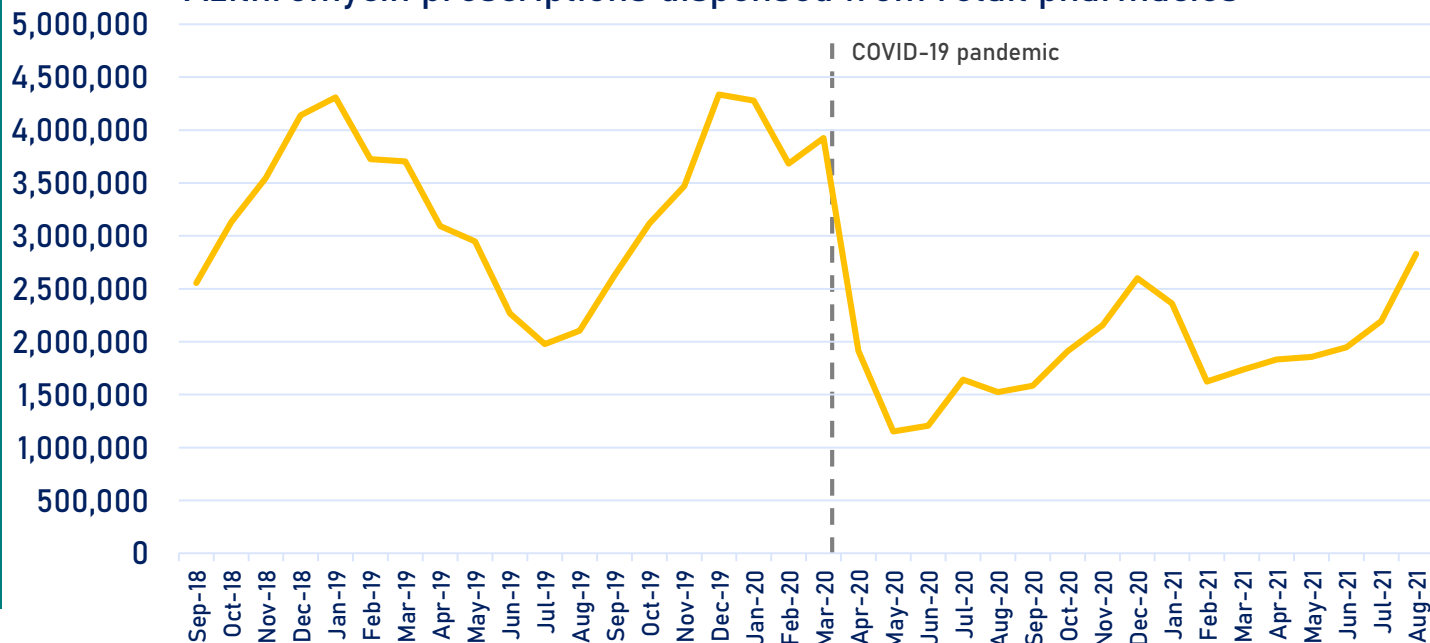
August 2021

86% year-over-year increase

29% month-over-month increase (compared with 7% MOM decrease in August 2020)

Azithromycin prescriptions dispensed from retail pharmacies

COVID-19 pandemic

Source: IQVIA National Prescription Audit
Last update: October 8, 2021

Outpatient Antibiotic Prescriptions Track with COVID-19 Cases and Visits Among Adults > 65 Years of Age

