

Acinetobacter Baumannii Nosocomial Infections in 212 Burned Patients of Moroccan Hospital 2004-2012

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Abstract:

Background:- Nosocomial infections caused by strains *Acinetobacter Baumannii* strands are a growing clinical problem. The occurrence of multidrug-resistant strands is observed and that limits the ways of therapy considerably. The aim of the present study is to bring out the epidemiological profile of burn patients infected with *Acinetobacter Baumannii* and to investigate the risk factors related to this pathology.

Methods: this is a retrospective study carried out on 212 burn and infected patients, hospitalized at Burn Service of Mohamed V Military Hospital of Rabat (Morocco), during the period 2004-2012. Subjects were selected through simple random sampling method. Data was collected using questionnaire.

Results: Among 212 patients, we registered 50 cases of *Acinetobacter Baumannii* infection.

Males were more frequent with a sex-ratio of 1.5. Moreover, the most concerned age group was 30 to 39 years old. The average age was 37.9 ± 17.7 years.

The results also showed that *Acinetobacter baumannii* is the most resistant to antibiotics, all types mixed up. It resisted to antibiotics in 76% of cases.

The study of Unit Burn Standard (UBS) showed that 42% of cases were severe to mortal. Furthermore, Baux index (IB) showed that 44% of cases have bad to very bad prognosis.

As for evolution of patients, 16% of cases were dead and 50% has a good evolution after grafting. The statistical analysis reveals that the risk of death in burn patients infected with *Acinetobacter baumannii* was three times as high as that of burn patients infected with other germs (OR= 3.2 ; IC= 1.2-8.9). Besides, women has a risk of death six times as high as men (OR= 6; IC= 1.1-33.7).

Conclusion: health authorities in our country should give more importance to the hospital hygiene by motivating and sensitizing all the health system participants.

I. Introduction:

Common usage of the term "nosocomial" is now synonymous with hospital-acquired. Nosocomial infections are infections that have been caught in a hospital and are potentially caused by organisms that are resistant to antibiotics. A nosocomial infection is specifically one that was not present or incubating prior to the patient's being admitted to the hospital, but occurring within 72 hours after admittance to the hospital.

Nosocomial infection is an infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility [1].

Acinetobacter Baumannii (*A. Baumannii*) infections are growing clinical problem affecting all countries of the world. *A. Baumannii* is one of the most prevalent bacterial species isolated from biological materiel from hospitalized patients [2].

A. Baumannii is a Gram-Negative, aerobic, immotile, glucose non-fermentative, oxidase negative, catalase positive bacterium [2]. It belongs to the genus *Acinetobacter* which comprises many species discovered during the last 3 decades, including *A. Baumannii*, *A. Johnsonii*, *A. Haemoliticus*, *A. Calcoaceticus*, *A. Junii* and *A. Lwoffii*. Due to an exceptional ability to adapt to unfavourable hospital conditions and resistance to antibiotics and disinfectant agents, it poses a significant threat to patients [3].

A. Baumannii causes opportunistic infections mainly in immunocompromised patients. The risk factors for infections include hospitalisation, poor overall condition, circulatory system insufficiency, respiratory system insufficiency, mechanical ventilation, prior antibiotic therapy and presence of foreign materials (such as venous, arterial and urinary catheters) [4].

A. Baumannii colonization and infections are often downplayed by physicians. However, longer hospitalization periods and higher mortality rates have been shown in patients with confirmed *A. Baumannii* infections [5].

A. Baumannii wound infections, especially with strains resistant to multiple antibiotics, pose a significant problem at surgical wards. A. Baumannii strains are defined as multi-drug-resistant (MDR) if they are insensitive to antibiotics pertaining to three of five classes of antibiotics (cephalosporines, carbapenems, fluoroquinolones, aminoglycosides and ampicillin sulbactam). Strains are defined as pan-drug-resistant (PDR) if they are resistant to all commercially available classes of antibiotics. These aspects combined cause A. Baumannii to present a significant threat to hospitalized patients and a significant clinical problem for physicians trying to choose the appropriate therapeutic regimen. Studies show that the mortality rate of hospitalized patients infected with A. Baumannii is 8-23% and 10-43% at the intensive care units (ICUs) [5].

