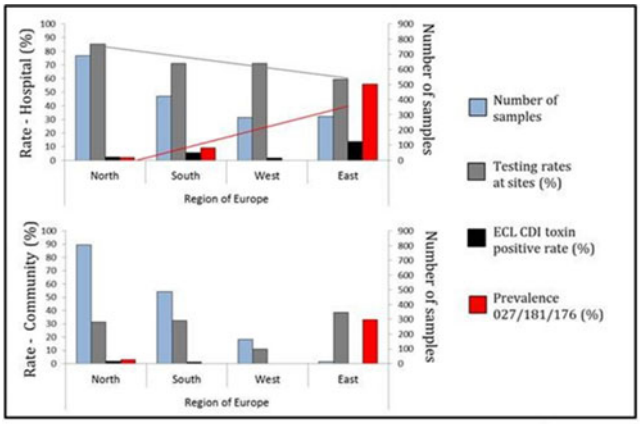

Figure 1. Testing rate, prevalence of toxinotype IIIb (RBT 027, 181 and 176) and CDI positivity rate in Hospital and Community locations. In Hospital setting, we observed an inverse correlation between testing rate at sites (grey trendline) and prevalence of toxinotype IIb (red trendline) (r=-0.79), and between testing rate and CDI toxin positivity rate identified at the European coordinating laboratory (ECL) (r=-0.81).

Fig. 1.

outbreaks of infection. The proportion of missed CDIs in the community was ~3.5× higher than in hospitals, indicating major underrecognition in the former setting. There were marked differences in ribotypes in different reservoir settings, emphasizing the complex epidemiology of *C. difficile*.

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Presentation Type:
Oral Presentation

Changing US Epidemiology of NDM-Producing Carbapenem-Resistant Enterobacteriaceae, 2017–2019

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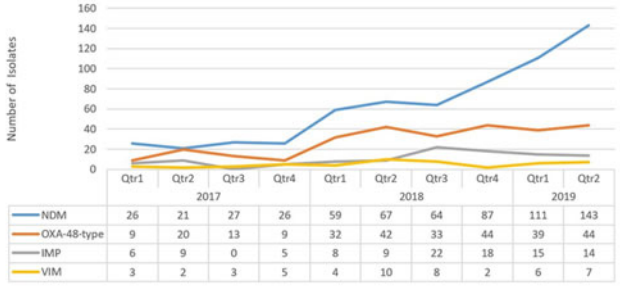
Background: Due to limited therapeutic options and potential for spread, carbapenem-resistant Enterobacteriaceae (CRE)-producing New Delhi metallo-β-lactamases (NDMs) are a public health priority. We investigated the epidemiology of NDM-producing CRE reported to the CDC to clarify its distribution and relative prevalence. **Methods:** The CDC's Antibiotic Resistance Laboratory Network supports molecular testing of CRE for 5 carbapenemases nationally. Although KPC is the most common carbapenemase in the United States, non-KPC carbapenemases are a growing concern. We analyzed CRE with any of 4 non-KPC plasmid-mediated carbapenemases (NDM, VIM, IMP, or OXA-48 type) isolated from specimens collected from January 1, 2017, through June 30, 2019; only a patient's first isolate per organism–carbapenemase combination was included. We excluded isolates from specimen sources associated with colonization screening (eg, perirectal). We compared the proportion of NDM-producing CRE to all non-KPC–producing CP-CRE between period A (January to June 2018) and period B (January to June 2019). Health departments and the CDC collected additional exposure and molecular information in selected states to better describe current NDM-producing CRE epidemiology. **Results:** Overall, 47 states reported 1,013 non–KPC-producing CP-CRE (range/state, 1–109 isolates; median, 11 isolates); 46 states reported 631 NDM-producing CRE (range/state, 1–84; median, 6). NDM-producing CRE increased quarterly from the third quarter of 2018 through the second quarter of 2019; CP-CRE isolates with other non-KPC carbapenemases remained stable (Fig. 1). In period A, 124 of 216 emerging CP-CRE had NDM (57.1%), compared with 255 of 359 emerging CP-CRE (71.0%) during period B ($P = .1179$). Among NDM-producing CRE, the proportion of *Enterobacter* spp increased from 10.5% in 2018 to 18.4% in 2019 ($P = .0467$) (Fig. 2). In total, 18 states reported more NDM-producing CRE in the first 6 months of 2019 than in all of 2018. Connecticut, Ohio, and Oregon were among states that conducted detailed investigations; these 3 states identified 24 NDM-producing CRE isolates from 23 patients in period B. Overall, 5 (21.7%) of 22 patients with history available traveled internationally ≤12 months prior to culture; 17 (73.9%) acquired NDM-producing CRE domestically. Among 15 isolates sequenced, 8 (53.3%) carried NDM-5 (6 *E. coli*, 1 *Enterobacter* spp and 1 *Klebsiella* spp) and 7 (46.7%) carried NDM-1 (6 *Enterobacter* spp and 1 *Klebsiella* spp). Species were diverse; no single strain type was shared by >2 isolates. **Conclusions:** Detection of NDM-producing CRE has increased across the AR Lab Network. Among states with detailed information available, domestic acquisition was common, and no single variant or strain

