

Risk factors associated with the acquisition of *Pseudomonas aeruginosa* resistant to carbapenems in a university hospital in Zaragoza, Spain

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BACKGROUND

P. aeruginosa is a clinically significant and opportunistic pathogen, usually associated with nosocomial infections, causing high morbidity and mortality. Displays not only intrinsic resistance, but also ability to acquire resistant mechanism during antibiotic therapy. Acquisition of drug-resistant pathogen is involved by many factors such as microbial substitution by antibiotic selection pressure and transmission in hospital. Carbapenem resistance in *P. aeruginosa* has become a serious health threat worldwide due to the limited options available for its treatment.



The aim of this study was to analyze the risk factors associated with the acquisition of carbapenem-resistant *P.aeruginosa* in a tertiary care hospital.

MATERIALS AND METHODS



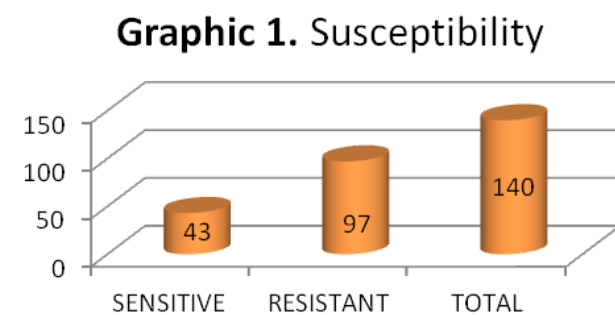
We performed a retrospective review of the clinical, demographic, microbiological and antibiotic susceptibility data of 140 clinical isolates of *P. aeruginosa*, including one isolate per patient in the first trimester of 2013.



For the statistical analysis we used the chi-square test (Yates-corrected) to compare categorical data. A multivariate logistic regression model was used to determine independent risk factors for variables that were associated at an univariate analysis level with *P* values less than 0.10 (SPSS program for Windows, version 18; SPSS Inc, Chicago Il).

RESULTS

✓ Of the total of 140 isolates, only 30.7% were sensitive to all antipseudomonal antibiotics tested. 69.35% (97) showed resistance to at least one of the antibiotics (or groups of antibiotics) tested. A total of 25 isolates were MDR (17.8%), 31 isolates were XDR (22.1%), and 54 isolates (38.5%) were resistant to carbapenems.



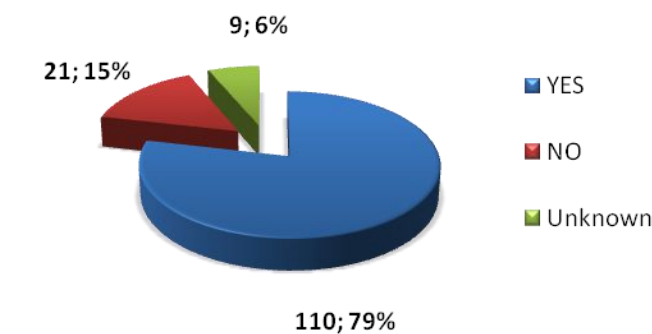
✓ Variables with statistical significance (bivariate analysis) are shown in table 1.

VARIABLES	P-value (≤0.05)
Days in hospital	<0.001
Admission service	0.046
Days between admission and isolation	<0.001
Respiratory sample	0.001
Death	0.014
Hematologic neoplasia	0.008
Prior treatment with carbapenems	0.002
Prior treatment with aminoglycosides	0.008

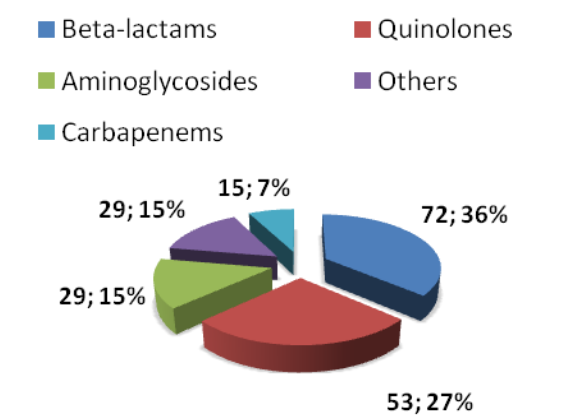
Table 1. Bivariate analysis

✓ Of the 140 patients studied, 110 (78.6%) received prior antibiotic treatment, of these, 48 patients (43%) had carbapenem-resistant *P.aeruginosa*. Patients with carbapenem-resistant *P.aeruginosa* isolates spend more days in hospital (average 50.22) compared to the group without resistance (average 27.42).

Graphic 2. Prior antibiotic treatment



Graphic 3. Received antibiotic



✓ The independent risk factors associated with the acquisition of carbapenem-resistant *P.aeruginosa* after the multivariate analysis are shown in table 2.

VARIABLES	Odds-ratio 95%	Confidence interval	P-value (≤0.05)
Days between admission and isolation	1.038	1.009 – 1.068	0.011
Neoplasia	10.492	3.067 – 35.884	<0.001
Prior treatment with aminoglycosides	4.246	1.253 – 14.386	0.020

Table 2. Independent risk factors associated with the acquisition of carbapenem-resistant *P. aeruginosa*

CONCLUSIONS

- ✓ In our hospital, there is a high rate of *P. aeruginosa* resistance, with a high percentage of carbapenem-resistant isolates. Antibiotic treatment prior to isolation evidences high antibiotic pressure that favors the selection of resistances.
- ✓ The days between admission and isolation, neoplasia and prior treatment with aminoglycosides are the risk factors associated with the acquisition of carbapenem-resistant *P. aeruginosa* in our hospital.
- ✓ The identification of the risk factors will allow defining the local epidemiology, implementing interventions and guiding the most efficient empiric therapy.

