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J. Paez[a]
A.S. Levin[b,c]
L. Fu[a]
M. Basso[b]
G.H.H. Fonseca[d]
F.L. Dulley[d]
F. Rossi[e]
T. Guimarães[b]
S.F. Costa[a,c,*]

[a]*Laboratory of Bacteriology, Hospital das Clinicas, University of São Paulo, São Paulo, Brazil*

[b]*Infection Control Committee, Hospital das Clinicas, University of São Paulo, São Paulo, Brazil*

[c]*Department of Infectious Diseases, School of Medicine, University of São Paulo, São Paulo, Brazil*

[d]*Bone Marrow Transplant and Hematology Units, Hospital das Clinicas, University of São Paulo, São Paulo, Brazil*

[e]*Laboratory of Microbiology of Hospital das Clinicas, São Paulo, Brazil*

* Corresponding author. Address: Laboratory of Bacteriology (LIM-54) of Hospital das Clinicas, University of São Paulo, Av. Dr. Eneias Carvalho de Aguiar 255, Cerqueirq Cesar, Sao Paulo 05403-900, Brazil. Fax: +55 11 30697066.
E-mail address: costasilviaf@ig.com.br (S.F. Costa).

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Resistance rates of *Pseudomonas aeruginosa* and *Acinetobacter* species causing ventilator-associated pneumonia do not always correlate with utilisation of antibiotics

Madam,

Numerous published studies have sought a correlation between the utilisation rate of antibiotics and resistance rates among hospital isolates, but their results are not clear-cut.[1] Some of the studies noticed a positive correlation between resistance rates of hospital isolates and the utilisation rates of ciprofloxacin, cephalosporins, carbapenems, piperacillin/tazobactam, or all of these.[1] However, there are studies which show no such correlation, especially for carbapenems, for ceftazidime and *Pseudomonas aeruginosa*, or for all classes of antibiotics administered as primary therapy in intensive care settings.[2,3] When demonstrated, the influence of the increased utilisation of antibiotics on resistance rates is immediate for carbapenems, penicillins and cephalosporins, and with a lag of one year for ciprofloxacin, macrolides and aminoglycosides.[1]

These differences are at least partially accounted for by the different prevalence of certain isolates for each study, which suggests that correlation between antibiotic utilisation and resistance is an isolate-dependent phenomenon. Therefore, we decided to compare utilisation of antibiotics used to treat ventilator-associated pneumonia (VAP) caused by *P. aeruginosa* (data not shown) or *Acinetobacter* spp. (Figure 1), and the resistance rates of these two pathogens isolated at the intensive care unit, Clinical Center, Kragujevac, Serbia, during an 18-month period. The observation period was divided into three 6-month intervals, and use of antibiotics effective against *P. aeruginosa* and *Acinetobacter* spp. was monitored during the study period and also for the preceding 6 months. There were 10 isolates of *P. aeruginosa* and 12 isolates of *Acinetobacter* spp. during the first interval, 6 isolates of *P. aeruginosa* and 4 isolates of *Acinetobacter* spp. during the second interval, and 13 isolates of *P. aeruginosa* and 17 isolates of *Acinetobacter* spp. during the last 6-month interval (the isolates were obtained from samples taken by bronchoalveolar lavage from patients with VAP). The utilisation of antibiotics was expressed as number of defined daily doses per 100 patient-days, and the resistance rate as the percentage of resistant isolates.

Our data indicate that the resistance rates of both *P. aeruginosa* and *Acinetobacter* spp. to carbapenems does not follow the utilisation rate of these antibiotics. On the other hand, while the resistance rate of *P. aeruginosa* to cefepime and piperacillin–tazobactam appears to be related to the use of these two agents, this is not the case with *Acinetobacter* spp. Finally, the resistance rate of *Acinetobacter* spp. to ampicillin–sulbactam seems to relate to the use of this antibiotic.

Although antibiotic use is a very important factor in the selection of multidrug-resistant bacteria in intensive care units, it is not the only one. Increasing use of invasive interventions, inadequate maintenance of hygiene standards and inadequate use of disinfectants (e.g. in hand disinfection) also play a significant role.[2,4] Emergence of multidrug-resistant *Acinetobacter* spp. isolates is associated with mechanical ventilation, haemodialysis, malignancies, neurological impairment, the isolation of *Acinetobacter* spp. from multiple anatomic sites, and resistance to multiple disinfectants.[5–7] *Acinetobacter* spp. induce weak inflammatory responses, and their presence in the tissues of infected patients is prolonged, which increases the chance of transmission from patient to patient.[8] Therefore, our efforts to control the incidence of multidrug-resistant bacteria in hospitals should not be limited to improvement of antibiotic prescribing, but should also include improvement of aseptic techniques in medical procedures, judicious use of disinfectants and adequate maintenance of hygiene.

Conflict of interest statement
None declared.

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