Figure 1. Carbapenemase Genes in CRE, by Genus and Geographic Region—Antibiotic Resistance Laboratory Network, January 2018–August 2019

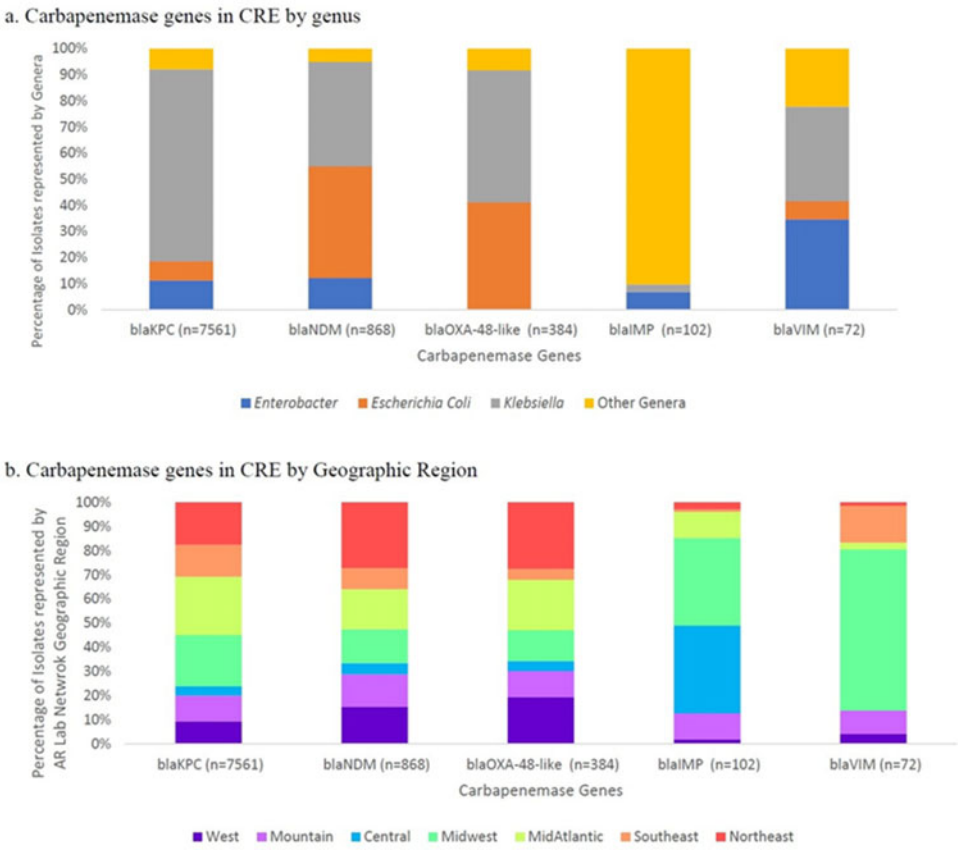

Fig. 1.

CDC monthly. Genera other than *Enterobacter*, *Klebsiella*, and *Escherichia coli* are categorized as other genera in this analysis. Data were compiled and analyzed using SAS v 9.4 software. **Results:** From January 2018 to August 2019, the AR Lab Network tested 25,705 CRE isolates; 8,864 of 25,705 CRE (34%) were CP. *Klebsiella* spp represented the largest proportion of CP-CRE at 68% (n = 6,063), followed by *E. coli* (12%, n = 1,052), *Enterobacter* spp (11%, n = 981), and other genera (9%, n = 768). Figure 1a shows the composition of CP-CRE carbapenemase genes by genus. The most common carbapenemase and genus profiles were *bla*KPC in *Klebsiella* (74%; 5,562 of 7,561 *bla*KPC-positive) blaNDM in *E. coli* (43%; 372 of 868 *bla*NDM-positive) *bla*VIM in *Enterobacter* spp (35%; 25 of 72 *bla*VIM-positive), and *bla*IMP among other genera (90%; 92 of 102 *bla*IMP-positive). Common CP-CRE genes and genera also varied by geography (Fig. 1b). **Conclusions:** The AR Lab Network has greatly enhanced our nation's ability to detect and characterize CP-CRE. Our data provide a snapshot of the organisms and regions where mobile carbapenemase genes are most often detected in CRE. Geographic variation in CP gene profiles provides actionable data to inform local priorities for detection and infection control and provide clinicians with situational awareness of the genes and organisms that are circulating in their region.

