Epidemiological update of mcr-1-producing Enterobacteriaceae clinical isolates from Argentina

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Background: Mobile polymyxins resistance mediated by mcr genes were recently described worldwide. mcr-1 was generally found in E. coli isolates recovered from raw meat, animals, but also from human samples. This gene was mainly located in plasmids and no association with a specific clone was found. From 2012 to Oct-2017 we confirmed at the NRL, 130 colistin-resistant clinical isolates carrying mcr genes. The aim of the present study was to update the epidemiology of human mcr-producing isolates in Argentina.

Materials/methods: Colistin susceptibility was evaluated by dilution method and other antimicrobial agents by dilution or diffusion methods (CLSI). mcr-1 and mcr-2 genes were screened by standard PCR. Genetic relatedness was assessed by XbaI-PFGE. PCR multiplex to detect E. coli ST131, ST73, ST95 and ST69 clones was used. Salmonella spp.M1744 was used as recipient for biparental conjugation assays. S1-nuclease and DNA-hybridation was used for plasmid analysis.

Results: Until Oct-2017, 130/338 colistin-resistant ETB clinical isolates were confirmed at the NRL as positive for mcr-1 and negative for mcr-2: 127 E. coli, 2 Klebsiella pneumoniae and 1 Citrobacter amalonaticus. These isolates were recovered from urine (74.57%), blood (17.13%) and other sites samples (39.30%). Isolates were submitted from 54 hospitals (10 provinces and Buenos Aires City). All strains were categorized as resistant to colistin (EUCAST:≥4μg/mL) with MIC50/MIC90/range: 8/8/4-16μg/mL. Strains were resistance to: ampicillin (86%), nalidixic acid (82%), ciprofloxacin (65%), trimethoprim-sulfamethoxazole (50%), third generation cephalosporins (TGC) (48%), tetracycline (44%), minocycline (29%), gentamicin (21%), fosfomycin (21%), nitrofurantoin (4%), amikacin (3%) and imipenem (2%). All were susceptible to tigecycline. TGC-resistance was associated to (n): CTX-M (49); plasmidic-AmpC(7); SHV(2), PER(1). Two NDM (1 E. coli and 1 C.amalonaticus) and 1 KPC (E.coli) carbapenemases were detected. Among 110 E. coli analyzed by PFGE, 103 different pulsotypes were identified, 7 were repeatedly non-typeable. Of them, only two were ST131, two ST95 and three ST69. A ca. 60 kb IncI2-plasmid containing mcr-1 was transferred by conjugation in nine E.coli isolates.

Conclusions: To date, mcr-1 was mainly associated to highly diverse E.coli clones. The presence of an IncI2-plasmid in common could suggest the key role of horizontal dissemination among ETB clinical isolates from Argentina.