% visits: 25.7 17.5 20.6 29.3 29.7 30.9 33.3 33.1 31.9 30.7 27.1 24.3 25.4

Legend: Antibiotics within 7 days · Visits with COVID-19 · COVID-19 cases in adults 65+ years
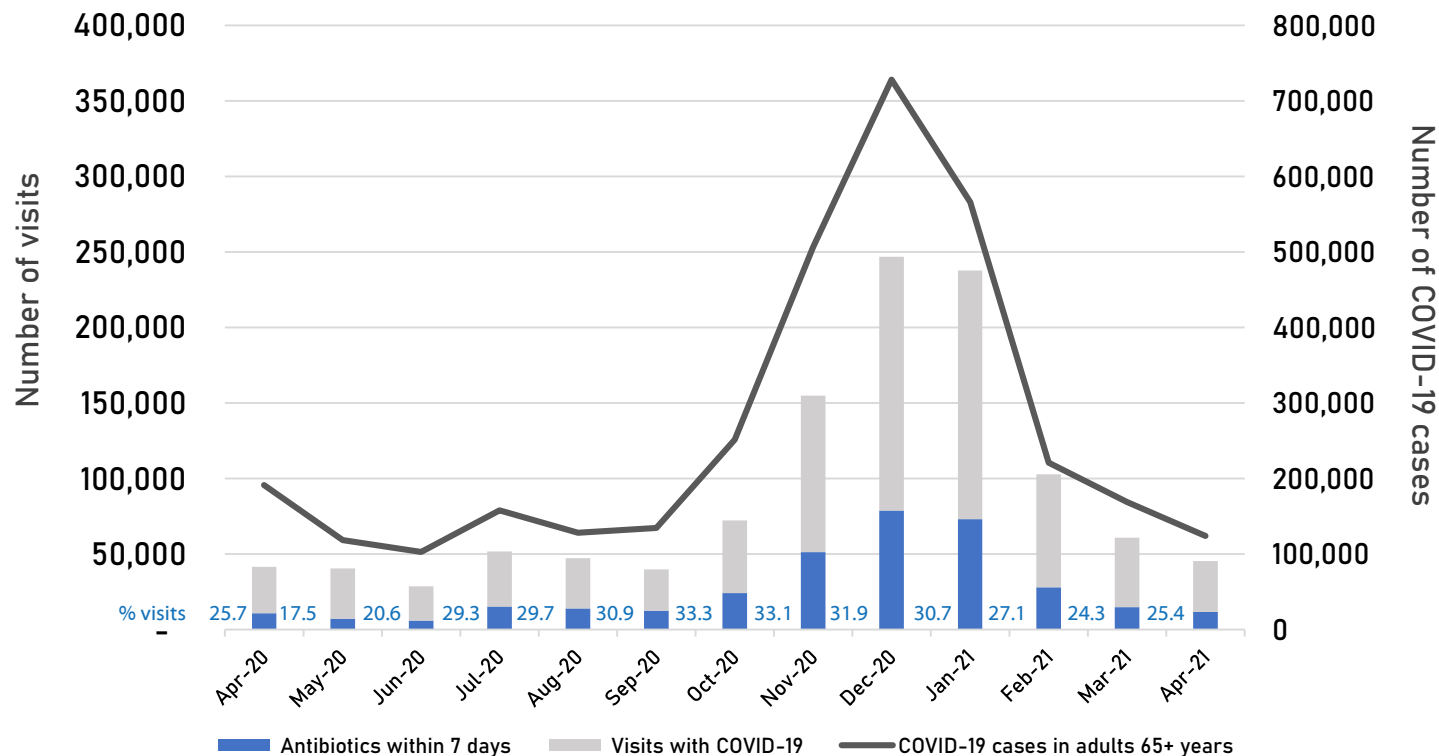
Antibiotic Use During the
COVID-19 Pandemic:
NURSING HOMES