Funding: None

Disclosures: In this presentation, the authors discuss the drug combination aztreonam-avibactam and acknowledge that this drug combination is not currently FDA-approved.

Doi:10.1017/ice.2020.668

Presentation Type:
Poster Presentation

Carbapenemase Production and Mortality Risk Among Carbapenem-Resistant Enterobacteriaceae Cases in Tennessee, United States

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Background: Carbapenem-resistant Enterobacteriaceae (CRE) are an urgent public health threat associated with poor patient outcomes. CRE that produce carbapenemase (CP-CRE) are of particular concern because the mechanism-conferring genes in plasmids can be transferred to other bacteria. CRE are reportable in Tennessee (TN); isolate submission is required for CP production and resistance mechanism testing. We aimed to compare patient characteristics and outcomes between CP-CRE and non–CP-CRE patients to guide potential public health interventions. **Methods:** A retrospective cohort study to compare 30-day mortality, and clinical characteristics of CP-CRE to non–CP-CRE

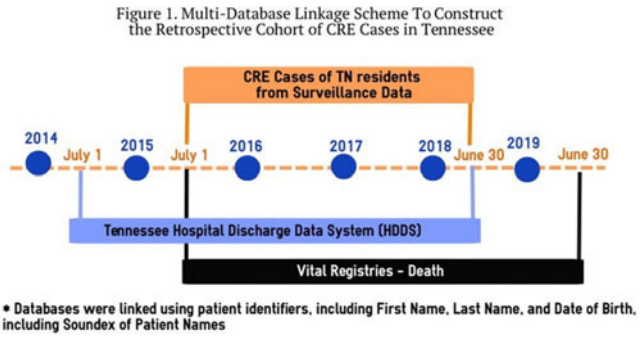

Fig. 1.

patients was conducted. Laboratory data were gathered from CRE isolates of Tennessee residents from July 1, 2015, to June 30, 2018. The most recent Council of State and Territorial Epidemiologists CRE and CP-CRE case definition was used to confirm and classify cases. Healthcare exposures within 1 year prior to onset, demographic characteristics, and clinical characteristics were obtained by linking surveillance data with the inpatient and outpatient Tennessee hospital discharge data. Cases were also matched with Tennessee vital statistics data to determine all-cause 30-day mortality from the event date. We evaluated risk ratios of 30-day mortality with a multivariable regression model. **Results:** Among 1,034 CRE cases that had at least 1 isolate submitted to public health, 445 (43.0%) were CP-CRE and 589 (57.0%) were non–CP-CRE. Among CP-CRE isolates, the *blaKPC* gene was found in 434 (98.9%). CP-CRE cases were more likely to have isolates from normally sterile sites, to have an organism with elevated resistance to meropenem (minimum inhibitory concentration, ≥16 μg/mL), to have prior admission to a long-term acute-care hospital, and to live in a nursing home (all $P < .001$). Also, 77 CP-CRE cases (17.3%) and 56 non–CP-CRE cases (9.6%) died within 30 days of infection onset. The risk of 30-day mortality was 57% higher for CP-CRE (adjusted risk ratio, 1.57; 95% CI:, 1.10–2.23) compared to non–CP-CRE patients after adjusting for comorbidities, nursing home residence, and prior healthcare exposures. **Conclusions:** CP-CRE cases had poorer outcomes than non–CP-CRE cases. This may be related in part to a higher proportion of sterile site infections among CP-CRE cases; our study was underpowered to analyze this subpopulation of sterile site cases. We plan to continue monitoring and performing analyses as mortality and hospital discharge data from more recent years become available and as more cases accumulate.