The aim of this study was to bring out the epidemiological profile of burn patients infected with *Acinetobacter Baumannii* and to investigate the risk factors related to this pathology.

II. Methods:

Design and study area

This research was a retrospective study undertaken in the burn department of the Moroccan military hospital in Rabat, from January 2004 to December 2012. Study participants who were hospitalized in burn service and who agreed to participate in the study were included in the sampling pool. The patients were selected by the simple random sampling method. Sample size was determined by $p=0.05$ and confidence interval 95%.

Questionnaire

Data was collected using a questionnaire whose validity was obtained using the content validity. The questionnaire included items on various aspects as follows:

- 1) Socio-demographic component: age, gender
- 2) Degree of burning.
- 2) Bacterial species.
- 3) Resistance to antibiotics.
- 4) Evolution.
- 5) Risk of death

Data collection

Data was collected by a trained research doctor. It was based on patient record. We were interested in patients infected by *Acinetobacter Baumannii*.

Data analysis

Data were analyzed using IBM SPSS 19.0 for Windows. Descriptive as well as analytical analyses were employed to determine the epidemiological profile of burn patients infected with *Acinetobacter Baumannii* and to investigate the risk factors related to this pathology. The results are expressed in terms of numbers for the qualitative variables and on average \pm standard deviation for the quantitative variables.

Differences between categorical groups were determined by using (χ^2) test. P -values < 0.05 were considered to be statically significant in all analyses.

III. Results:

Description of socio demographic variables

Between January 2004 and December 2012, we administered questionnaire to 212 patients, of the 50 patients infected by *Acinetobacter Baumannii*, 60% ($n=30$) were males and 40% ($n=20$) females, Sex Ratio = 1.5.

96% of the burns were thermal burns and 94% of the burns took place at home. 24% of infected patients were diabetic. The mean age of participants was 37, 7 ± 17 , 7 years, [1-80] and the most concerned age group were 30 to 39 years old.

Degree of burning

We used the standard burn unit (UBS) to assess the severity of *Acinetobacter Baumannii*-infected burns. Indeed, 42% of the cases encountered in the burn service were serious to fatal. The Baux index allowed us to classify the burns infected with *Acinetobacter baumannii* according to the prognosis. It was bad to very bad in 44% of cases, whereas it was good in 56% of the cases (Fig 1).

Bacterial species:

The results of the distribution of infections in 234 sites according to the species showed that infections with *Staphylococcus Aureus* were the most frequent 39% of burn, infections caused by *Pseudomonas* came second with 18% of the sites, followed by *Acinetobacter baumannii* with 16% of the sites (Fig 2).

Resistance to antibiotics:

The results also showed that *Acinetobacter baumannii* was the most resistant to antibiotics, all types mixed up. Indeed, it resisted to antibiotics in 76% of cases (Fig 3).

Evolution:

Death occurred in 8 patients (16%), a specific lethality of 16%. The evolution was good in 34% of cases and good with grafting in 50% of the cases (Fig 4).

Risk of death:

The statistical analysis reveals that the risk of death in burn patients infected with *Acinetobacter baumannii* was three times as high as that of burn patients infected with other germs (OR= 3.2 ; IC= 1.2-8.9). Besides, women has a risk of death six times as high as men (OR= 6; IC= 1.1-33.7).

IV. Discussion:

The male predominance observed in our study (60%) is consistent with the results of previous studies [6,7]. the mean age in our study, which is 37.9 ± 17.7 years, is much lower than that found in another study at the national level and is of the order of 52.3 ± 12 , 54 years old [7].

The results of the present study show that infections with *Staphylococcus Aureus* are the most important in patients burned, followed by those caused by *Pseudomonas aeruginosa* and *Acinetobacter baumannii* respectively. This result is consistent with that obtained in previous studies [8].The specific lethality due to nosocomial infections with *Acinetobacter baumannii*, which is 16% in the present study, is lower in other studies [9].

Acinetobacter baumannii is the most resistant to antibiotics of all types. Women has a risk of death six times as high as men (OR= 6; IC= 1.1-33.7).

This is in agreement with the results of other studies which have addressed the same subject [10, 11].

