System. Georgia vital records data were used to determine 90-day mortality rates. Prevalence estimates were calculated. Comparisons used a χ² test.

**Results.** Of 1,511 CRE cases, 136 (9%) were on chronic dialysis, 128 (9%) of which were on hemodialysis (HD) and 5 (4%) were on peritoneal dialysis. Among CRE cases with HD, 94 (73%) had a catheter and 30 (23%) had an arteriovenous fistula or graft. CRE cases with ERD were more likely to have a central venous catheter (CVC) (58% vs. 40%) Black (76% vs. 38%), and have diabetes (67% vs. 38%), congestive heart failure (25% vs. 17%), or peripheral arterial disease (12% vs. 4%). CRE cases with ERD had more hospitalizations within 30 days of the culture date (77% vs. 47%), ICU admissions prior to (29% vs. 7%) or after the culture date (43% vs. 14%) and discharges to LTCFs (35% vs. 15%) after hospitalization. CRE cases with ERD and bacteremia were more likely to have been hospitalized >3 days before the culture compared with CRE cases with ERD and positive cultures from other body sites (52% vs. 24%). The 90-day mortality rate per 100,000 population was higher among CRE cases with ERD (106.9 cases) than without ERD (11.0 cases).

**Conclusion.** Among a population-based cohort of patients with CRE infections, ERD comprised 10% but had markedly mortality, suggesting that future interventions should target ERD.

**Disclosures.** No reported disclosures.

505. Making of a “Super-Duper Bug”: Plasmid-Mediated Resistance Accumulation in a Carbapenemase-Producing Klebsiella quasipneumoniae from Patients and the Environment

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**Session:** 54. HAI MDRO – GNR Epidemiology, CRE

**Thursday, October 3, 2019: 12:15 PM**

**Background.** Carbapenemase-producing Enterobacteriaceae can form a reservoir in hospital wastewater biofilms. Klebsiella quasipneumoniae is increasingly recognized as an emerging nosocomial threat, frequently carrying antimicrobial resistance (AMR) genes on plasmids. The dynamics of AMR gene and plasmid gain/loss over time in this species remain unclear.

**Methods.** Klebsiella quasipneumoniae carbapenemase producing KPC-Kq isolates from patients and wastewater sites from drains and toilets were sequenced (Illumina). Sequence assemblies (SPAdes) were probed in silico for AMR genes. This same accumulation was not witnessed environmental sites over time all species. Sequencing of longitudinal isolates revealed that under environmental conditions, AMR genes accumulated multiple plasmids and AMR genes over 4 months; the other was unchanged over 5 months.

For the longitudinal subset, there were 17 related isolates from two patients and two sink/ toilet environmental samples with 5 unique incompatibility types from patients and 4 from the environment (Illumina). From 2009 to 2016 there were a total of 15 KPC-Kq isolates from 8 patients and 17 environmental isolates from 11 rooms. The mean number of resistance genes identified in patients and environmental isolates were 15 and 14, respectively (P = NS), with five resistance genes carried by all isolates including blaKPC. There was an average of 4.4 unique incompatibility types from patients and 4.0 from the environment (P = NS). For the longitudinal subset, there were 17 related isolates from two patients and two sink drains. One hospitalized patient with repeated antimicrobial exposure had a KPC-Kq initial isolate with 3 plasmid types and 13 AMR genes and died one year later with a KPC-Kq iso that emerged from blood with 11 plasmid types and 25 AMR genes. The other patient was primarily an outpatient with little antimicrobial exposure. His KPC-Kq lost 1 plasmid and 3 AMR genes over 15 months. One KPC-Kq strain in the environment lost 3 plasmid types and 8 AMR genes over 4 months; the other was unchanged over 5 months.

**Conclusion.** KPC-Kq has been seen in both patients and the environment for several years at our institution. Sequencing of longitudinal isolates revealed that under antimicrobial pressure a patient KPC-Kq accumulated multiple plasmids and AMR genes. This same accumulation was not witnessed environmental sites although the numbers are small and will require additional study.