Table 1. Characteristics of Adult TN Cases of Carbapenem-Resistant Enterobacteriaceae, July 2015 – June 2018

Baseline Characteristics	CRE Category N (%)or Mean (SD)*		p-value**	Overall
	Non-CP-CRE n=589 (57.0)	CP-CRE n=445(43.0)		
Age, years	65.8 (17.3)	63.9 (15.7)	0.070	65.0 (16.7)
Females	368 (63.7)	224 (50.6)	<0.001	592 (58.0)
Race				
White	369 (62.6)	316 (71.0)	<0.001	685 (66.3)
Black	126 (21.4)	111 (24.9)		237 (22.9)
Other	94 (16.0)	18 (4.0)		112 (10.8)
Primary Isolate				
Urine	441 (74.9)	254 (57.1)	<0.001	695 (67.2)
Blood	23 (3.9)	41 (9.2)		64 (6.2)
Other Sterile Sites	3 (0.5)	7 (1.6)		10 (1.0)
Other Non-Sterile Sites	122 (20.7)	143 (32.1)		265 (25.6)
Genera				
Enterobacter	230 (39.1)	208 (46.7)	<0.001	438 (42.4)
Escherichia	211 (35.8)	34 (7.64)		245 (23.7)
Klebsiella	148 (25.1)	203 (45.6)		351 (33.9)
Medicare/Medicaid Insurance	390 (66.2)	359 (80.7)	<0.001	749 (72.4)
Charlson's Comorbidity Index	3.0 (2.2)	2.2 (2.4)	<0.001	2.6 (2.4)
Underlying Conditions				
Diabetes	135(22.9)	151 (33.9)	<0.001	286 (27.7)
Congestive Heart Failure	156 (26.5)	185 (41.4)	<0.001	340 (32.9)
Moderate-to-Severe Renal Diseases	182 (30.9)	192 (43.2)	<0.001	374 (36.2)
Any Cancer	62 (10.5)	59 (13.3)	0.176	121 (11.7)
Cerebrovascular Diseases	91 (15.5)	96 (21.6)	0.011	187 (18.1)
Healthcare exposures during prior year				
Inpatient hospitalizations	348 (59.1)	372 (83.6)	<0.001	720 (69.6)
Resident of a long-term care facility	146 (24.8)	220 (49.4)	<0.001	366 (35.4)
Admission to LTACH	16 (2.7)	43 (9.7)	<0.001	59 (5.7)
Inpatient or outpatient surgery	126 (21.4)	156 (35.1)	<0.001	282 (27.3)
Non-surgical Endoscopy	44 (7.5)	66 (14.8)	<0.001	110 (10.6)
Assisted Ventilation > 96 hrs	41 (7.0)	112 (25.2)	<0.001	153 (14.8)
Meropenem MIC, μg/mL				
<4	438 (74.4)	100 (22.5)	<0.001	538 (52.0)
4-15	127 (21.6)	142 (31.9)		269 (26.0)
>=16	24 (4.1)	203 (45.6)		227 (22.0)
Mortality in 30 days	56 (9.5)	77 (17.3)	<0.001	133 (12.9)

Funding: None
Disclosures: None
Doi:10.1017/ice.2020.669

Presentation Type:
Poster Presentation

Carbapenemase-Producing, Carbapenem-Resistant *Acinetobacter baumannii*: Summary of CDC Consultations, 2017–2019

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Background: Carbapenemase-producing carbapenem-resistant *Acinetobacter baumannii* (CP-CRAB) are a public health threat due to potential for widespread dissemination and limited treatment options. We describe CDC consultations for CP-CRAB to better understand transmission and identify prevention opportunities. **Methods:** We defined CP-CRAB as CRAB isolates with a molecular test detecting KPC, NDM, VIM, or IMP carbapenemases or a plasmid-mediated oxacillinase (OXA-23, OXA-24/40, OXA-48, OXA-58, OXA-235/237). We reviewed the CDC database of CP-CRAB consultations with health departments from January 1, 2017, through June 1, 2019. Consultations were grouped into 3 categories: multifacility clusters, single-facility clusters, and single cases. We reviewed the size, setting, environmental culturing results, and identified infection control gaps for each consultation. **Results:** We identified 29 consultations involving 294 patients across 19 states. Among 9 multifacility clusters, the median number of patients was 12 (range, 2–87) and the median number of facilities was 2 (range, 2–6). Among 9 single-facility clusters, the median number of patients was 5 (range, 2–50). The most common carbapenemase was OXA-23 (Table 1). Moreover, 16 consultations involved short-stay acute-care hospitals, and 6 clusters involved ICUs and/or burn units. Also, 8 consultations involved skilled nursing facilities. Environmental sampling was performed in 3 consultations; CP-CRAB was recovered from surfaces of portable, shared equipment (3 consultations), inside patient rooms (3 consultations) and nursing stations (2 consultations). Lapses in environmental cleaning and interfacility communication were common across consultations.