The major preventive effort should be focused in hospitals and other health care facilities. Risk prevention for patients and staff is a concern of everyone in the facility, and must be supported at the level of senior administration. A yearly work plan to assess and promote good health care, appropriate isolation, sterilization, and other practices, staff training, and epidemiological surveillance should be developed.

Hospital hygiene is everyone's business (professionals, managers and health decision-makers). A strong motivation of all these players is necessary to meet the challenges facing the hospital, in terms of quality and cost, and for the patient, in terms of safety.

V. Declarations:

Ethics approval and consent to participate:

Permission to conduct the study at the hospital was received from the hospital administration.

Consent for publication:Not applicable

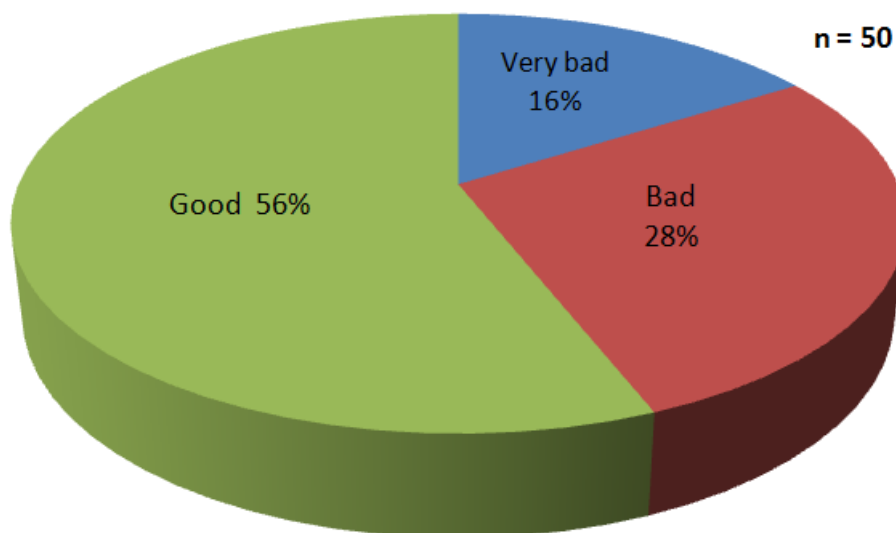
Availability of data and material: The datasets during and/or analyzed the current study available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