Nursing Home Antibiotic Use, 2019-2021
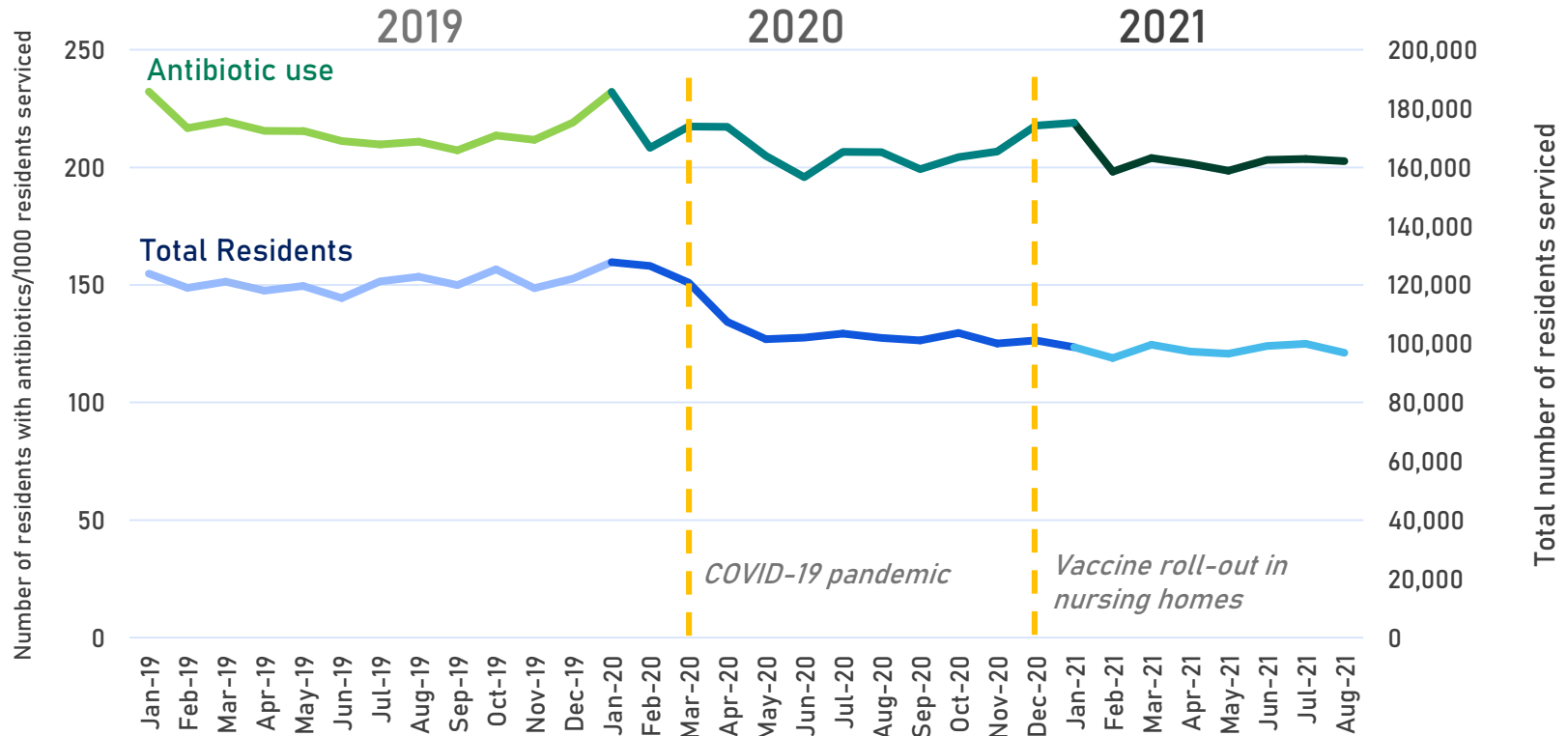
Increased Prescribing Rates of