

O094

2-hour Oral Session

Trends in antimicrobial resistance

Environmental dissemination of MDRB carrying *bla*<sub>NDM</sub> and *bla*<sub>CTX-M-15</sub> in hospital environment, drinking water, birds and insects

B. Hassan<sup>1</sup>, M. Carvalho<sup>1</sup>, A. Mushtaq<sup>2</sup>, T. Walsh<sup>1</sup>

<sup>1</sup>Cardiff University, cardiff, United Kingdom

<sup>2</sup>Dow Medical College, Karachi, Pakistan

**Environmental dissemination of MDRB carrying *bla*<sub>NDM</sub> and *bla*<sub>CTX-M-15</sub> in hospital environment, drinking water, birds and insects**

**Objectives:** The spread of multi-drug resistant bacteria (MDRB) in developing countries has become an international problem. Increased clinical and community surveillance is encouraged to limit the spread of antibiotic resistance, however little or no attention has been given to the prevalence of MDRB within the environment. The current study assessed the dissemination of *bla*<sub>NDM</sub> and *bla*<sub>CTX-M-15</sub> carrying bacteria in the environment and its implications on the spread of MDRB.

**Methods:** Samples were collected in Civil Hospital Karachi, Pakistan, by swabbing surfaces and equipment. Insects from the hospital area were also collected. Drinking water and birds' faecal swabs were acquired from different areas in Karachi. Each swab was streaked on Liofilchem® (Liofilchem, Italy) chromogenic agar supplemented with vancomycin+ertapenem (10mg/L+2mg/L) and vancomycin+cefotaxime (10mg/L+1mg/L). Additionally, insects were smashed with a loop and incubated in Luria Broth medium. The presence of *bla*<sub>NDM</sub> and *bla*<sub>CTX-M-15</sub> was assessed by PCR and the results were confirmed by sequencing analysis or hybridisation. Isolated *bla*<sub>NDM</sub> and/or *bla*<sub>CTX-M-15</sub> positive isolates were identified by MALDI-TOF. Antibiotic susceptibility profiles were established for *bla*<sub>NDM</sub> positive organisms according to EUCAST 2014 guidelines.

**Results:** A total of 729 environmental samples were obtained and *bla*<sub>NDM</sub> and *bla*<sub>CTX-M-15</sub> were detected in all environmental niches. Among hospital surface swabs (n=347), 20.15% were positive for *bla*<sub>NDM</sub> and 11.8% for *bla*<sub>CTX-M-15</sub>. The positive *bla*<sub>NDM</sub> samples included swabs taken from blood bag, oxygen mask, intravenous line, lunch trolley, ward bed, stretcher and electric switch board etc. Within 193 insects samples, 2.5% were *bla*<sub>NDM</sub> positive and 9.32% were *bla*<sub>CTX-M-15</sub> positive. The positive sample were carried by ants (n=5), cockroaches (n=2), mosquitos (2), and flies (n=10). Regarding birds (n=92), 1.0% of isolates carried *bla*<sub>NDM</sub> and 23.9% carried *bla*<sub>CTX-M-15</sub>. Among drinking water samples (n=97) 7.21% and 8.24% were positive for *bla*<sub>NDM</sub> and *bla*<sub>CTX-M-15</sub>, respectively. MALDI-TOF analysis revealed that Enterobacteriaceae isolates were the most occurring followed by *Acinetobacter* sp. and *Pseudomonas* sp. The majority of *bla*<sub>NDM</sub> positive isolates were resistant to ertapenem (100%), imipenem (86%), cefotaxime (86%) and susceptible to tigecyclin (100%), colistin (100%) and fosfomycin (87%).

**Conclusion:** Results show that *bla*<sub>NDM</sub> and *bla*<sub>CTX-M-15</sub> are widespread in the hospital setting and non-clinical environment in Karachi. Hospital surfaces and equipment may be a source of transmission of MDRB between patients, wards, personnel and the community. Similarly, insects and birds may play an important role in antibiotic resistance spread in distinct environments. This study further corroborates the role of drinking water as a crucial part of the antibiotic resistance dissemination pathway.