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Background. CRE cause substantial morbidity and mortality. The purpose of this study was to describe the clinical, epidemiological, molecular and microbiological characteristics of our patients with CRE.

Methods. Patients with CRE strains isolated from July 2013 to July 2015 were identified at a tertiary care VA hospital and a university-affiliated hospital in San Antonio, TX. CRE was defined as a strain with imipenem, meropenem, or doripenem MIC ≥2 μg/ml or disk diffusion zone diameter ≤22 mm (using 10 μg disks) and resistance to β-lactamase genes in 19 isolates.

Results. A total of 25 patients were identified. Thirteen had CRE infections; the remaining were colonized. Seventeen (68%) were men and average age was 55 years. Nineteen (76%) patients were hospitalized and 57.8% of them were readmitted within 30 days. Thirty day mortality was 20%. Sixty percent had history of multi-drug resistant organisms. Patients had history of prior hospitalization (88%), surgery (76%) and central line (72%). Only 12% received appropriate empiric therapy. Klebsiella pneumoniae was the most common isolate (60%) followed by Enterobacter (12%). Cefazidime–Avibactam (CAZ-AVI) susceptibility was tested in 18 isolates and they were all found to be susceptible by FDA approved breakpoints. K. pneumoniae carbapenemases (KPC) were identified in 10 isolates (52.6%). No oxacillinase-4-type carbapenemases (blaOXA-48) or New Delhi metallo-β-lactamase (blaNDM) were detected. Prior healthcare exposures are listed in Table 1.

Table 1

| Exposure during prior 12 months | No blaOXA-48 | blaOXA-48
|------------------------------|-------------|-------------|
| Surgery                      | 70%         | 89%         |
| Hospitalization               | 100%        | 89%         |
| Long-term facility            | 40%         | 33%         |
| Admission to acute long-term | 50%         | 11%         |
| Care hospital                 | 10%         | 11%         |
| Admission to ICU              | 70%         | 44%         |
| Duodenoscopy                  | 10%         | 22%         |
| ERCP                         | 0           | 22%         |
| Central line                  | 90%         | 78%         |
| Urinary Catheter 2 calendar days prior to culture | 70% | 44% |
| Antibiotics 3 months prior to diagnosis | 80% | 78% |

Conclusion. CRE continues to be infrequent at South Texas but it is associated with high morbidity and mortality. Patients with CRE had frequent healthcare contact, especially acute long-term facilities, and blaKPC was the most common carbapenemase detected. All isolates were susceptible to CAZ-AVI.

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355. Sensitivity of Different Anatomic Sites for Detection and Duration of Colonization with Carbapenemase-Producing Enterobacteriaceae (CPE)

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Background. CRE are a growing threat worldwide. Screening to identify colonization with carbapenemase-producing Enterobacteriaceae (CPE) are a growing threat worldwide. Screening to identify colonization with carbapenemase-producing Enterobacteriaceae (CPE) is essential. Colonization with CRE is defined by CLSI breakpoints in effect during a given year. Inclusion criteria were: (i) hospital admission; (ii) age ≥18 years; (iii) ≤2 blood culture positive for an Enterobacteriaceae species demonstrating resistance to ≥1 carbapenem agent per 2015 CIDC definitions (including entrapment). In recurrent CRE-BSI, only the first case was included. Incidence densities of CRE-BSI were compared year-by-year (overall and by CRE species category) using linear regression analysis.

