# P2054 RISK FACTORS FOR *ACINETOBACTER BAUMANNII* COLONIZATION AND INFECTION AMONG PATIENTS ADMITTED TO INTENSIVE CARE UNITS

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## Introduction and Purpose

- Over the past two decades, infections due to MDR-*A. baumannii* (AB) have become an increasingly common nosocomial problem, mainly in the Intensive Care Units (ICUs).
- Active surveillance cultures (SCs) for AB have been suggested as a strategy to control the spread of AB in ICUs.
- However, standardized screening schemes are missing and data on which patients and body sites are most commonly colonized by AB are scant.
- The purpose of our study is to identify the risk factors for AB colonization upon ICU admission, and to assess the risk factors for AB infection in a large cohort of critically ill patients.

## Methods

- **Study design and population:** prospective cohort of all adult (≥ 18 years) patients hospitalized in ICUs for ≥ 48 hours, over a 9-month period (May 2012-January 2013).
- **Setting:** 6 ICUs with a total number of 47 beds at 1 tertiary-care hospital, 1 research institute and 2 secondary-care hospitals, in Rome (Italy).
- **Procedures:** in all the enrolled patients SCs were taken on ICU admission and once a week until discharge from ICU. SCs included a rectal swab and a respiratory sample, i.e. a tracheal aspirate (TA) in patients on mechanical ventilation and a pharyngeal swab (PS) in patients who were not intubated.
- **Microbiological study:** identification of strains and susceptibility tests were performed using the VITEK 2 system. Susceptibility was assessed according with the EUCAST breakpoints.
- **Statistical analysis:** patients colonized and non colonized by AB upon ICU admission were compared using Pearson $\chi^2$ test for categorical variables and non-parametric Mann-Whitney U test for continuous variables. All the variables with a p value ≤ 0.1 at the univariate analysis were introduced in a multivariate binary logistic regression model. Univariate and multivariate analysis of risk factors for AB infection incidence during ICU stay were done using a Cox regression model. Variables in the final models were selected by forward elimination procedure (p > 0.10 out criteria). The analysis was carried out using SPSS 20.0 (SPSS, Chicago, Illinois, USA).

## Results

- During the study period 1,781 patients were admitted to the ICUs. Of these 554 patients stayed ≥ 48 hours, and 434 were enrolled in the study.
- Overall 1,983 SCs were obtained, most patients were screened during 1 or 2 weeks (Figure 1), positivity rates for respiratory samples and rectal swabs were 6% and 4.9%, respectively (Figure 2).
- AB colonization at ICU admission was found in 20 (4.6%) patients.
- AB colonization was acquired during the ICU stay in 32 (7.4%) patients, within a median of 10 days (IQR 7 – 17) after the ICU admission.
- Univariate and multivariate analysis of risk factors for AB colonization at ICU admission are shown in Table 1.

| Table 1 | Non colonized N=414 (%) | Colonized N=20 (%) | *p* | Multivariate analysis OR (95%CI) | *p* |
|---|---|---|---|---|---|
| Age* | 66.5 (54-78) | 70.5 (57.5-78) | 0.54 | | |
| Male sex | 245 (59.2) | 9 (45.0) | 0.25 | | |
| Charlson index* | 5 (3-7) | 4.5 (2-6) | 0.36 | | |
| Dialysis | 41 (9.9) | 5 (25.0) | 0.05 | | |
| Prior hospitalization (90 d) | 178 (43.0) | 10 (50.0) | 0.64 | | |
| Prior ICU stay (90 d) | 76 (18.4) | 4 (20.0) | 1.00 | | |
| Prior antimicrobial therapy (30 d) | 163 (39.4) | 12 (60.0) | 0.10 | | |
| Fluoroquinolones | 43 (10.4) | 2 (10.0) | 1.00 | | |
| Cephalosporins 2nd/3thgen | 49 (11.8) | 1 (5.0) | 0.49 | | |
| Carbapenems | 19 (4.6) | 5 (25.0) | 0.003 | 5.08 (1.58-16.34) | 0.006 |
| Day of hospitalization before ICU admission | 1 (0-8) | 12.5 (0-38.25) | 0.08 | 1.02 (1.00-1.03) | 0.02 |
| ICU admission for medical condition | 262 (63.3) | 11 (55.0) | 0.48 | | |
| ICU admission for surgery or trauma | 152 (36.7) | 9 (45.0) | 0.48 | | |
| APACHE II score* | 14 (10-18) | 13 (9.2-14.7) | 0.08 | | |
| Any infection upon ICU admission | 140 (33.8) | 12 (60.0) | 0.03 | | |