Figure 1. Number of isolates with NDM, OXA-48-type, IMP, and VIM carbapenemase genes reported, among emerging CP-CRE isolates from specimens collected January 1, 2017 through June 30, 2019, United States (N=1,013 isolates*)



	Qtr1 2017	Qtr2 2017	Qtr3 2017	Qtr4 2017	Qtr1 2018	Qtr2 2018	Qtr3 2018	Qtr4 2018	Qtr1 2019	Qtr2 2019
NDM	26	21	27	26	59	67	64	87	111	143
OXA-48-type	9	20	13	9	32	42	33	44	39	44
IMP	6	9	0	5	8	9	22	18	15	14
VIM	3	2	3	5	4	10	8	2	6	7

*Among the 75 isolates with more than one of these carbapenemase genes detected, each emerging carbapenemase was counted separately.

Fig. 1.

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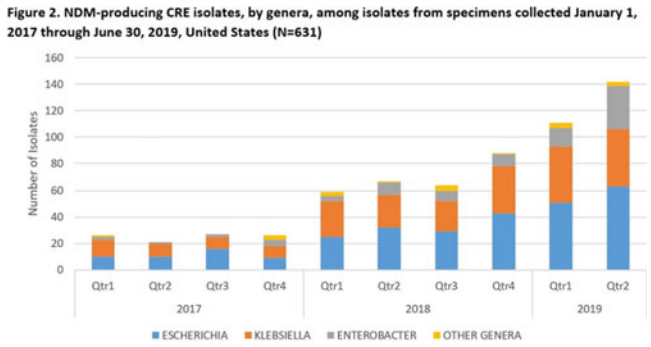

Fig. 2.

predominated. Aggressive public health response and further understanding of current US NDM-CRE epidemiology are needed to prevent further spread.

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Chlorhexidine MICs Remain Stable Among Antibiotic-Resistant Bacterial Isolates Collected from 2005 to 2019 at Three US Sites

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Background: Chlorhexidine bathing reduces bacterial skin colonization and prevents infections in specific patient populations. As chlorhexidine use becomes more widespread, concerns about bacterial tolerance to chlorhexidine have increased; however, testing for chlorhexidine minimum inhibitory concentrations (MICs) is challenging. We adapted a broth microdilution (BMD) method to determine whether chlorhexidine MICs changed over time among 4 important healthcare-associated pathogens. **Methods:** Antibiotic-resistant bacterial isolates (*Staphylococcus aureus* from 2005 to 2019 and *Escherichia coli*, *Klebsiella pneumoniae*, and *Enterobacter cloacae* complex from 2011 to 2019) were collected through Emerging Infections Program surveillance in 2 sites (Georgia and Tennessee) or through public health reporting in 1 site (Orange County, California). A convenience sample of isolates were collected from facilities with varying amounts of chlorhexidine use. We performed BMD testing using laboratory-developed panels with chlorhexidine digluconate concentrations ranging from 0.125 to 64 µg/mL. After successfully establishing reproducibility with quality control organisms, 3 laboratories performed MIC testing. For each organism, epidemiological cutoff values (ECVs) were established using ECOFFinder. **Results:** Among 538 isolates tested (129 *S. aureus*, 158 *E. coli*, 142 *K. pneumoniae*, and 109 *E. cloacae* complex), *S. aureus*, *E. coli*, *K. pneumoniae*, and *E. cloacae* complex ECVs were 8, 4, 64, and 64 µg/mL, respectively (Table 1). Moreover, 14 isolates had an MIC above the ECV (12 *E. coli* and 2 *E. cloacae* complex). The MIC_{50} of each species is reported over time (Table 2). **Conclusions:** Using an adapted BMD method, we found that chlorhexidine MICs did not increase over time among a limited sample of *S. aureus*, *E. coli*, *K. pneumoniae*, and *E. cloacae* complex isolates. Although these results are reassuring, continued surveillance for elevated chlorhexidine MICs in isolates from patients with well-characterized chlorhexidine exposure is needed as chlorhexidine use increases.

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Table 1. Chlorhexidine MIC Results

Organism	MIC Range (µg/mL)	MIC_{50} (µg/mL)	MIC_{90} (µg/mL)	ECV (µg/mL)
S. aureus	1–8	2	4	8
E. coli	1–64	2	4	4
K. pneumoniae	4–64	16	32	64
E. cloacae complex	1–>64	16	64	64

Table 2. Chlorhexidine MIC_{50} Results Over Time

Year	*S. aureus*		*E. coli*		*K. pneumoniae*		*E. cloacae* complex	
	n	MIC_{50} (µg/mL)	n	MIC_{50} (µg/mL)	n	MIC_{50} (µg/mL)	n	MIC_{50} (µg/mL)
2005–2007	27	4	0	N/A	0	N/A	0	N/A
2008–2010	18	4	0	N/A	0	N/A	0	N/A
2011–2013	25	4	8	2	25	16	2	N/A
2014–2016	43	2	27	2	20	16	23	16
2017–2019	16	2	123	2	97	16	84	16