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Abstract (poster session)

Beta-lactamase production among ceftazidime-resistant Pseudomonas aeruginosa from five European countries: high prevalence of oxacillinases and VIM enzymes in the SENTRY Programme

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Objective: To evaluate the beta-lactamase (BL)-encoding genes carried by ceftazidime- and/or carbapenem-resistant P. aeruginosa (PSA) strains collected from five European countries displaying high beta-lactam resistance rates, including Belgium, Greece, Poland, Russia (3 cities; Smolensk, Tomsk and Yekaterinburg) and Ukraine. Methods: A total of 139 ceftazidime-resistant PSA recovered from five European countries during 2011 were evaluated for the presence of BL-encoding genes: blaTEM, blaSHV, blaCTX-M, blaGES, blaVEB, blaPER, blaBEL, blaPSE, blaKPC, blaIMP, blaVIM, blaNDM, blaOXA-2-, blaOXA-10- and blaOXA-13-group, blaOXA-18 and blaOXA-45. Detection of BL was performed by a commercial nucleic acid based microarray and a combination of PCRs. All amplicons were sequenced. Results: Among the 139 PSA, 100 (71.9%) produced VIM metallo-beta-lactamases (MBLs). VIM-2 was the most prevalent (87 strains) and was detected in all 7 hospitals from 5 countries. Isolates producing VIM-4 (10 strains; Greece and Poland), VIM-1 (one strain; Poland) and two new VIM variants (Belgium and Poland) were also noted. All tested strains from Belgium, Poland and Smolensk carried VIM MBLs. One strain from Yekaterinburg carried blaGES-4 encoding a serine-carbapenemase. The other 36 (25.9%) strains carried genes encoding ESBLs and/or oxacillinases (OXA). Five OXA-types were detected: OXA-2 (16 strains); OXA-10 (16), OXA-14 (5), OXA-4 (2), and OXA-35/-101 (2). blaGES-1 (ESBL) was found among 27 strains: 12 from Russia (2 hospitals) and 15 from the Ukraine. A PER-1-encoding gene was observed in Yekaterinburg (2 strains) and the Ukraine (2), whereas blaPSE-1 was noted in Greece (2 strains) and Poland (10). A total of 14 enzymes/combinations were detected and 12 enzymes and/or combinations were noted in Poland alone. 27 VIM-producing strains from Greece (4), Poland (22) and Smolensk (1) carried 1-3 additional BLs. Conclusions: VIM-producing isolates remain very prevalent in the five European countries analyzed and VIM-2-producing strains were observed in all countries. Additionally, Ambler class D enzymes with narrow and extended spectrum were detected alone or in combination with other enzymes. Only two strains tested were negative for the presence of beta-lactamases. These results highlight a scenario of multiple BLs that is not commonly observed in PSA strains and surveillance of BL resistance mechanisms seems prudent in these and nearly all countries.