

507. Epidemiology of Community-Associated Carbapenemase + Producing Carbapenem-Resistant Enterobacteriaceae Identified from the Emerging Infections Program, 2012–2017

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Session: 54. HAI: MDRO – GNR Epidemiology, CRE
Thursday, October 3, 2019: 12:15 PM

Background. Carbapenemase-producing (CP-) carbapenem-resistant Enterobacteriaceae (CRE) have been almost exclusively linked to extensive healthcare exposure and are of significant concern due to limited treatment options and potential for plasmid-mediated spread of resistance. We report on CP-CRE in community-dwelling individuals.

Methods. We used 2012–2017 active, laboratory and population-based surveillance data for CRE from CDC's Emerging Infections Program sites (9 sites by 2017). Cases were the first isolation of *Escherichia coli*, *Klebsiella* spp., or *Enterobacter* spp. from a normally sterile body specimen or urine in a surveillance site resident meeting a CRE phenotype (figure) in a 30 day period. Epidemiologic data were obtained from chart review. Cases were community-associated (CA) if not isolated after the first three days of a hospital stay; without inpatient healthcare, dialysis, or surgery in the year prior; and without indwelling medical devices within two days prior to culture. A convenience sample of isolates was tested at CDC by real-time PCR to detect *bla*_{KPC}, *bla*_{NDM}, *bla*_{OXA-48-like}, *bla*_{VTM}, or *bla*_{IMP}.

Results. Of 4023 CRE cases, 699 (17%) were CA, from which 297 isolates were tested; 20 (7%) were CP-CRE, from 18 patients (2 had repeat isolation of the same gene/species). The median age was 68 years (range: 33–91), and 14 (78%) were female. Patients were from 7 sites (range: 1–4/site). Their CP-CRE (10 *bla*_{KPC}, 6 *bla*_{NDM}, and 2 *bla*_{OXA-48-like}) were from three species (10 *K. pneumoniae*, 6 *E. coli*, 2 *E. cloacae*) and isolated from urine (*n* = 16) and blood (*n* = 2). Among those with CP-CRE from urine, 12 (75%) had clinical diagnoses of urinary tract infections and the rest had no infection documented. Overall, 7 (39%) were admitted to a hospital within 30 days of culture; none died during hospitalization. Most (*n* = 13; 72%) had underlying medical comorbidities, most commonly urinary tract abnormalities (*n* = 5; 28%) and diabetes mellitus (*n* = 5; 28%). Three (17%) had international travel within two months prior to culture.

Conclusion. CA CP-CRE were found in most surveillance sites but are rare, occurring primarily in older patients with underlying medical conditions. Patient interviews are planned to determine whether CA CP-CRE may be associated with distant or undocumented healthcare exposures.

Figure: 2011–2015 vs 2016–2017 phenotypic definitions (determination of intermediate or resistant based on 2012 Clinical & Laboratory Standards Institute breakpoints) for carbapenem-resistant *Escherichia coli*, *Klebsiella pneumoniae*/oxytoca, *Enterobacter cloacae* complex, and *E. aerogenes* (now *K. aerogenes*) cases

2011-2015 definition	2016-2017 definition
Intermediate or resistant to at least one of: imipenem, meropenem, doripenem	Resistant to at least one of: imipenem, meropenem, doripenem, ertapenem
AND	
Resistant to all tested among ceftazidime, ceftriaxone, cefotaxime	

Disclosures. All authors: No reported disclosures.

508. Gentamicin Non-susceptibility is Associated with Persistence of Carbapenem-Resistant *Klebsiella pneumoniae* in the Urinary Tract

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Session: 54. HAI: MDRO – GNR Epidemiology, CRE
Thursday, October 3, 2019: 12:15 PM

Background. Urinary tract infection (UTI) is the most common clinical manifestation of carbapenem-resistant *Klebsiella pneumoniae* (CRKp). Persistent CRKp bacteriuria is associated with the spread of CRKp and antibiotic overuse. Risk factors for persistent CRKp bacteriuria are uncertain.