*Continuous variables are expressed as median (IQR)

- Infection due to AB was diagnosed in 17 (3.9%) patients. Of these, 5 patients presented with AB infection upon ICU admission and 12 acquired infection during the ICU stay within a median of 8 days (IQR 3-16). The types of AB infection are shown in Figure 3.

Figure 3. Types of AB infection

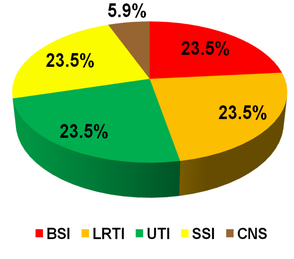



Figure 1: Number of patients screened over the ICU stay

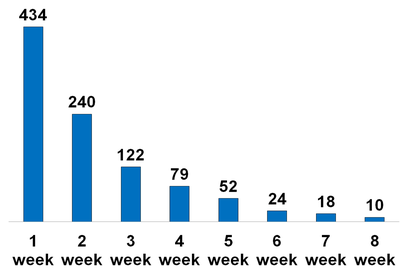
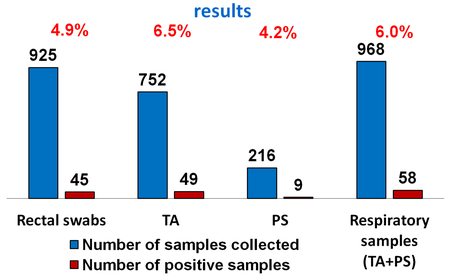



Figure 2: Samples obtained and their results




- Univariate and multivariate analysis of the risk factors for AB infection during the ICU stay are shown in Table 2.

| Table 2 | Univariate analysis HR (95% CI) | p | Multivariate analysis HR (95% CI) | P |
|---|---|---|---|---|
| Age | 0.97 (0.95-1.01) | 0.14 | | |
| Male sex | 0.51 (0.16-1.61) | 0.25 | | |
| APACHE II score | 0.89 (0.79-1.01) | 0.06 | | |
| Prior antibiotic therapy (30 d) | 0.78 (0.23-2.61) | 0.69 | | |
| Days of hospitalization before ICU admission | 1.00 (0.98-1.02) | 0.68 | | |
| ICU admission for medical condition | 1.11 (0.33-3.68) | 0.87 | | |
| Any infection upon ICU admission | 1.41 (0.45-4.45) | 0.55 | | |
| Antibiotic therapy during ICU stay | | | | |
| Carbapenems | 4.86 (1.42-16.58) | 0.01 | 3.96 (1.14-13.76) | 0.03 |
| Cephalosporin 2nd/3th gen | 0.23 (0.03-1.77) | 0.16 | | |
| Piperacillin/tazobactam | 1.12 (0.35-3.53) | 0.85 | | |
| Fluoroquinolones | 0.68 (0.15-3.14) | 0.62 | | |
| AB colonization upon ICU admission | 32.99 (8.19-133) | <0.001 | 24.29 (5.96-99.96) | <0.001 |

## Conclusions

- AB colonization upon ICU admission was independently associated with the exposure to carbapenems in the prior 30 days and with the length of hospitalization before ICU admission. The independent risk factors for AB infection during the ICU stay were AB colonization at ICU admission and treatment with carbapenems during the ICU stay.
- Our results suggest that a mitigated use of carbapenems may reduce the prevalence of patients colonized by AB upon ICU admission and the incidence of patients who acquire AB infection during the ICU stay.