



Impact of carbapenem-resistant *Acinetobacter baumannii* healthcare-associated infections in patients admitted to Italian intensive care units: results of the SPIN-UTI cohort study

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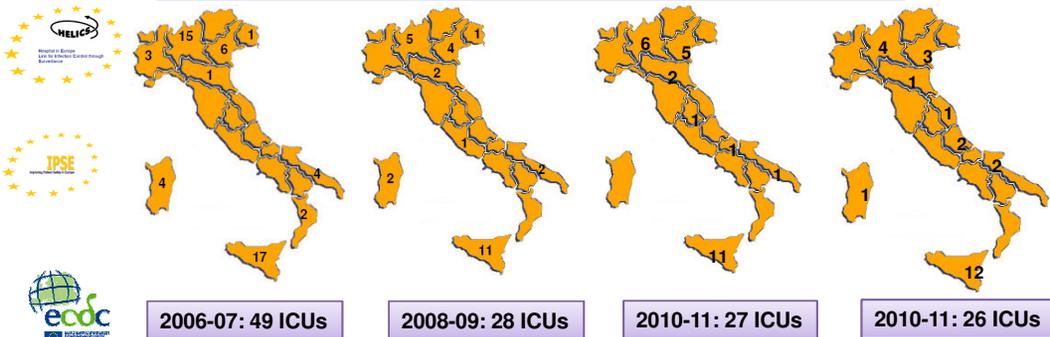
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Objectives This study aimed at identifying risk factors for the acquisition of carbapenem-resistant *Acinetobacter baumannii* (CRAB) and to assess the impact of carbapenem resistance on mortality and prolongation of Intensive Care Unit (ICU) stay in patients with *A. baumannii* infection in the Italian Nosocomial Infections Surveillance in ICUs network (SPIN-UTI project).

Methods The four editions of the SPIN-UTI project (2006-2013) adopted the patient-based European protocol for the surveillance of infections in ICUs (ECDC-HAICU) and a web-based data collection procedure. Characteristics of patients with CRAB versus patients with carbapenem-sensitive *A. baumannii* (CSAB) were compared and a multivariate model was built using a backward selection procedure. The Kaplan–Meier method was used to construct survival curves and the Cox proportional hazards models to investigate the association between carbapenem resistance and the risk of mortality.

Results The 74 participating ICUs admitted a total of 10,707 patients. Cumulative incidence of *A. baumannii*-associated infections increased in the first three editions of the project (from 1.8 to 3.5, to 4.5 per 100 patients) and decreased in the last one (1.1 per 100 patients). Over the first three editions of the project, the number of CRAB isolates significantly increased (from 78.8% to 79.7%, to 95.5%), then it declined, although slightly, in 2012-2013 (to 93.5% $p=0.001$). A total of 228 patients with infection due to CRAB were compared with the 31 patients with infection due to CSAB. All CRAB isolates and 77.8% of CSAB isolates were multidrug resistant ($p<0.001$). Compared with patients with CSAB, patients with CRAB had higher SAPS II scores at admission ($p <0.01$), were less frequently affected by pneumonia and more frequently by bloodstream infection ($p <0.05$). In univariate analysis, no other significant difference were observed among the two groups also considering previous treatment with carbapenems (48.0% of patients with CRAB versus 38.7% of patients with CSAB). After multiple logistic regression analysis, SAPS II score above the median value (RR: 8.07; 95%CI: 1.22-53.20) was significantly associated to CRAB acquisition. No significant difference in the mean length of stay in ICU after the onset of infection was found between the two groups (18.2 versus 20.1 days). The survival probability was not different among the two groups (log rank Mantel Cox $p=0.836$) and carbapenem resistance was not significantly associated with mortality after adjusting for confounding factors.

Participating ICUs in the four editions of the SPIN-UTI project



Conclusions In our study, patients with high SAPS II score and with bloodstream infection were at greater risk for CRAB acquisition. Furthermore, although carbapenem resistance does not increase mortality and length of stay in ICU after the onset of infection, carbapenem resistance is associated with resistance to several other classes of antibiotics, emphasizing the difficulty of appropriate antibiotic administration.