Methods. CRACKLE-1 was a multicenter, prospective study that included 960 patients with at least one carbapenem-resistant Enterobacteriaceae (CRE)-positive culture from December 2011 to June 2016 collected from 18 hospitals encompassing 8 healthcare systems in the Midwestern US and North Carolina. Patients with CRKp bacteriuria who were discharged alive from index hospitalization were included in the current study, and sporadic (single positive CRKp urine culture) and persistent (≥2 CRKp urine cultures during independent hospital admissions occurring at least 2 days apart) cases were compared. Antibiotic susceptibility testing was performed by local laboratories. Amikacin, gentamicin (GENT), and trimethoprim/sulfamethoxazole were included in the analysis based on variance and frequency of testing. The CDC/National Healthcare Safety Network criteria for UTI were used.

Results. CRKp was the most common CRE isolate (*n* = 869, prevalence 91%). In patients with CRKp, 527 had CRKp isolated from the urine (prevalence 61%, 95% CI 0.57, 0.64). Of these, 486 patients, of whom 129 (27%) were diagnosed with a UTI, were discharged alive. Notably, 135/486 (28%) patients with CRKp bacteriuria were readmitted and yielded a second urine culture of CRKp. Most patients with persistent bacteriuria, 99/135 (73%), were asymptomatic at initial admission. Of these patients, 20/99 (20%) were diagnosed with a UTI at second admission. In multivariable analysis, only GENT non-susceptibility was associated with an increased risk (adjusted OR 1.66, 95% CI 1.10–2.49) of persistent bacteriuria. Persistent bacteriuria was independent of GENT treatment during index hospitalization (GENT was used in 15% of patients).

Conclusion. Bacteriuria with GENT non-susceptible CRKp strains was associated with persistent bacteriuria. As this was independent of GENT treatment, GENT resistance determinants may be co-transmitted along with traits that promote bacterial persistence in CRKp.

Patient characteristic	Sporadic [Median (IQR) or n (%)]	Persistent [Median (IQR) or n (%)]	aOR (95% CI)	p
n	351	135		
Age, median yrs. (IQR)	70 (61-80)	67 (56-79)	0.99 (0.98-1.00)	0.054
Female	216 (62)	69 (51)	0.68 (0.45-1.02)	0.063
Race and Ethnicity				
White, non-Hispanic	191 (54)	68 (50)		
Black, non-Hispanic	132 (38)	63 (47)		
Hispanic	15 (4)	3 (2)		
Other	13 (4)	1 (1)		
UTI	93 (26)	36 (27)		
Charlson index, median (IQR)	3 (2-5)	3 (2-5)		
Chronic kidney disease	83 (24)	30 (22)		
Diabetes mellitus	174 (50)	67 (50)		
Dementia	67 (19)	23 (17)		
Weight median, kg (IQR)	77 (64-95)	78 (66-109)		
Urinary drainage				
Physiological	139 (40)	52 (39)		
Foley catheter	162 (47)	59 (44)		
Other	50 (14)	24 (18)		
Susceptible/tested (%)				
Gentamicin	186/350 (53)	54/135 (40)	1.66 (1.10-2.49)	0.015
Amikacin	148/202 (73)	71/89 (80)		
TMP/SMX	103/346 (30)	31/132 (23)		

Disclosures. All authors: No reported disclosures.

509. The Prevalence of Carbapenem-Resistant Enterobacteriaceae (CRE) in a Community Hospital Setting

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Session: 54. HAI: MDRO – GNR Epidemiology, CRE
Thursday, October 3, 2019: 12:15 PM

Background. Carbapenems are bactericidal β-lactam antibiotics with a wide spectrum of antimicrobial activity. The emergence of carbapenem resistance, specifically carbapenem-resistant enterobacteriaceae (CRE), has left few viable treatment options. Multiple factors contribute to overutilization of carbapenems. At Union Hospital, in Terre Haute, Indiana, carbapenems are utilized for patients with a documented anaphylactic allergy to penicillins and cephalosporins and are the drug of choice for the treatment of ESBL infections. The overuse and inappropriate use of carbapenems plus increasing resistance has contributed to the development of CRE and other multi-drug-resistant organisms. Thus, an examination of resistance patterns was conducted at a smaller level in a community hospital.

Methods. A retrospective analysis was conducted to examine carbapenem resistance patterns at Union Hospital. Patients with a CRE diagnosis from June 2017 to July 2018 were included. Data analysis examined baseline characteristics, culture site, presence of carbapenemase production, treatment agent, and patient outcome. An assessment of true infection vs. colonization was conducted for all positive CRE cultures.