

# Health vigilance concerning *Acinetobacter baumannii* bacteremia at the mohammed VI university hospital of oujda (morocco): epidemiological profile and antibiotic resistance

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**Abstract.** The objective of this work is to determine the epidemiological profile of *Acinetobacter baumannii* (A.baumannii) bacteremia in the microbiology laboratory of CHU Mohammed VI of Oujda and its antibiotic resistance rates. This is a retrospective and descriptive study of 27 months from June 24, 2016 to September 19, 2018 including all positive blood cultures processed in the microbiology laboratory in accordance with REMIC (reference in medical microbiology) and EUCAST (European Committee on Antimicrobial Susceptibility Testing). Contaminated blood cultures were excluded. As results we collected 863 positive blood cultures, A. baumannii accounted for 7.41% (n = 64). 67% (n =43) of the strains were isolated from patients hospitalized in intensive care (adults, children and newborns). The two main risk factors described in patients with our series were wearing of intravascular device in 55% (n=35) Immunosuppression in 22% (n=14). A. baumannii bacteremia was associated with care in 37.5% (n=24). 75% (n=48) of A. baumannii isolates were resistant to carbapenems. No strain of A. baumannii was resistant to colistin. In light of these results strengthening the control and prevention measures for healthcare associated infections would be the most reliable way to limit the spread of A. baumannii in our establishment.

## Introduction

*A. baumannii* is a Gram-negative, non-motile, strictly aerobic, non-fermentative, non-spore-forming coccobacillus. The ability of *A. baumannii* to form biofilms contributes to its survival in adverse environmental conditions including hospital environments and medical devices [1].

Of particular importance is the ability of *Acinetobacter* to cause bacteremia, especially in critically ill patients, the clinical course of which may range from a benign transient bacteremia to fulminant septic shock [2].

The existence of multi-resistant strains places *A. baumannii* among the organisms that threaten the current therapeutic management and therefore the choice of molecules during probabilistic treatment is a real challenge. Carbapenems have long been considered as the treatment of choice for *Acinetobacter* infections. Today, this class is threatened by the emergence of resistance, favored by its increasing use in connection with the emergence of multi-resistant enterobacteria. [3].

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Patients with multi-drug resistant *A. baumannii* nosocomial bacteremia have longer lengths of stay, higher costs, and higher mortality rates [4].

The objective of this work is to determine the epidemiological profile of *A. baumannii* bacteremia and its antibiotic resistance rates.

## Materials and methods

This was a retrospective and descriptive study from June 24, 2016 to September 19, 2018 and included all positive blood cultures processed in the microbiology laboratory; Contaminated blood cultures were excluded.

The samples are taken by venipuncture and then injected into two vials: one aerobic and one anaerobic, in our study the blood culture vials used are BD BACTEC™ vials (Becton Dickinson). After verification of non-compliance; The vials are recorded and incubated in the BD FX 400 automaton for a maximum of 7 days

(beyond this time, the microorganisms detected are usually contaminants).

The vials detected positive by the BD BACTEC are discharged from the automaton and analyzed. The culture was performed on enriched and selective agar media. Incubation was performed at 37°C for 24 to 48 hours.

The identification of *A. baumannii* at the laboratory level was based on conventional morphological, cultural, biochemical and antigenic characteristics. Biochemical identification was done by Api galleries, determined with the BD Phoenix 100.

Antibiotic susceptibility testing was performed in accordance with the recommendations of the Antibiotic susceptibility Committee of the French Society of Microbiology (CA-SFM) and the European Committee on Antimicrobial Susceptibility Testing (EUCAST) [ 5].

The results were interpreted in accordance with the recommendations of the medical microbiology reference system (REMIC) [6] .

## Results:

### Epidemiology

During the study period, we collected 863 positive blood cultures, with *A. baumannii* accounting for 7.41% (n=64). The majority of *A. baumannii* strains were isolated from newborns, which represented 47% of cases (n=30) .19 patients were female (30%) versus 45 male (70%), representing a sex ratio of 2.36.

67% (n=43) of the strains were isolated from patients hospitalized in the intensive care unit (adults, children and neonates), by medical departments with 22% (n=14) of the isolates, and surgical departments with 5% (n=3) of the isolates, the hospital department was not specified for 6% (n=4) of the patients.

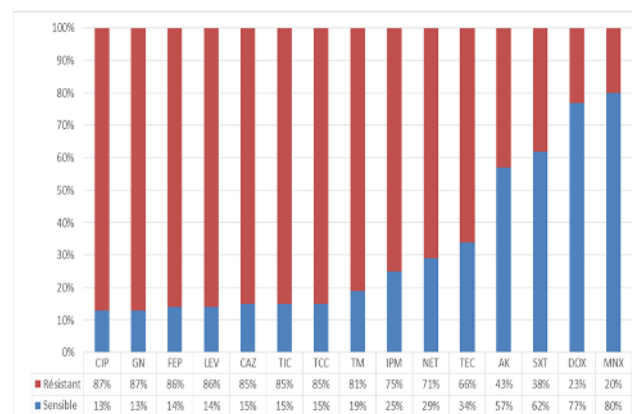
The two main risk factors described in the patients of our series were: Intravascular device wear in 55%(n=35), Immunosuppression in 22% n=14).

