Trends in the Rates of Multidrug-resistant (MDR) Bacteria Commonly Associated with Healthcare in U.S. Acute Care Hospitals, 2019-2021

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Background

After declining in recent years, antimicrobial-resistant infections with hospital onset increased in 2020 (CDC. COVID-19: U.S. Impact on Antimicrobial Resistance, Special Report 2022). This study examined trends in the rates of multidrug-resistant (MDR) infections in 2019-2021 among acute care hospitals for bacteria commonly associated with healthcare:

MRSA – methicillin-resistant *Staphylococcus aureus*

ESBL – extended-spectrum ß-lactamase (ESBL)-producing Enterobacterales

VRE – vancomycin-resistant *Enterococcus*

MDRPSEU - MDR *Pseudomonas aeruginosa*

CRE – carbapenem-resistant Enterobacterales

CRAB – carbapenem-resistant *Acinetobacter* species

Methods

We measured incidence of clinical cultures yielding the bacterial species of interest among hospitalized patients in a dynamic cohort of hospitals submitting microbiology data on clinical culture and associated antimicrobial susceptibility testing results to the PINC AI™ Healthcare Database during January 1, 2019 – December 31, 2021

Community-onset (CO) - cultures obtained ≤ day 3 of hospitalization;

Hospital-onset (HO) – cultures obtained ≥ day 4

Incidence rates were measured per 10,000 discharges (Figures 1, 3). Adjusted annual trends in hospital-specific rates for each species were examined using generalized estimating equations (GEE) multivariable negative binomial regression models adjusting for seasonality, facility-level patient age and gender distributions, teaching status, urban/rural location, bed size (Figures 2, 4)

Hospital-onset MDR infections increased in 2020-2021

Hospital-onset MDR Pathogens

Figure 1. Hospital-onset Incidence Rates of Multidrug-resistant Pathogens in Premier Acute Care Hospitals (N=322) in 2019-2021

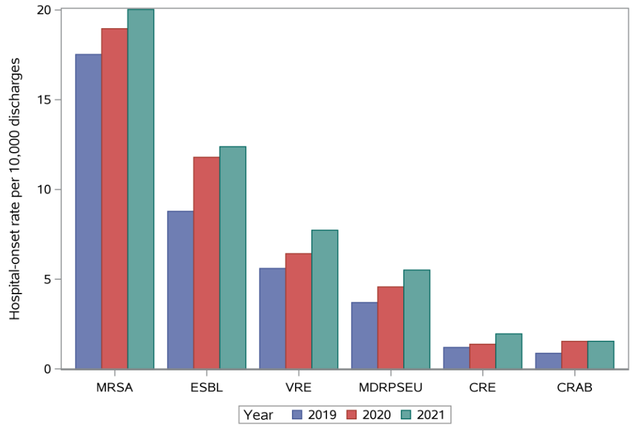
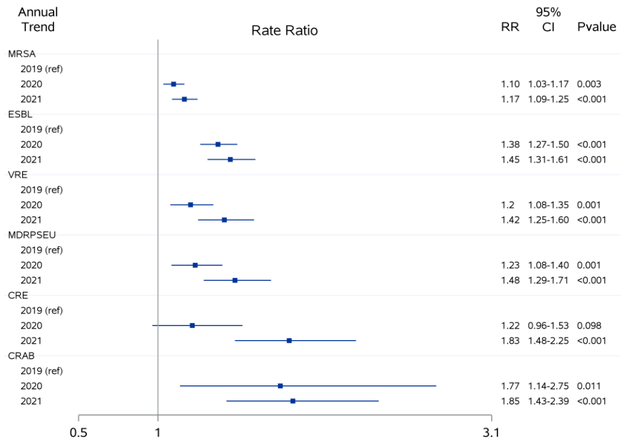


Figure 2. Adjusted Annual Trends in Hospital-onset MDR Infections



Community-onset MDR Pathogens

Figure 3. Community-onset Incidence Rates of Multidrug-resistant Pathogens in Premier Acute Care Hospitals (N=322) in 2019-2021

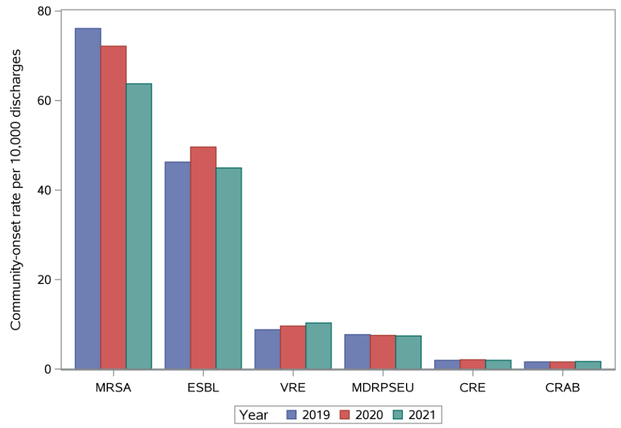
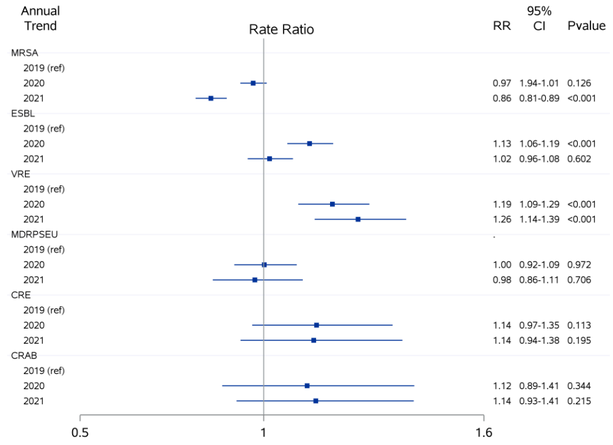


Figure 4. Adjusted Annual Trends in Community-onset MDR Infections



Summary

Changes in adjusted rates in comparison with 2019

	Hospital-onset		Community-onset	
	2020	2021	2020	2021
MRSA	↑*10%	↑*17%	↓ 3%	↓*14%
ESBL	↑*38%	↑*45%	↑*13%	↑ 2%
VRE	↑*20%	↑*42%	↑*19%	↑*26%
MDRPSEU	↑*23%	↑*48%	0%	↓ 2%
CRE	↑ 22%	↑*83%	↑ 14%	↑ 14%
CRAB	↑*77%	↑*85%	↑ 12%	↑ 14%

* - Significant increase/decrease

Conclusions

Our study showed that the rates of hospital-onset MDR infections increased in 2020 and continued to increase through 2021. Similar to HO infections, CO VRE increased in both 2020 and 2021. CO MRSA was the only pathogen with significant decline in 2021. Future studies of factors contributing to the emerging trends are needed to inform prevention strategies during a pandemic.

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