Impact of antibiotic use on carbapenem resistance in *Pseudomonas aeruginosa*: Is there a role for antibiotic diversity?

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Abstract

Purpose: In this study, we aimed to evaluate the relationship between the rates of resistance of *Pseudomonas aeruginosa* to carbapenems and the levels and diversity of antibiotic consumption.

Methods: Data were retrospectively collected from 20 acute care hospitals across 3 regions of Switzerland between 2006 and 2010. The main outcome of the present study was the rate of resistance to carbapenems among *P. aeruginosa*. Putative predictors included the total antibiotic consumption and carbapenem consumption in defined daily doses per 100 bed days, the proportion of very broad-spectrum antibiotics used, and the Peterson index.

Results: The present study confirmed a correlation between carbapenem use and carbapenem resistance rates at the hospital and regional levels. The impact of diversifying the range of antibiotics used against *P. aeruginosa* resistance was suggested by (i) a positive correlation in multivariate analysis between the above-mentioned resistance and the proportion of consumed antibiotics having a very broad spectrum of activity (coefficient = 1.77; 95% confidence interval, 0.58 to 2.96; $P < 0.01$) and (ii) a negative correlation between the resistance and diversity of antibiotic use as measured by the Peterson homogeneity index (coefficient = -0.52; $P < 0.05$).

Conclusion: We conclude that promoting heterogeneity plus parsimony in the use of antibiotics appears to be a valuable strategy for minimizing the spread of carbapenem resistance in *P. aeruginosa* in hospitals.