was the most common non-KPC (n = 30) followed by OXA (n = 28). The proportion of CRE with no genotypic marker increased over the course of the study. Case characteristics were obtained from 41 non-KPC CP CRE cases; median age was 66 years (range: 6-94 years); 12 (29%) expired. Among the 41 cases, 20 (49%) had a central line; 11 (27%) had surgery; 14 (34%) had antibiotics in the 6 months prior to culture date. Of the 41 cases, 11 (27%) had international healthcare exposure within 12 months with an invasive procedure and/or antibiotics.

Conclusion. Surveillance in a large urban setting suggests the molecular epidemiology of CRE is changing, with declining prevalence of KPC, increasing metallo-β-lactamase CP, and a greater proportion of isolates without resistance markers detected. Given the worrisome trends in non-KPC CRE, more systematic surveillance is warranted, potentially using more robust molecular epidemiology.

Table 1. Enhanced CRE Surveillance 2015-2018 (n=1006).

| Characteristics | Total | N-MDRO | N-MI | p-value |
|-----------------|-------|--------|------|---------|
| CRE isolates    | 1006  | 496    | 510  | 0.032   |
| CRE isolates    | 1006  | 496    | 510  | 0.032   |
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| CRE isolates    | 1006  | 496    | 510  | 0.032   |
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| CRE isolates    | 1006  | 496    | 510  | 0.032   |
| CRE isolates    | 1006  | 496    | 510  | 0.032   |

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49.7. High Burden of CRE Colonization and Its Association with Infection Among Patients transferred to a Tertiary Care Hospital in India

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Background. Enterobacteriaceae (CRE) colonization and infection are associated with hospital length of stay and mortality. The emergence and spread of CRE in hospital settings has generated increased interest in their transmission. CRE have been associated with several antimicrobial resistance mechanisms including metallo-beta-lactamase (MBL), carbapenemases (KPC, NDM, VIM, IMP), and AmpC.

Methods. A matched case-case-control investigation was conducted at Medanta (Assaf Haroeh) Medical Center, for calendar years 2007–2017. Each CRE case was matched to a carbapenem-susceptible CRE (CS CRE) case and to an uninfected control (1:1:1 ratio). Logistic and Cox regression-matched analyses were conducted in order to study predictors and outcomes of CRE colonization and/or infection, respectively.

Results. The study included 216 cases (72 in each group). Numerous predictors were significantly associated with CRE colonization as per bivariant analyses, but the only independent significant predictors were: (1) recent (3 months) exposure to fluoroquinolones (aOR=2.94, P = 0.04), (2) intensive care unit stay in current hospitalization prior to culture (aOR=3.56, P = 0.003), and (3) a rapidly fatal McCabe score (aOR=4.71, P = 0.01). Patients with CRE colonization experienced significant delays in instituting appropriate antimicrobials (P = 0.03), and for those who survived the hospitalization, were more frequently discharged to a long-term care facility after being admitted to the index hospitalization from home (aOR=3.3, P = 0.02).

Conclusion. This case–case-control matched investigation of CRE epidemiology, revealed a unique modifiable predictor, i.e., recent fluoroquinolone exposure, which could target a potential strategy for stewardship intervention. The case–case–control–matched design allowed for the control of numerous confounders previously analyzed while implementing updated methodological tools and design.

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499. Carbapenem-resistant Enterobacteriaceae (CRE)-associated Infections and Prolonged Colonization among Hospitalized Patients Colonized by CRE

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Background. Carbapenem-resistant Enterobacteriaceae (CRE) are increasingly recognized as a significant source of healthcare associated infections. CRE are a group of Gram-negative bacilli carrying carbapenemase or metallo-beta-lactamase resistance patterns. CRE epidemiology revealed a unique modifiable predictor, i.e., recent exposure to fluoroquinolones, which could target a potential strategy for stewardship intervention.

Methods. This study aimed to determine rates of subsequent carbapenem resistance Enterobacteriaceae (CRE)-associated infections and prolonged colonization among patients colonized by CRE and to identify risk factors of such conditions.

Methods. This study was conducted among a cohort of hospitalized adult patients identified by CRE at admission. From June 1, 2015 to December 31, 2018, the patients had been prospectively identified by the Infection Control (IC) Division of a Thai tertiary-care hospital. According to the hospital's IC protocol, patients with CRE colonization/infections were isolated and underwent CRE cultured at the colonized/infection. Every week until the cultures have turned negative for 2 consecutive times. Prolonged colonization was defined as having CRE colonization more than 30 days.

