**492. High Prevalence of Colonization with Carbapenem-Resistant Enterobacteriaceae Among Patients Admitted to Vietnamese Hospitals: Risk Factors and Burden of Disease**

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**Session:** 54. HAI: MDRO – GNR Epidemiology, CRE
*Thursday, October 3, 2019: 12:15 PM*

***Background.*** Carbapenem-resistant Enterobacteriaceae (CRE) is an increasing problem worldwide, but particularly problematic in low- and middle-income countries (LMIC) due to limitations of resources for surveillance of CRE and infection prevention and control (IPC).

***Methods.*** A point prevalence survey (PPS) with screening for colonization with CRE was conducted on 2233 patients admitted to neonatal, pediatric and adult care at 12 Vietnamese hospitals located in northern, central and southern Vietnam during 2017 and 2018. CRE colonisation was determined by culturing of fecal specimens on selective agar for CRE. Risk factors for CRE colonisation were evaluated. A CRE admission and discharge screening sub-study was conducted among one of the most vulnerable patient groups; infants treated at an 80-bed Neonatal ICU from March throughout June 2017 to assess CRE acquisition, hospital-acquired infection (HAI) and treatment outcome.

***Results.*** A total of 1165 (52%) patients were colonized with CRE, most commonly *Klebsiella pneumoniae* ($n$ = 805), *Escherichia coli* ($n$ = 682) and *Enterobacter* spp. ($n$ = 61). Duration of hospital stay, HAI, intubation, peripheral venous catheter and treatment with a carbapenem were independent risk factors for CRE colonization. The PPS showed that the prevalence of CRE colonization increased on average 4.2% per day and mean CRE colonisation rates increased from 13% on the day of admission to 89% at day 15 of hospital stay. At the NICU CRE colonisation increased from 32% at admission to 87% at discharge, mortality was significantly associated (OR 5·5, $P < 0·01$) with CRE colonisation and HAI on admission.

***Conclusion.*** These data indicate that there is an epidemic spread of CRE in Vietnamese hospitals with rapid transmission to hospitalized patients. CRE colonization places a major burden on the healthcare system due to the increased risk of HAI caused by CRE and associated increased mortality. This study shows that large-scale epidemiological surveillance of CRE using affordable methods is possible in low- and middle-income countries.

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**493. Laboratory Evaluation and Epidemiology of Carbapenemase-Producing Carbapenem-Resistant *Enterobacteriaceae* in Department of Veterans Affairs, 2017**

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**Session:** 54. HAI: MDRO – GNR Epidemiology, CRE
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***Background.*** Carbapenemase-producing (CP)-carbapenem-resistant Enterobacteriaceae (CRE) pose a major threat to public health and are a priority target of national prevention and control efforts including within Department of Veterans Affairs (VA). The laboratory evaluation and epidemiology of CRE in VA is uncertain.

***Methods.*** Using data from the Veterans Health Administration Corporate Data Warehouse, we identified all Veterans with ≥1 CRE result obtained during 2017 and reviewed their electronic health record. Two case definitions were used: (1) 2015 CDC CRE (Enterobacteriaceae resistant to any carbapenem or with documented carbapenemase production) and (2) 2017 VA CP-CRE (*E. coli, Klebsiella* spp., *and Enterobacter* spp. resistant to imipenem, meropenem, or doripenem or with documented carbapenemase production). Patients harboring carbapenemase-producers detected by rectal screening tests only were included. We reviewed patient charts whose isolates met both CRE definitions, extracting detailed microbiologic and travel data for the first positive 2017 result.

***Results.*** We identified 904 unique Veterans with CRE; 577 (64%) patients had results meeting both CRE case definitions while 327 (36%) had results meeting CDC CRE criteria only (Figure 1). Of the 458 patients with clinical isolates meeting both case definitions, urine specimens predominated (64%) and were associated with the lowest crude 90-day mortality (16%); mortality was highest amongst patients with respiratory tract cultures (40%) and bloodstream isolates (34%) (Figure 2). Nearly half (48%) of VA CP-CRE were tested for carbapenemases (76% in-house; 24% send-out); of these, 75%tested positive with 78% being a KPC, 1% NDM, and 21% unspecified (Figure 3). Additionally, all 119 CRE carriers with an identified gene had KPC. Only 7 patients (1%) had documented overseas travel.

***Conclusion.*** Currently the incidence of CP-CRE in the nation's largest healthcare system is low relative to other problem pathogens such as MRSA and *Clostridioides difficile* but is associated with a high crude mortality especially with respiratory and bloodstream isolates. KPC comprised almost all carbapenemases identified. This provides an initial, granular snapshot of CRE in VA to serve as a roadmap for ongoing CP-CRE prevention and control.

**Figure 1: Incidence of CRE in VA, 2017**

| Result Type* | n | % | Incidence** (2017 patient years n = 1,823,140) |
|---|---|---|---|
| VA CP-CRE | 458 | 51% | 0.0251% |
| CRE Screen only | 119 | 13% | 0.0065% |
| *Results meeting both case definitions* | *577* | *64%* | *0.0316%* |
| CDC CRE only | 327 | 36% | 0.0179% |
| **Total CRE** | **904** | **100%** | **0.0496%** |

*Result Type Definitions
VA CP-CRE: All clinical cultures meeting 2017 VA CP-CRE also meet the 2015 CDC CRE definition.
CRE Screen only: Rectal or perirectal swab-positive cases without clinical cultures – i.e., patients identified as having CP-CRE colonization; this meets both CRE case definitions.
CDC CRE only: CDC CRE only consist of clinical cultures meeting the 2015 CDC CRE definition but not the 2017 VA Suspected CP-CRE definition.

**Incidence calculated using "2017 patient years" as denominator, which represents the number of Veterans who accessed the VA system for medical care nationally in 2017.

**Figure 2: VA CP-CRE Specimen Type and Associated Crude 90-day Mortality**

| Specimen Type | n | % | 90-Day Mortality (n) | 90-Day Mortality (%) |
|---|---|---|---|---|
| Urine | 293 | 64% | 47 | 16% |
| Respiratory Tract | 55 | 12% | 22 | 40% |
| Wound | 46 | 10% | 13 | 28% |
| Other | 35 | 8% | 8 | 23% |
| Blood | 29 | 6% | 10 | 34% |
| **Total** | **458** | **100%** | **100** | **22%** |