Antimicrobial resistance

FIRST DESCRIPTION IN EUROPE OF A CIPROFLOXACIN RESISTANT SALMONELLA TYPHIMURIUM HARBOURING AAC6'-IB-CR AND OQXAB IN AN INCHI2 PLASMID

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Background
Fluoroquinolones are critical antibiotics (AB) for the treatment of Salmonella non-typhoid infections. Plasmid-mediated quinolone resistance (PMQR) genes have been often associated with decreased susceptibility to these AB worldwide, but concomitant presence of oqxAB and aac6'-Ib-cr genes, increasingly described in Asia, is still scarce in Europe.

Objectives
To characterize the genetic background (clonality, AB resistance genes, their transferability and genetic environment) of ciprofloxacin resistant S.Typhimurium clinical isolates.

Methods
Two clinical isolates of S.Typhimurium resistant to ciprofloxacin [young children (feces)/one hospital/2012/Portugal] were studied. Susceptibility to AB and detection of ESBL were assessed by disk diffusion and/or Etest methods (CLSI/EUCAST). Characterization of AB resistance genes, including topoisomerases (gyrA/gyrB/parC/parE) and PMQR [qnrA/qnrB/qnrC/qnrD/qnrS/qepA/aac(6')-Ib-cr/oqxAB] genes, and metals (copper/silver/mercury/arsenic/tellurite) tolerance genes was performed (PCR/sequencing). Clonality (XbaI/PFGE/MLST), class 1 integron, plasmid characterization (PCR/sequencing), conjugation/transformation assays and genomic location (I-Ceul/S1-PFGE hybridization) were also performed.

Conclusions
Presence of multidrug-resistant IncH12~180Kb plasmid encoding oqxAB and aac-6'-Ib-cr in a ciprofloxacin resistant S.Typhimurium/ST34, also carrying gyrA mutation (Asp87Asn), is here firstly described in Europe. Co-resistance to nalidixic acid,
chloramphenicol-cmlA/floR/catB3, gentamicin-aac(3)-IV, kanamycin-aphA1, streptomycin-aadA1/strA-strB, sulfamethoxazole-sul1/sul2/sul3, tetracycline-tetB, trimethoprim-dfrA12, ampicillin-blaTEM/blaOXA-1 and genes coding for metals tolerance (merA/sllA/pcoD/terF) were found. Transformation of PMQR carrying plasmid was associated with resistance acquisition to several antibiotics (cmiA/floR/catB3/aac(3)-IV/aphA1/aadA1/sul1/sul2/sul3/dfrA12/blaoXA-1) and an eight-fold increase on ciprofloxacin MIC. Interestingly, the IncHI2 plasmid carried oqxAB genes flanked by IS26 and an incomplete class 1 integron containing aac-6’-Ib-cr-blaoXAX1-catB3-arr3-gacEA1-sul1, atypical sul3-integron and terF. A similar PMQR genetic environment in Salmonella with IncHI2 circulating in Asia was observed, highlighting the role of these plasmids in oqxAB and aac-6’-Ib-cr global spread.