Results. A total of 1,361 CRE-BSI cases were observed over the study period, corresponding to an overall incidence of 1.74 cases/10,000 hospitalizations. There was a profound increase in the incidence of CRE-BSI from 1.08 cases/10,000 hospitalizations in 2004 to 2.24 cases/10,000 hospitalizations in 2009. Following a decrease in incidence in 2010 (1.61 cases/10,000 hospitalizations), rates of CRE-BSI increased again by 2013 (1.90 cases/10,000 hospitalizations). The majority of CRE-BSI cases (44%) were due to Klebsiella pneumoniae (n = 638, 49.0%), followed by Enterobacter species (n = 188; 14.5%), Proteus species (n = 148; 11.1%), and Escherichia coli (n = 120; 9.2%). The incidence of CRE-BSI caused by Proteus species increased from 0.19 cases/10,000 hospitalizations in 2009 to 0.38 cases/10,000 hospitalizations in 2014. In contrast, the incidence of CRE-BSI caused by E. coli decreased from 0.29 cases/10,000 hospitalizations in 2009 to 0.10 cases/10,000 hospitalizations in 2014.

Conclusion. In a national sample of hospitalized VA patients, marked changes in the incidence of CRE-BSI were observed from 2004 to 2014. Rates of CRE-BSI caused by Proteus species appear to be increasing and rates of CRE-BSI caused by E. coli appear to be decreasing.

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357. Optimized β-Lactam Therapy Improves Survival in Carbapenem Non-Susceptible Gram-Negative Infections

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**Background.** Infections due to carbapenem non-susceptible organisms are associated with significant mortality. The objective of this study was to identify modifiable predictors for survival in patients with these infections with a focus on antimicrobial therapies.

**Methods.** This was a case–control study at a four-hospital health-system. Patients were included if they were ≥18 years of age with a carbapenem-resistant infection. Patients were matched 2:1 for inclusion if they were ≥18 years of age and had a carbapenem non-susceptible organism from November 2013 to October 2016. Exclusion criteria were infections localized to the urinary tract or hospice designation. The primary objective was to identify independent predictors of all cause 30-day mortality. Phage-styodynamic (PD) optimized BL therapy was the exposure of interest, defined as doses administered to patients expected to obtain an estimated target attainment of ≥90% of FT – MIC targets associated with a log kill for the isolated pathogens MIC, based on published PK/PD literature and the renal function of the patient.

**Results.** A total of 203 patients were included. Median age was 61 (49–70) and charlson comorbidity index was 2 (1–4). Forty-one (20%) had septic shock and 30-day mortality was observed in 63 (31%). P. Aeruginosawas the causative pathogen in 149 (73%) of patients with Enterobacteriaceae representing the other 54 (27%). Lower respiratory tract infection were the most common (n = 128; 63%). Fifty-five patients received combination therapy (27%) with the most common combination consisting of BL and aminoglycoside (38%). Mortality was observed in 22% of patients receiving combination therapy compared with 35% monotherapy (P = 0.07). Forty-five percent of patients received a 24 h blood sample for BL and not PD optimized, and 30% without a BL. Receipt of PD optimized BL and combination therapy were independent predictors of survival (table).

**Conclusion.** PD optimized BL therapy and combination therapy were associated with improved 30-day survival.

### Table

|                | Survived, n = 140 | Expired, n = 63 | CRude OR (95% CI) | Adjusted OR (95% CI) |
|----------------|-------------------|-----------------|-------------------|----------------------|
| Received PD optimized β-lactam | 71 (78%) | 20 (22%) | 2.2 [1.2–4.1] | 2.2 [1.1–4.3] |
| Septic shock | 16 (39%) | 25 (61%) | 0.2 [0.1–0.4] | 0.1 [0.1–0.3] |
| Combination therapy | 44 (80%) | 11 (20%) | 1.9 [1.4–6.3] | 3.0 [1.2–7.2] |
| Malignancy | 18 (53%) | 16 (47%) | 0.4 [0.2–0.9] | 0.4 [0.2–0.8] |

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### 358. Explosive Emergence of Colistin-Resistant and Carbapenem-Resistant Enterobacteriaceae (CRE) Among Community Food-Handlers in Kuwait

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**Background.** Colistin is an antimicrobial agent used as last resorts for the treatment of carbapenem-resistant Enterobacteriaceae (CRE) and multidrug-resistant Gram-negative bacterial infections. Enterobacteriaceae cause urinary tract infections and other potentially life-threatening sepsis. The extent of colistin resistance and CRE among healthy individual food-handlers in various community eateries. Comparatively lower prevalence of CRE was encountered. These findings call for introduction of preventive measures by Public Health Authority to prevent dissemination among the general population at large. Further genetic study is needed to evaluate the determinants of colistin resistance among the Enterobacteriaceae in our community.