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506. Urinary Catheters Are Associated with Progression from Bacteriuria to Invasive Infections in Patients with Carbapenem-Resistant Enterobacteriaceae, Metropolitan Atlanta, 2011–2017

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**Background.** Patients with carbapenem-resistant Enterobacteriaceae (CRE) bacteriuria have better outcomes than patients with an invasive CRE infection, but patients with bacteriuria may subsequently develop an invasive infection (“progression”). We sought to evaluate risk factors, particularly urinary catheters, for progression from CRE bacteriuria to an invasive CRE infection within one year.

**Methods.** We used population-based active surveillance data from the Georgia Emerging Infections Program to identify patients in metropolitan Atlanta with CRE in urine but not in a concurrent or previous sterile site between August 1, 2011 and July 31, 2017. CRE was defined as an isolate resistant to tested third-generation cephalosporins and a minimum inhibitory concentration of 24 μg/mL for meropenem. Two patients (5%) progressed from CRE bacteriuria to an invasive CRE infection within one year (median 34 days). The incidence of progression in inpatient cultures was 0.4% (95% CI: 0.0–1.7). The incidence of progression in urinary cultures was 2.6% (95% CI: 1.4–4.6).

**Conclusion.** Progression from CRE bacteriuria to an invasive CRE infection is rare but clinically significant and is associated with urinary catheters. Future interventions should target urinary catheter removal, wherever possible, in patients with CRE bacteriuria.

**Table 1:** Demographic and clinical characteristics of patients with CRE bacteriuria in metropolitan Atlanta stratified by the presence of a urinary catheter

| Age (mean years, SD) | No urinary catheter (n = 227) | Urinary catheter (n = 280) | P-value |
|----------------------|-----------------------------|---------------------------|---------|
| 65.5 (17.9)          | 67.2 (14.9)                 | 65.2 (17.4)               | 0.05    |
| Female (n=256)       | 169 (67)                    | 167 (60)                  | 0.10    |
| Race (n=480)         | White                       | Black                     | 0.04    |
| 166 (35)             | 160 (35)                    | 80 (20)                   |
| Other                | 51 (13)                     | 37 (10)                   | 5 (2)   |
| Charlson comorbidity index ≥3 (n=594) | 199 (33) | 193 (32) | 0.54 |
| Decubitus ulcer      | 175 (54)                    | 173 (49)                  | 0.001   |
| Central urinal catheter | 137 (39) | 122 (24) | 0.001   |
| Other indwelling devicea | 177 (55) | 177 (55) | 0.01    |
| Oropharynx           | 9 (0.3)                     | 7 (0.2)                   | 0.001   |
| K. pneumoniae         | 355 (86)                    | 296 (66)                  | 0.01    |
| E. coli              | 80 (20)                     | 76 (19)                   | 0.001   |
| K. aerogenes         | 7 (2)                       | 4 (1)                     | 0.001   |
| K. oxytoca           | 11 (2)                      | 9 (3)                     | 0.001   |

**Table 2:** Risk factors for progression to an invasive CRE infection

| Risk factor                  | No progression (n = 482) | Progression Univariable OR (95% CI) | Multivariable OR (95% CI) |
|------------------------------|--------------------------|-------------------------------------|---------------------------|
| Location 4 days prior to culture (n=500) | 84 (17) | 20 (9) | 0.42 (0.19–0.86) | 0.22 (0.07–0.69) |
| ICU                          | 238 (48)                 | 95 (43)                             | 4.05 (2.12–7.82)          |
| Private Residence            | 78 (16)                  | 16 (4)                              | 0.20 (0.06–0.60)          |
| IUC prior to the culture (n=496) | 92 (23) | 63 (13) | 0.03 (0.01–0.12) | 0.10 (0.03–0.32) |
| IUC after the culture (n=500)  | 109 (22) | 87 (17) | 0.01 (0.00–0.06) | 0.04 (0.01–0.18) |

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