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Paper Poster Session
Emergence and worldwide outbreaks of carbapenemase-producing bacteria

Emergence and nosocomial spread of Carbapenem-resistant Klebsiella pneumoniae in Brunei Darussalam

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Background: Carbapenem resistant *Enterobacteriaceae* (CRE) are identified as a major global health concern. They account for myriad infections (urinary tract, pneumonia, bacteremia, surgical site) associated with substantial attributable morbidity and mortality. The success of CRE is facilitated by the emergence, acquisition and spread of successful clones carrying plasmid encoded resistance genes. Here we report on a cluster of infections due to a MDR strain of *K. pneumoniae* recovered from hospitals in Brunei Darussalam in 2015.

Material/methods: Carbapenem resistant *K. pneumoniae* were recovered from 5 patients admitted over a 3 month period (May – July 2015) to general and critical care wards (ICU) at the main (RIPAS) and district hospitals (Tutong) in Brunei. Antimicrobial susceptibility (MIC) was determined by broth microtiter dilution using the Micronaut-S β-lactamase VII kit. Carbapenemase production was confirmed using the RAPID CARB screen and class A, B, C and D β-lactamases detected by multiplex PCR. Molecular typing was performed by RAPD and MLST with associated virulence and capsular types identified by PCR and sequencing. Plasmids were extracted, sized and characterized by PCR-based replicon typing (PBRT).

Results: All isolates were resistant to cephalosporins, carbapenems, aminoglycosides, quinolones and sulfonamides, but remained susceptible to polymyxins. Isolates were indistinguishable by RAPD PCR and all belonged to sequence type ST 231. Multi-drug resistance (MDR) in this clone was mediated by TEM-1, SHV-1, SHV-11, CTX-M-15 and FOX-7 β-lactamases and the OXA-232 class D carbapenemase. The *dfrA12* and *aadA2 g*enes were also contained within a class1 integron structure. Resistance genes were mapped to 2 plasmids of 6kb and >10kb with IncF and IncA/C replicons that could not be mobilized to *E. coli* by conjugation.

Conclusions: This is the first report of plasmid-encoded OXA-232 producing CRE *K. pneumoniae* in Brunei hospitals. Spread between patients was demonstrated locally and associated with the ST 231 clone. OXA-232 producing ST 231 *K. pneumoniae* have also recently been reported in Singapore, suggesting that this may be an emerging high-risk clone disseminating throughout South East Asia.