Table 3: Comparison of In-hospital Mortality Among EU Patients with CRE and CSE

| Enterobacteriaceae isolate | Carbenapenem-Susceptible (%) | Carbenapenem-Resistant (%) | Total | p-value |
|---------------------------|-------------------------------|-----------------------------|-------|---------|
| Survived                  | 95 (7.2%)                     | 79 (6.1%)                   | 174 (68.9%) | 0.032 |
| Died                      | 33 (25.8%)                    | 49 (38.3%)                  | 82 (12.0%) |

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4.96. Carbapenem-resistant Enterobacter: A Case–Case–Control Investigation

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Background. The World Health Organization has declared carbapenem-resistant Enterobacteriaceae (CRE) as a worldwide public health threat. Analyzing the epidemiology of CRE was derived from cohorts consisting primarily of Klebsiella pneumoniae isolates. The second most frequent CRE is Enterobacter (CReN), but its molecular and clinical epidemiology differ from that of K. pneumoniae, and it has not been analyzed while implementing updated molecular tools and design.

Methods. A matched case–case–control investigation was conducted at Shamir (Assal Harofeh) Medical Center, Israel, for calendar years 2007–2017. Each CRE case was matched to a carbapenem-susceptible Enterobacter (CSeN) case and to an unmatched control (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 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=0.471, P = 0.01). A recent exposure to fluoroquinolones, which could represent a target for stewardship intervention. The case-case–control-matched investigation of CRE epidemiology, revealed a unique modifiable predictor, i.e., recent fluoroquinolone exposure, which could target a course for stewardship intervention. The case–case–control–matched design allowed for the control of numerous confounders previously reported to be associated with CRE infection in general. As with other CRE, CRE carriers suffer from significant delays in initiation of appropriate antimicrobials and from worse outcomes.

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4.97. Changing Molecular Epidemiology of CRE from 2016–2018, Increase in the Non-KPC Resistance Mechanisms

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Background. Historically, endemic K. pneumoniae carbapenemase (KPC) has accounted for the majority of carbapenem-resistant Enterobacteriaceae (CRE) in Los Angeles County (LAC). The LAC Department of Public Health (DPh) initiated enhanced CRE surveillance in 2016 to determine CRE prevalence and track emerging non-KPC resistance mechanisms (IMP, NDM, OXA, and VIM) among CRE to describe characteristic strains and identify local epidemiology for novel multidrug-resistant organism (N-MDRO) infection and colonization.

Methods. CRE isolates were voluntarily submitted by local clinical laboratories for mechanism detection by LAC Public Health Laboratory via MALDI-TOF and Xpert Carba R (Cepheid) performed on the day of transfer. subsequently recovered of CRE in cultures of blood, bronchoalveolar lavage fluid, urine in specimens with pyuria obtained from patients without urinary catheters, pus, and tissue were considered to be indicative of CRE infection. The association of CRE colonization with subsequent CRO infection was assessed with a Fisher exact test.

Results. Among 457 patients screened, 205 patients (45%) were found to be colonized with CRO at admission. Genes for New Delhi Metallo-β-lactamase (NDM) were detected in 184 (40%) patients, OXA-48 in 97 (21%) patients, VIM in 18 (4%) patients, KPC in 5 (1%) patients, and IMP in 15 (4%) patients; >1 carbapenemase gene was detected in 95 (21%) patients. CRE infections were observed in 25 (5%) patients including 12 with bacteraemia, 7 with pneumonia, 4 with urinary tract infection, and 2 with soft-tissue infection. Among patients with CRO colonization, 17 (8%) patients developed CRO infection during the course of hospitalization; among patients without admission CRO colonization, subsequent CRO infection was found in 8 (3%) patients. CRO admission colonization was associated with subsequent clinical infection with CRO (odds ratio 2.8, P = 0.002). CRE colonization was found in almost half of patients transferred from outside hospitals to a large tertiary care hospital in India and was associated with subsequent CRO infection. Further work is necessary to understand the role of CRO colonization screening in infection control and antimicrobial stewardship in a setting with high CRE burden.

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

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Background. Infections with carbapenem-resistant organisms (CRO) are increasing worldwide and are associated with high mortality. Patients transferred from outside hospitals have been reported to be at increased risk of CRO colonization and infection. The rate of subsequent CRO infection in patients colonized with CRO is unknown.

Methods. Medanta Hospital in Gurgaon, India, initiated CRO screening for patients transferred from outside hospitals for infection control purposes. From April 2018 to May 2018, patients transferred from other hospitals to the intensive care unit at Medanta were subjected to CRO colonization screening using Xpert Carba R (Cepheid) performed on the day of transfer. Subsequent recovery of CRO in cultures of blood, bronchoalveolar lavage fluid, urine in specimens with pyuria obtained from patients without urinary catheters, pus, and tissue were considered to be indicative of CRO infection. The association of CRE colonization with subsequent CRE infection was assessed with a Fisher exact test.

Results. Among 457 patients screened, 205 patients (45%) were found to be colonized with CRO at admission. Genes for New Delhi Metallo-β-lactamase (NDM) were detected in 184 (40%) patients, OXA-48 in 97 (21%) patients, VIM in 18 (4%) patients, KPC in 5 (1%) patients, and IMP in 15 (4%) patients; >1 carbapenemase gene was detected in 95 (21%) patients. CRE infections were observed in 25 (5%) patients including 12 with bacteraemia, 7 with pneumonia, 4 with urinary tract infection, and 2 with soft-tissue infection. Among patients with CRO colonization, 17 (8%) patients developed CRO infection during the course of hospitalization; among patients without admission CRO colonization, subsequent CRO infection was found in 8 (3%) patients. CRO admission colonization was associated with subsequent clinical infection with CRO (odds ratio 2.8, P = 0.002). CRE colonization was found in almost half of patients transferred from outside hospitals to a large tertiary care hospital in India and was associated with subsequent CRO infection. Further work is necessary to understand the role of CRO colonization screening in infection control and antimicrobial stewardship in a setting with high CRO burden.

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

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Background. This study aims to determine rates of subsequent carbapenem-resistant 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/infections. Every week until the cultures have turned negative for 2 consecutive times. Prolonged colonization was defined as having CRE colonization detected. Given the worrisome trends in non-KPC CRE, more systematic surveillance is warranted, potentially using more robust molecular epidemiology.

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