Results. Of the 125 patients identified, 25 were excluded due to death, being transferred, or discharged within 48 hours of CRE colonization detected. The final

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cohort included 100 patients, the median age was 74 years, 48% were male, the most common colonized site was rectum (37%) and 20 patients (20%) developed subsequent CRE-associated infections. The median time from colonization to infection was 13 days and the most common site of infection was bloodstream (45%). Independent factors associated with subsequent CRE-associated infections were the number of colonization sites (adjusted odds ratio [aOR]=7.97, P<0.0011), and empirically-treated with antibiotics active against CRE while those with risk factors for prolonged colonization should receive continued surveillance and isolation to prevent CRE transmission.

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500. Prevalence of Extended-Spectrum β-lactamase and Carbapenem-Resistant Gram-Negative Bacteria in Patients with Urinary Tract Infection and Urosepsis Admitted through Emergency Departments in the United States

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Background. Gram-negative infections due to extended-spectrum β-lactamase (ESBL)-producing Enterobacteriaceae, and carbapenem-resistant Enterobacteriaceae (CRE) are increasingly encountered. Study objectives were to determine prevalence and associated risk factors and outcomes for these strains among emergency department patients hospitalized for urinary tract infection (UTI) at 11 US hospitals.

Methods. This was a prospective observational study of patients ≥218 years hospitalized for UTI. Clinical data were collected at the index visit. Urine was obtained for culture and susceptibility testing. Electronic medical record and telephone follow-up were conducted after 30 days for site laboratory results, treatment, and clinical outcomes. Positive culture was defined as ≥1 uropathogen with growth at ≥10 cfu/mL, or ≥3 with 1 or 2 at ≥10 cfu/mL. Isolates with ceftriaxone (CRO) or meropenem MIC >1 μg/mL will undergo reference laboratory (IHMA, Inc., Schaumburg, IL) susceptibility testing, including against newer antibiotics and carbapenem.

Results. We enrolled 774 participants between 2018 and 2019; 289 (37.3%) excluded due to urine culture not done, no growth, or contamination. Of 485 culture-positive participants (median age 56 years, 62.0% female), 432 (89.1%) grew ≥1 uropathogen with 48 (9.9%) 2, and 5 (1.0%) ≥3. Prevalences of CRO-resistant Enterobacteriaceae, CRE, and CR-NF were 19.3%, 2.1%, and 10.0%, respectively. At sites ≥5, 7.3% of CRO-resistant Enterobacteriaceae isolates were ESBL. Among participants with any or no antibiotic resistance risk factors, i.e., antibiotics, hospitalization, long-term care, or travel within 90 days, prevalence of CRO-resistant Enterobacteriaceae was 68/228 (29.8%) and 10/155 (6.5%), respectively. Among those with CRO-resistant vs. susceptible Enterobacteriaceae infections, ICU admission and death occurred in 9.6% vs. 6.6% and 3.7% vs. 1.0%, with median time home over 30 days, 24 vs. 27 days, respectively.

Conclusion. Among hospitalized patients with UTI, infections due to CRE remain uncommon; however, ESBL and CR-NF now account for a substantial proportion of cases and are associated with resistance risk factors and worse outcomes.

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501. Risk of Infection in Persons Colonized with Carbapenemase-Producing Enterobacteriaceae (CPE) in Ontario, Canada

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Table. Selected characteristics in patients who did and did not develop infection.

| Characteristics                                      | Developed infection | Collected only | P  |
|-------------------------------------------------------|---------------------|----------------|----|
| Age, years (median, IQR)                              | 64 (60-72)          | 69 (56-78)     | .03|
| Transferred from another hospital                     | 7 (9.9%)            | 42 (15.0%)     | .007|
| Invasive devices (current or within last year)        | 4 (5.2%)            | 9 (3.1%)       | .003|
| Central venous line                                   | 13 (16%)            | 60 (21%)       | <.001|
| Chest tube                                            | 4 (2.4%)            | 9 (3.1%)       | <.001|
| Urinary catheter                                      | 14 (17.8%)          | 30 (13.4%)     | .001|
| Central venous line                                  | 13 (16%)            | 29 (12%)       | <.001|
| Umbilical catheter                                    | 13 (16%)            | 38 (15%)       | <.001|
| Receiving hemodilans                                  | 13 (16%)            | 27 (11%)       | .01|

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502. Klebsiella variicola Infections in Service Members Who Sustained Trauma in Iraq and Afghanistan

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Background. Recent work has argued that genus Klebsiella is best divided into 3 clades: K. pneumoniae (Kp), K. quasipneumoniae (Kq), and K. variicola (Kv). Kv has drawn attention from reports of higher mortality and virulence. We evaluated a previously defined group of military trauma patients with Klebsiella infections for the presence of Kv, described clinical and isolate characteristics, and compared Kv and Kp groups.

Methods. All initial and serial (≥2 days from prior isolate) infecting Kp isolates (identified by clinical laboratories without the ability to speciate Kq and Kv)