Antibiotic Agents Used for Respiratory Infections, 2019–2021
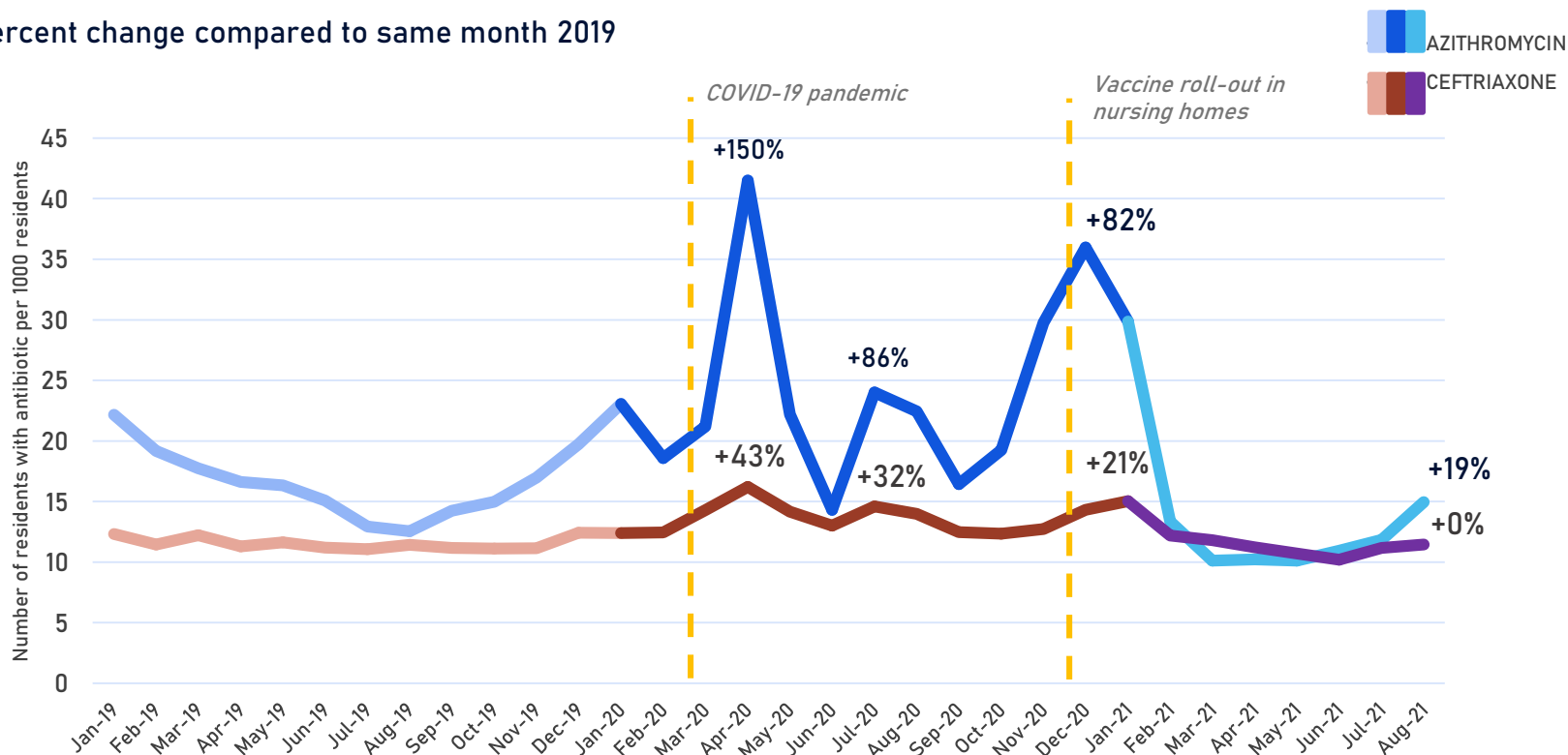
What's Next

