

## **Supplemental Material**

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## **Description of Multivariable Model Development**

The first multivariable model included age and sex as covariates. The second model included all potential confounding covariates that were significantly associated ( $p < 0.1$ ) with both the presence of a urinary catheter and subsequent bacteremia (outcome) in univariable analyses. There was no significant interaction between urinary catheter and any covariate. The third model and fourth (final) model were created by adjusting model 2 for clinical relevance and parsimony while preserving the accuracy and precision of the estimate of association between urinary catheter and subsequent bacteremia (Supplemental Table 1). The final model included urinary catheter as the exposure and central venous catheter, other indwelling device, and the location where the culture was obtained as covariates.

**Supplemental Table 1: Multivariable Models Estimating the Association Between Urinary Catheter and Subsequent Bacteremia in Patients with Carbapenem-Resistant Enterobacterales Bacteriuria**

Variable	Model 1	Model 2	Model 3	Model 4 <sup>a</sup>
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Urinary catheter <sup>b</sup>	8.4 (1.9–36.7)	5.4 (1.2–24.5)	5.5 (1.2–24.7)	5.3 (1.2–23.6)
Sex	1.2 (0.5–3.1)	--	--	--
Age	1.0 (0.98–1.0)	--	--	--
Central venous catheter <sup>b</sup>	--	1.8 (0.6–5.3)	1.9 (0.7–5.4)	1.8 (0.6–5.1)
Other indwelling device <sup>b</sup>	--	2.0 (0.6–6.4)	2.3 (0.7–7.2)	2.2 (0.7–6.5)
Location where culture was obtained				
Inpatient	--	3.4 (0.7–17.3)	3.4 (0.7–17.5)	3.1 (0.6–15.0)
LTCF or LTACH	--	2.4 (0.4–12.5)	2.1 (0.4–10.8)	2.1 (0.4–11.0)
Outpatient	--	Ref	Ref	Ref
ICU prior to the culture <sup>c</sup>	--	0.7 (0.2–2.6)	0.7 (0.2–2.4)	--
<i>Klebsiella pneumoniae</i> in culture		5.9 (0.8–45.7)		

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; Ref, reference; LTCF, long-term care facility; LTACH, long-term acute care hospital; ICU, intensive care unit

a. Final model selected

b. At the time culture was obtained or in the prior 2 calendar days

c. Any time in the 7 calendar days prior to the culture

**Supplemental Table 2:** Pulsed-Field Gel Electrophoresis (PFGE) Results on Paired Urine and Blood Carbapenem-Resistant Enterobacterales Isolates

Patient	Species	Time to Subsequent Bacteremia <sup>a</sup> (days)	Percent Similarity on PFGE
1	<i>Klebsiella pneumoniae</i>	22	100%
2	<i>Klebsiella pneumoniae</i>	25	91%
3	<i>Klebsiella pneumoniae</i>	27	100%
4	<i>Klebsiella pneumoniae</i>	31	100%
5	<i>Klebsiella pneumoniae</i>	35	100%
6	<i>Klebsiella pneumoniae</i>	101	75%
7	<i>Escherichia coli</i>	118	100%
8	<i>Klebsiella pneumoniae</i>	300	91%