Bacteremia caused by *A. baumannii* were associated with care in 37.5% (n=24).

### Resistance profile

Of the 64 strains of *A. baumannii* isolated in the microbiology laboratory, 87% were resistant to Ciprofloxacin and Gentamicin, 86% to Cefepime and Levofloxacin, 85% to Ceftazidime, Ticarcillin, and Ticarcillin/clavulanic acid combination, 75% (n=48) of *A. baumannii* isolates were resistant to carbapenems .No *A. baumannii* strain was resistant to colistin. ( Fig 1)

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**Fig 1.** Resistance rates of *Acinetobacter Baumannii*.

Ciprofloxacin (CIP), Gentamicin (GN), Cefepime (FEP), Levofloxacin (LEV), Ceftazidime (CAZ), Ticarcillin (TIC), Ticarcillin/clavulanic acid (TCC), Tobramycin (TM), Imipenem (IPM), Netilmicin (NET), Tetracycline (TEC), Amikacin (AK), Trimethoprim - sulfamethoxazole (SXT), Doxycycline (DOX), Minocycline (MNX).

## Discussion

### Epidemiology

During the period of our study, *A. baumannii* represented 5.8% (n=64) of all positive blood cultures. This figure remains lower than that reported in the literature. The different studies [7-10] underline that *A. baumannii* is the most frequent non-fermenting Gram-negative bacillus incriminated in bacteremia.

Being an opportunistic pathogen, *Acinetobacter baumannii* often affects fragile patients such as the immunocompromised, low birth weight neonates, and intensive care patients [11,12] .

In our study, the average age was 25 years, which is due to the fact that about 47% of *A. baumannii* bacteremias were isolated in newborns. This average age is far from the data of the literature, which note a predominance in adult subjects with an average age of 67 years [2,13,14].

In the present study, we also noted a male predominance with a sex ratio of 2.36, which is in line with the data in the literature. This male predominance is reported by several studies [2 ,13,14].

The male predominance may be explained by the finding that *A. baumannii* bacteremia is often associated with underlying conditions such as smoking, alcoholism, diabetes and other chronic lung diseases [15].

In our study, a large proportion (67%) of *A. baumannii* bacteremias originated in the intensive care unit. These results are consistent with the literature, as the intensive care unit is the most common site for *A. baumannii* infections, but with varying rates. The rate found in this study is lower than that reported in Italy in 2019 (85%)[16], but remains higher than that reported in Greece in 2016 (53.9%)[17].

We pointing out that only 22%(n=14) of patients were immunocompromised while 55% (n=35) of patients wore an intravascular device and. These rates are lower than those reported in Lebanon in 2017[2] and in China in 2016[18].

### Resistance profile

According to a recent WHO report, *A. baumannii* becomes a major threat to public health when it acquires resistance to broad-spectrum antibiotics, such as carbapenems [19]. Current findings suggest that the battle against this pathogen is being lost [20] due to the limited alternatives for treating the infections it causes [21] and the lack of public health interventions to control antibiotic resistance.

From 2011 to 2014, 2337 *A. baumannii* were collected from 453 hospital sites in 48 countries as part of the SMART continuous surveillance initiative. Rates of multidrug-resistant acinetobacter *baumannii* were lowest in North America (47%) and highest in Europe and the Middle East (>93%),[22]. In our study we noted multiresistance of *A. baumannii* to the tested antibiotics.

The resistance to ciprofloxacin in the different studies is higher than 50% which is in line with the data of our study [23-28].

Resistance to aminoglycosides was 87% for gentamycin and 81% for tobramycin, these rates are higher than those reported in Casablanca [28] and Tunisia [27].

Resistance to amikacin is variable: 43% in our study against 66% in Casablanca [28], 79% in Tunisia [27], and 82% in Iran [23].

Our strains are less resistant to imipenem (75% in our study compared to 93% in China, 96.9% in Iran and 88.6% in Tunisia).

For the combination of trimethoprim and sulfamethoxazole 38% of our strains were resistant, this rate remains far from that reported in Casablanca (77%), Tunisia (51.5%) and China (93.4%)

Colistin is the last resort for the treatment of multi-resistant *Acinetobacter baumannii*. Unfortunately,

resistance to colistin has been reported worldwide. The highest rate of resistance has been reported in Asia, followed by Europe [29]. In our study no *A. baumannii* strain was resistant to colistin.

### Conclusion

Our study showed the important place that occupies the bacteremia with *A. baumannii* within our hospital structure in particular in intensive care unit, in fragile patients carriers of invasive materials or presenting a ground of immunodepression, indeed this bacteria became a not negligible therapeutic headache considering the emergence of the multi resistant strains to the antibiotics.

In light of these results, strengthening healthcare-associated infection control and prevention measures would be the most reliable way to limit the spread of *A. baumannii* in our institution.

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