Announcing Next Week:
New Global Projects to Combat AR & Other Infectious Diseases

CDC's Global AR Lab & Response Network	The Global Action In Healthcare Network (GAIHN)
Rapid detection of and response to AR	Prevent and respond to emerging healthcare threats
Anywhere AR can occur: healthcare, community, food, environment	Anywhere human healthcare is delivered
Targeting emerging & AR Threats Report pathogens	Targeting emerging infectious disease threats in healthcare (e.g., COVID-19, AR)

New Global Projects to Combat AR & Other Infectious Diseases (cont'd)
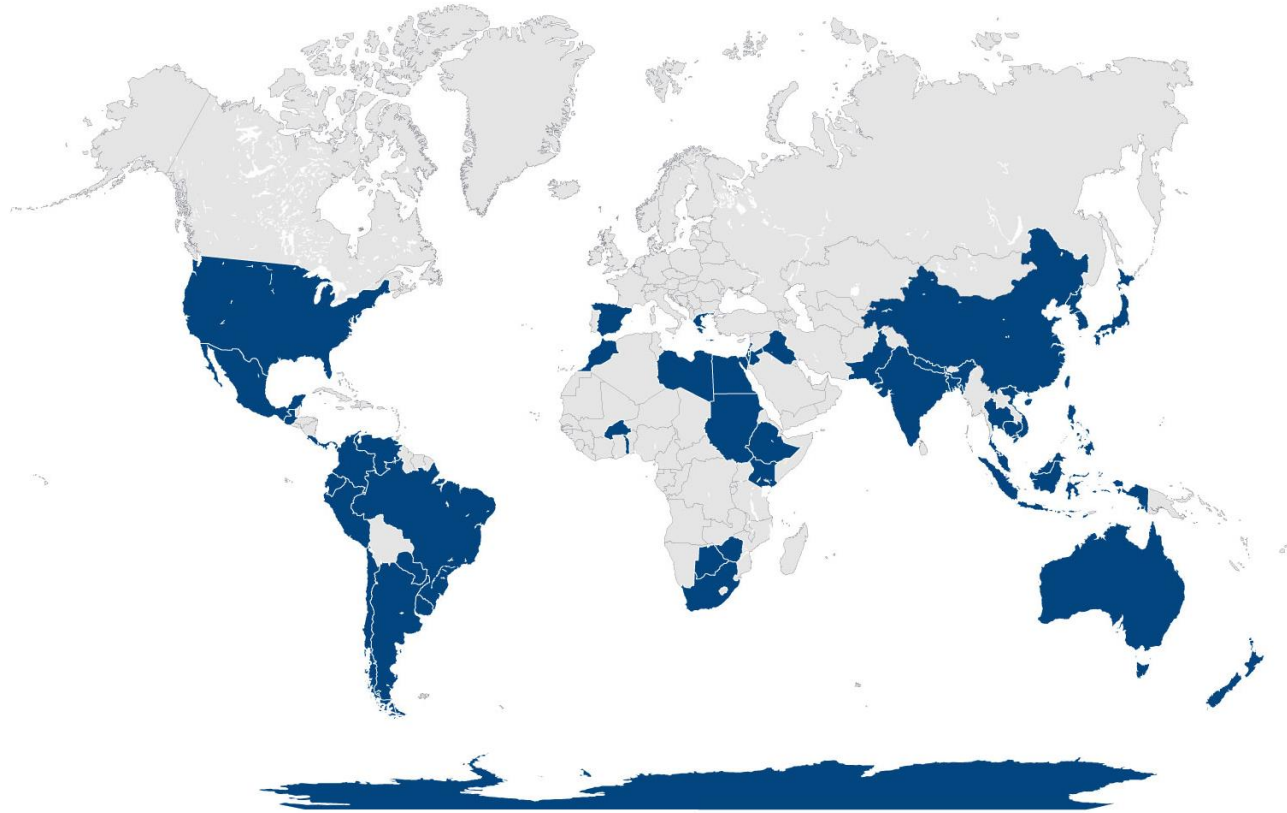
Lessons Learned from COVID-19

- **We cannot treat our way out of a pandemic, epidemic, or outbreak.**

- **We get what we pay for now.** If we don't invest in effective public health capacity and prevention today, we will not have these when we need them most:

  - Early detection and containment;

  - Response capacity to stop transmission;

  - Infection control; and

  - Evidence-based prevention interventions including vaccines and preventives.

- **Preventing AR infections is preparedness.**

  - Preparedness is not exercises, tabletops, and planning documents alone.

  - Prevention must span One Health.

  - Leverage preventives like vaccines and decolonization.

Join CDC for the Next #AMRExchange!

- What: Hooves, Paws, or Feet: A Multispecies Examination of Antimicrobial Use and Stewardship Practices

- Who: CDC and experts from Ohio State University, Iowa State University, and EpiX Analytics

- When: Tuesday, December 14, 9am EST

- Register: Head to @CDC_AR Twitter handle for all the details!

NEW WEBINAR

AMR Exchange
HOOVES, PAWS, OR FEET
Examining AMR in Animals

TUESDAY, DECEMBER 14
9:00 AM EST – 10:30 AM EST

Acknowledgements

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

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.