120. Multimodal Sequencing of a Clonal Case Cluster of Carbapenem-Resistant Citrobacter Reveals Unexpectedly Rapid Dynamics of KPC-3-Containing Plasmids

Background. Carbapenem-resistant Enterobacteriaceae (CRE) are a major public health threat. We report four clonally related *Citrobacter freundii* isolates harboring the *bla*KPC-3 carbapenemase in April–May 2017 that are nearly identical to a strain previously identified at the same institution in 2014. Despite differing by ≤5 single nucleotide polymorphisms (SNPs) within the same genome, these isolates exhibited dramatic differences in carbapenemase plasmid architecture.

Methods. We sequenced four carbapenem-resistant *C. freundii* isolates from 2013 to 2017 at the same institution and compared them with an ongoing CRE surveillance project at our institution. SNPs were identified from Illumina MiSeq data aligned to a reference genome using the software tool Unicycler. To evaluate genetic relationship among IMP-CPE isolates of different species, plasmid analysis using S1 nuclease to separate plasmid and chromosomal DNA followed by plasmid DNA extraction and whole-genome sequencing (WGS) was conducted.

Results. During the study period, 22 cases were identified and 22 IMP-CPE isolates which consisted of eight *Escherichia coli*, five *Klebsiella oxytoca*, five *Enterobacter cloacae*, three *Klebsiella pneumoniae* and one *Enterobacter aerogenes* were obtained. All five isolates of *K. oxytoca* had similar PFFGE profiles which suggested clonal transmission. However, PFFGE profiles of *E. coli*, *E. cloacae* and *K. pneumoniae* isolates were diverse. Plasmid analysis revealed that all 22 isolates shared ca. 50 kb IncN plasmid with *bla*KPC-3 which implies interspecies transmission of it. The case–control study which adjusted odds ratio (aOR) = 6.8, 95% confidence interval (CI) 1.3–32.4) and enteric fistula (aOR = 8.6, 95% CI 1.5–41.9) were associated with IMP-CPE acquisition. Use of endoscopy within the past six months was not associated with IMP-CPE (aOR = 0.8 95% CI 0.2–4.2). With a bundled infection control with Osaka City Hospital, the CRE outbreak was controlled in July 2016.

Conclusion. Dissemination of carbapenemase gene by transfmissible plasmid can play a critical role to complicate epidemiology of CRE outbreak and make it difficult to control. Plasmid analysis using WGS technology is a promising tool to untangle it.

Disclosures. All authors: No reported disclosures.

120.4. Multidrug Resistant Organisms (MDRO) Posing a Growing Burden, Including in Non-Hospital Settings. Delay in Initiation of Appropriate Antimicrobial Therapy (DAAT) upon Admission to an Acute Care Hospital is Common and is Associated with Worse Outcomes.

Background. Multi-drug-resistant organisms (MDRO) pose a growing burden, including in non-hospital settings. Delay in initiation of appropriate antimicrobial therapy (DAAT) upon admission to an acute care hospital is common and is associated with worse outcomes. The aim of this study was to develop a prediction score for MDRO infection upon admission, in order to improve patients’ outcomes and avoid misuse of broad-spectrum antimicrobials.

Methods. A retrospective case–control analysis was conducted at Assaf Harofeh Medical Center, Israel, comparing adult patients with MDRO infections diagnosed in the first 48 hours of hospitalization to patients presenting with non-MDRO sepsis (i.e., patients with microbiologically confirmed non-MDRO infection, or patients with non-microbiologically confirmed sepsis). MDROs were determined by clinical laboratory testing. Patients were identified over four consecutive months (August–December 2016). A multivariable logistic regression of predictors for MDRO infection upon admission was used to develop the prediction score.

Results. Ninety-five of 818 total patients (11.6%) had MDRO infection. The final score included 10 parameters: (1) home therapy (IV therapy, wound care, or specialized nursing care, 16 points), (2) routine (at least weekly) outpatient clinic visits in the past 3 months (15 points), (3) history (2 years) of past MDRO colonization (14 points), (4) any antibiotics in the preceding 3 months (12 points), (5) invasive procedure in the past 6 months (11 points), (6) elderly (>65 years old, 10 points), (7) hemiplegia or paraplegia (8 points), (8) resident of long-term care facility (7 points), (9) severe sepsis (severe sepsis, septic shock, or organ failure, 6 points), and (10) any kidney injury (5 points). A cutoff of ≥24 points had a sensitivity of 90%, a specificity of 73%, and an ROC AUC = 0.88 (figure).

Conclusion. This study presents the development of a new prediction score for MDRO infection upon admission, based on parameters that could easily be extracted from clinical and laboratory data from admission to 12mo post discharge was reviewed. Genes associated with VRE (VanA), ESBL (CTX-M), carbapenem-producing organisms or CPOs (OXA-23, OXA-51) and CREs (KPC,NDM,VIM, IMP, OXA-48) were tested on swabs by the Acuitas-MDRO Test (OpGen, Inc.)