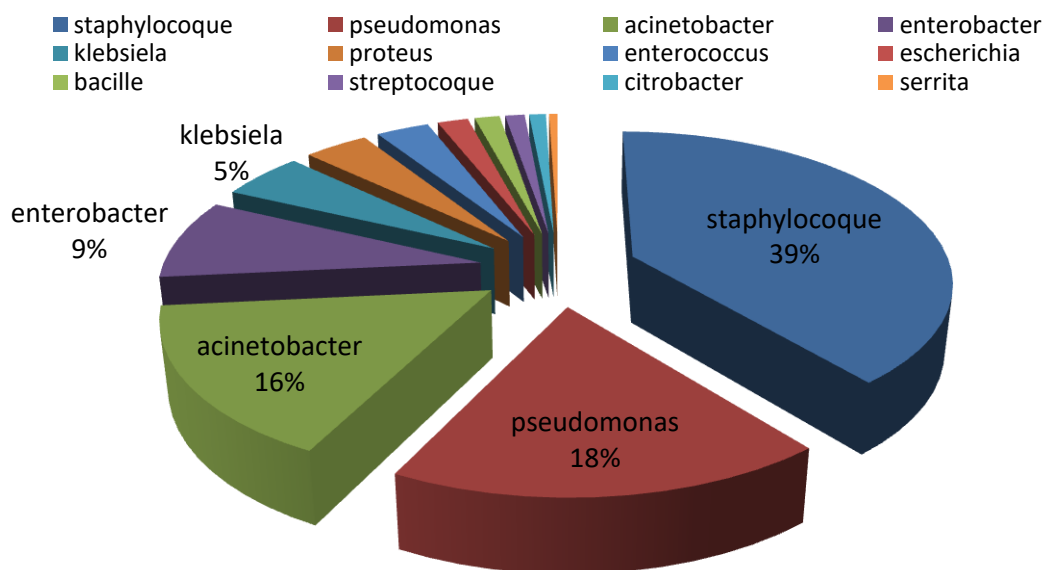
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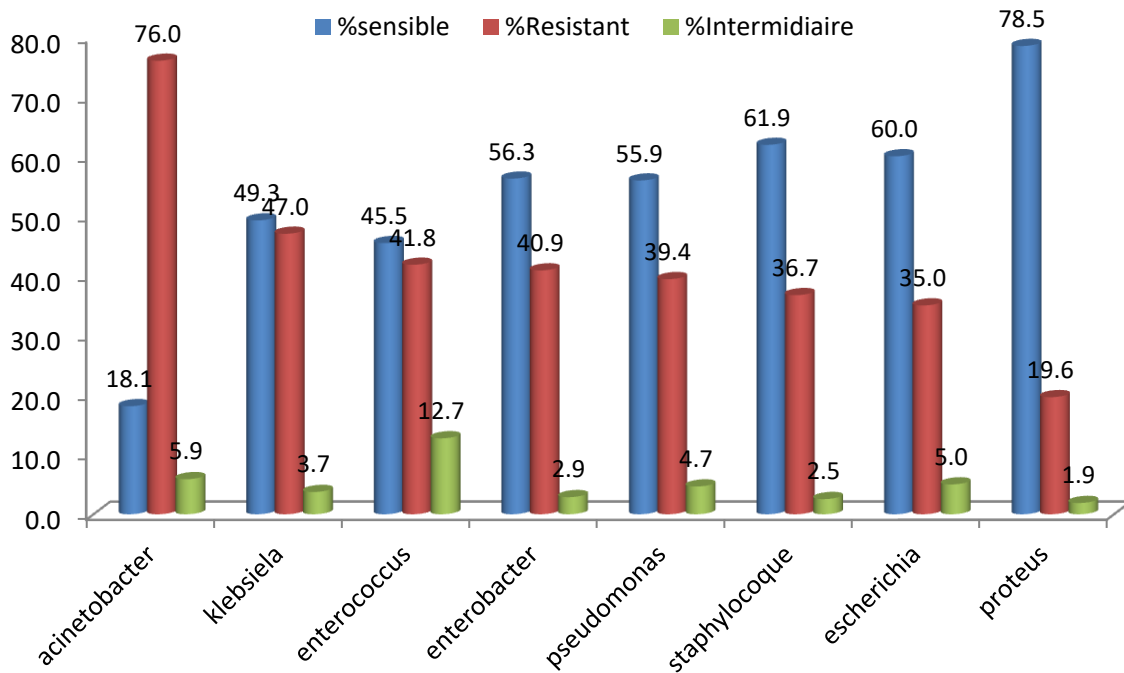
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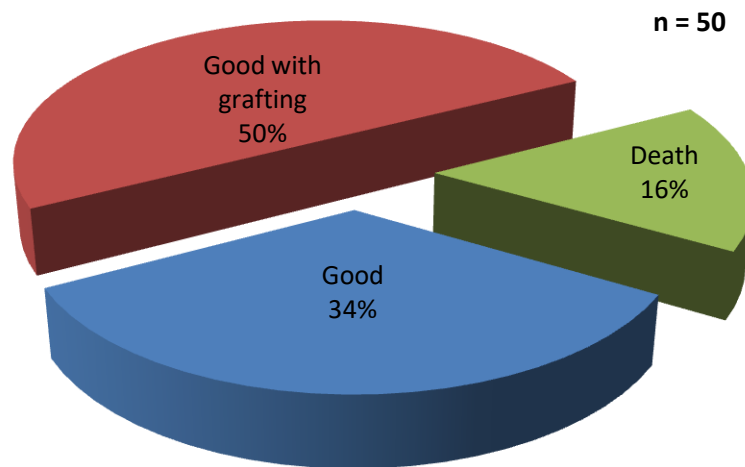
(FIG 1) Distribution of patients infected with Acinetobacter baumannii, according to the Baux index (IB).



(Fig 2) Distribution of burned sites according to the germs in the burned patients of the hospital Mohamed V Rabat



(Fig 3) Distribution of germs according to resistance to antibiotics used in the burn service of the Mohamed V Rabat hospital.



(Fig 4) Distribution of patients infected with *Acinetobacter baumannii*, according to the evolution.