a. Time between first CRE urine culture and first CRE blood culture

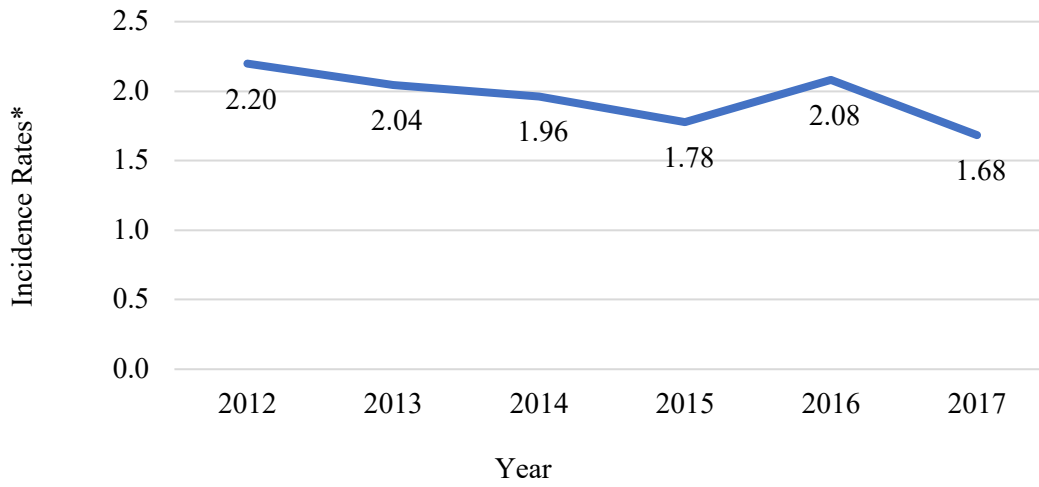
<b>Definition</b>	<b>Period</b>	<b>Species</b>	<b>Carbapenem Susceptibility Phenotype</b>
Initial CDC surveillance definition	2011–2015	<i>Escherichia coli</i> <i>Klebsiella pneumoniae</i> <i>Klebsiella oxytoca</i> <i>Enterobacter cloacae</i> <i>Klebsiella aerogenes</i> <sup>a</sup>	<u>Intermediate or resistant to:</u> - Imipenem (MIC $\geq$ 2 $\mu$ g/mL), or - Meropenem (MIC $\geq$ 2 $\mu$ g/mL), or - Doripenem (MIC $\geq$ 2 $\mu$ g/mL) <u>AND resistant to<sup>b</sup>:</u> - Ceftazidime (MIC $\geq$ 16 $\mu$ g/mL), and - Ceftriaxone (MIC $\geq$ 4 $\mu$ g/mL), and - Cefotaxime (MIC $\geq$ 4 $\mu$ g/mL)
Revised CDC surveillance definition	2016–present	<i>Escherichia coli</i> <i>Klebsiella pneumoniae</i> <i>Klebsiella oxytoca</i> <i>Enterobacter cloacae</i> <i>Klebsiella aerogenes</i> <sup>a</sup>	<u>Resistant to:</u> - Imipenem (MIC $\geq$ 4 $\mu$ g/mL), or - Meropenem (MIC $\geq$ 4 $\mu$ g/mL), or - Doripenem (MIC $\geq$ 4 $\mu$ g/mL), or - Ertapenem (MIC $\geq$ 2 $\mu$ g/mL)
Present Study	2011–2017	<i>Escherichia coli</i> <i>Klebsiella pneumoniae</i> <i>Klebsiella oxytoca</i> <i>Enterobacter cloacae</i> <i>Klebsiella aerogenes</i> <sup>a</sup>	<u>Resistant to:</u> - Imipenem (MIC $\geq$ 4 $\mu$ g/mL), or - Meropenem (MIC $\geq$ 4 $\mu$ g/mL), or - Doripenem (MIC $\geq$ 4 $\mu$ g/mL), or <u>AND resistant to<sup>b</sup>:</u> - Ceftazidime (MIC $\geq$ 16 $\mu$ g/mL), and - Ceftriaxone (MIC $\geq$ 4 $\mu$ g/mL), and - Cefotaxime (MIC $\geq$ 4 $\mu$ g/mL)

**Supplemental Figure 1:** Definitions of carbapenem-resistant Enterobacterales (CRE) used for surveillance during the study period. We created a unified definition for CRE that allowed us to make comparisons across the entire study period.

Abbreviations: CDC, Centers for Disease Control and Prevention; MIC, minimum inhibitory concentrations

a. Formerly *Enterobacter aerogenes*

b. If the antibiotics were tested



\*Cases per 100,000 people

**Supplemental Figure 2:** Trend in annual incidence rates of Carbapenem-Resistant Enterobacterales bacteriuria from 2012 to 2017 in Metropolitan Atlanta