Results. Between July 2015 and August 2016, 565 hospitalized patients were screened with 210 swabs collected from 182 subjects. One swab was non-gradable. Subjects had a mean age 67.5 ± 12 years (26-94 years, 38% >70 years) and 39% were 1st time users of aminoglycosides at admission. Subjects were hospitalized for a cumulative bed-days (1-81 days) with median LOS of 3 days; 84% (152/182) had a stay of a week or less. Among those who remained hospitalized long enough for serial testing, 45% were willing or able to provide >1 swab. Those with >1 swab were significantly older (P = 0.03), more likely to have had a recent infection diagnosis (48% vs. 24%, P = 0.02). All subjects negative for MDRO genes on admission with >1 swab remained negative on serial sampling. Sixteen subjects (8.8%) had one or more genes present on screening and all three with >1 swab had persistence of that gene on repeat sampling. Genes harbored included CTX-M (4.4%), VazN (4.4%), OXA-51(0.6%), KPC (0.6%).

Conclusion. The rate of occult MDRO colonization was low in our predominately elderly hospitalized patients. The majority of consenting participants were discharged before swabs could be repeated. Serial sampling revealed that results of swabs persisted over time in the same subject despite treatments received during hospitalization, including exposures to antibiotics. The identification of occult MDRO carriage during a hospitalization, even when obtained after admission, may have utility in guiding treatment for providers.

Disclosures. All authors: No reported disclosures.

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Background. Multi-drug-resistant organisms (MDRO) pose a growing burden, including in non-hospital settings. Delay in initiation of appropriate antimicrobial therapy (DAAT) upon admission to an acute care hospital is common and is associated with worse outcomes. The aim of this study was to develop a prediction score for MDRO infection upon admission, in order to improve patients’ outcomes and avoid misuse of broad-spectrum antimicrobials.

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Results. Fifty-five of 818 total patients (11.6%) had MDRO infection. The final score included 10 parameters: (1) home therapy (IV therapy, wound care, or specialized nursing care, 16 points), (2) routine (at least weekly) outpatient clinic visits in the past 3 months (15 points), (3) history (2 years) of past MDRO colonization (14 points), (4) any antibiotics in the preceding 3 months (12 points), (5) invasive procedure in the past 6 months (11 points), (6) elderly (≥65 years old, 10 points), (7) hemiplegia or paraplegia (8 points), (8) resident of long-term care facility (7 points), (9) severe sepsis (severe sepsis, septic shock, or organ failure, 6 points), and (10) any kidney injury (5 points). A cutoff of ≥24 points had a sensitivity of 90%, a specificity of 73%, and an ROC AUC = 0.88 (figure).

Conclusion. This study presents the development of a new prediction score for MDRO infection upon admission, based on parameters that could easily be extracted from clinical and laboratory data from admission to 12mo post discharge was reviewed. Genes associated with VRE (VanA), ESBL (CTX-M), carbapenem-producing organisms or CPOs (OXA-23, OXA-51) and CREs (KPC,NDM,VIM, IMP, OXA-48) were tested on swabs by the Acuitas-MDRO Test (OpGen, Inc.)
Conclusion. CPE is increasingly recognized in southern Ontario, both in patients with a history of exposure in healthcare in other countries, and to healthcare in Canada. Intensification of control programs is urgently needed.

Figure 1. Incidence of clinical isolates of CPE over time.

Figure 2. Number of incident CPE cases with different hospitalization (H) and travel (T) history over time.

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1206. Risk Factors of Antibiotic Resistance in E. coli Isolated from the MAL-ED Birth Cohort Study in Rural Tanzania

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Background. The emergence and spread of antimicrobial resistance is a serious global public health crisis. Drug-resistant Gram-negative bacteria, like Escherichia coli, are particularly concerning given their significant morbidity and mortality. Despite the increasing prevalence of drug-resistant Gram-negative bacteria worldwide, there are significant knowledge gaps in low-resource countries. We aimed to characterize the prevalence, phenotypes, and risk factors of drug-resistant E. coli carriage in children up to age 5 from a household-based cohort study of Enteric Infections and Malnutrition and the Consequences for Child Health and Development (MAL-ED) birth cohort study in rural Tanzania.

Methods. Two hundred sixty-two children were enrolled in the MAL-ED Tanzania site. We randomly selected 100 children who had E. coli specimens archived every 6 months through 60 months. Up to five lactose-fermenting colonies were selected from growth on MacConkey agar. Drug susceptibility testing of 18 antibiotics was performed by disk diffusion. CLSI interpretive criteria were used for determination of resistance. Generalized estimating equations were used to create a multivariate Poisson regression model for drug resistance risk factors.

Results. Eight hundred twenty-three E. coli specimens were available for testing. The highest rates of resistance were to ampicillin, cefazolin, and cotrimoxazole, respectively. No carbapenem resistance was found. 1.8% met criteria for extended-spectrum β-lactamase production based on combination disk testing. 696 (84.6%) specimens met criteria for multi-drug resistance (nonsusceptible to at least 1 drug in at least 3 drug categories). In terms of dynamic risk factors, there was no association between antibiotic use or episodes of diarrhea and antibiotic resistance. For static risk factors, there was an association between higher income and increased antibiotic resistance.

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