

P1612

Poster Session VI

Controlling infections in long-term care facilities

NURSING HOMES AS RESERVOIR OF CARBAPENEM-RESISTANT ACINETOBACTER BAUMANNII

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Aim: *Acinetobacter baumannii* is considered a relevant nosocomial pathogen occurring particularly in intensive care (ICU) as well as burn therapy units. β -lactamase-mediated resistance is the most common mechanism for carbapenem resistance in this species. However, *Acinetobacter* may develop resistance to carbapenems through various combined mechanisms including decreased permeability, altered penicillin binding proteins (PBPs) and, rarely, efflux pump over-expression. Carbapenemases found in *Acinetobacter* belong to molecular class D (OXA enzymes) or class B (metallo- β -lactamases of IMP, VIM or SIM family). Recently a multicenter study on carbapenem-resistance in *A. baumannii* was conducted in Croatia. OXA-24/40-like and OXA-58-like were found to be the most prevalent groups of acquired oxacillinases in Croatian hospitals. Nursing homes are known to be reservoir for multiresistant bacteria including ESBL, plasmid-mediated AmpC and carbapenemase producing Gram-negative bacteria. Recently, emergence of carbapenem-resistance in *A. baumannii* isolates from nursing homes in Zagreb and Pula was observed. The aim of the study was to analyze the occurrence and genetic background of carbapenem-resistance in *A. baumannii* from nursing homes in these two centers in Croatia.

Methods: In total, 14 carbapenem-nonsusceptible isolates were collected from a nursing home in Zagreb and Pula; ten from urinary catheters, three from wound swabs and one from tracheal aspirate. Antibiotic susceptibilities were determined by broth microdilution method according to CLSI. *bla*_{OXA} and *bla*_{MBL} (*bla*_{VIM}, *bla*_{IMP}, *bla*_{SIM}, *bla*_{NDM}) genes were sought by multiplex PCR. PCR mapping was performed with primers for *ISAb*₁, *ISAb*₂ and *ISAb*₃ combined with forward and reverse primers for *bla*_{OXA-23}, *bla*_{OXA-51} and *bla*_{OXA-58} genes, respectively. Genotyping of the strains was performed by determination of sequence groups (international clonal lineages) by multiplex PCR.

Results: All strains were resistant to ceftazidime, cefotaxime, ceftriaxone, piperacillin alone and combined with tazobactam and ciprofloxacin and all except one were found to be resistant to both carbapenems and gentamicin. Amikacin and ampicillin/sulbactam preserved good activity with 64 % of susceptible strain. No resistance to colistin was observed. PCR revealed the presence *bla*_{OXA-23-like} genes in six and *bla*_{OXA24-like} in two isolates. MBLs were not found. *ISAb*₁ was found upstream of *bla*_{OXA-51} genes in all strains. Eight strains belonged to ICL II (SG 1) and six to ICL I (SG2).

Conclusions: The study found nursing homes to be important reservoir of carbapenem-nonsusceptible isolates of *A. baumannii*. Indwelling urinary catheters were the most important source of multiresistant *A. baumannii*. In contrast to hospitals where OXA-24/40-like and OXA-58-like β -lactamases were dominant, OXA-23-like was the dominant group of acquired oxacillinases in the nursing homes. Nursing homes can act as a source of dissemination of *bla*_{OXA} genes in the environment and the possible influx to the hospital environment. Further analysis which would include more nursing homes throughout Croatia will be conducted.