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### 359. Clinical Outcomes of Patients with IMP-type Carbapenemase-Producing Enterobacteriaceae (CPE)

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**Background.** Dominant molecular types of carbapenemase-producing Enterobacteriaceae (CPE) vary geographically. The clinical outcome of IMP type CPE (IMP-CPE), the dominant type in Japan, is not well known.

**Methods.** Non-meropenem-susceptible per CLSI criteria and/or cefazidime-resistant Enterobacteriaceae were screened, and metallo-ß-lactamase-positive isolates were examined for blaIMP by PCR. Unique IMP-CPE-positive cases (January 2012–December 2016) were included. Medical charts were reviewed retrospectively.

**Results.** Enterobacter cloacae (EC) (n = 67; 59%) were most frequently isolated followed by Klebsiella pneumoniae (KP) (n = 31; 27.7%), Citrobacter freundii (n = 4; 3.6%), and E. coli (n = 4; 3.6%) among 112 IMP-CPE identified. Although 30-day mortality was slightly higher in KP, clinical outcomes and background factors were similar between KP and EC; isolation sites were significantly different (P = 0.04). In 10 bacteremia cases, 1 of 9 (11.1%) EC patients died in hospital within 30 days. All CPE except EC 1 were sensitive to ≥1 of levofloxacin (LVFX), amikacin (AMK), or gentamicin (GM). GM resistance was more common in KP than in EC (P < 0.01). Independent predictor for 30-day mortality was age adjusted Charlson Comorbidity Index (acc) ≥8 (adjusted odds ratio 6.4 [95% CI: 1.9–21.7], P = 0.003) in multivariate analysis controlled for species of CPE, and polymicrobial isolation.

**Conclusion.** IMP-CPE had significant clinical impact on, and higher mortality in, the elderly population with multiple comorbid conditions.

**Clinical outcomes of IMP-CPE, n (%)**

|                | Whole cohort (n = 112) | KP (n = 31) | EC (n = 67) |
|----------------|------------------------|-----------|------------|
| 30-day mortality | 16 (14.3) | 6 (20) | 8 (12) |
| in-hospital mortality | 22 (19.6) | 6 (19.4) | 12 (17.9) |
| Functional deterioration | 12 (13.6) | 2 (6.4) | 10 (14.9) |
| Dependent status on discharge | 69 (78.4) | 17 (54.8) | 52 (77.9) |
| Re-admission ≥30 days | 33 (29.8) | 13 (41.9) | 20 (29.9) |
| Weight ≥10% of discharge after isolation (days) | 113 (99.1) | 33 (103.2) | 80 (118.8) |
| Background factors | | | |
| median, (IQR) | | | |
| Age | 76 (65–85) | 77 (65–86) | 76 (65–86) |
| ACI | 5 (4–7) | 5 (4–7) | 5 (4–7) |
| Sites | | | |
| Blood | 10 (8.9) | 10 (8.0) | 10 (14.9) |
| Urine | 43 (38.4) | 43 (38.4) | 43 (64.2) |
| Wound | 42 (37.5) | 42 (37.5) | 42 (63.4) |
| Susceptibility | | | |
| LVFX | 63 (56.4) | 63 (56.4) | 63 (94.0) |
| AMK | 67 (59.5) | 67 (59.5) | 67 (99.5) |
| GM | 89 (79.5) | 89 (79.5) | 89 (131.0) |

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### 360. Carbapenem-Resistant Enterobacteriaceae Associated with High Rates of Clinical Failure Despite Best Available Therapy

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**Background.** IMP-CPE had significant clinical impact on, and higher mortality in, the elderly population with multiple comorbid conditions.