Multidrug Resistant Bacteria in 200 Patients of Moroccan Hospital 2011-2012

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ABSTRACT:

Background: - Antibiotic resistance is a serious public health problem. Antibiotic resistant bacteria are germs that have developed resistance to certain antibiotics that normally kill the bacteria. Infections with antibiotic resistant bacteria can be harder to treat. The aim of the present study is to bring out the epidemiological profile of patients infected with Multi Drug Resistant Bacteria (MDRB) and to investigate the risk factors related to this pathology.

Methods: this is a retrospective study carried out on 200 infected patients, isolated in Patients hospitalized in the different departments of the Hospital of Rabat (Morocco), during the period between September 2011 and October 2012. Subjects were selected through simple random sampling method. Data was collected using questionnaire.

Results: During the period, we registered 200 cases of MDRB infection.

Males were more frequent with a sex-ratio of 2.57. Moreover, the most concerned age group was 50 to 60 years old. The average age was 54.6±12 years.

The results also showed that the urine samples were the majority of sampling sites (60%).

Isolated MDRB were Extended spectrum b lactams (ESBLE) (69%), Acinetobacter Baumannii (ABR) (26.5%), Pseudomonas aeruginosa (PAR) (8.5%) and methicillin-resistant Staphylococcus aureus (MRSA) (2%).

Most of these MDRB were acquired at the institution (32.6%). The identified risk factors were intensive care and emergency, diabetes, immunodeficiency, surgical intervention and the notion of trauma.

Conclusion: Antibiotic resistance is a serious public health problem. It can be prevented by minimising unnecessary prescribing and overprescribing of antibiotics, the correct use of prescribed antibiotics, and good hygiene and infection control.

I. INTRODUCTION

The discovery of penicillin in 1928 was followed by the discovery and commercial production of many other antibiotics. We now take for granted that any infectious disease is curable by antibiotic therapy. Antibiotics are manufactured at an estimated scale of about 100,000 tons annually worldwide, and their use had a profound impact on the life of bacteria on earth. More strains of pathogens have become antibiotic resistant, and some have become resistant to many antibiotics and chemotherapeutic agents, the phenomenon of multidrug resistance Antibiotic medications are used to kill bacteria, which can cause illness and disease. They have made a major contribution to human health. Many diseases that once killed people can now be treated effectively with antibiotics. However, some bacteria have become resistant to commonly used antibiotics. [1]

Antibiotic resistant bacteria are bacteria that are not controlled or killed by antibiotics. They are able to survive and even multiply in the presence of an antibiotic. Most infection-causing bacteria can become resistant to at least some antibiotics. Bacteria that are resistant to many antibiotics are known as multi-resistant organisms (MRO). [2] Indeed, some strains have become resistant to practically all of the commonly available agents. A notorious case is the methicillin-resistant *Staphylococcus aureus* (MRSA), which is resistant not only to methicillin (which was developed to fight against penicillinase-producing *S. aureus*) but usually also to aminoglycosides, macrolides, tetracycline, chloramphenicol, and lincosamides. Such strains are also resistant to disinfectants, and MRSA can act as a major source of hospital-acquired infections. An old antibiotic, vancomycin, was resurrected for treatment of MRSA infections. However, transferable resistance to vancomycin is now quite common in *Enterococcus* and found its way finally to MRSA in 2002, although such strains are still rare [3].

Multiresistant bacteria (MRB) are assumed to emerge primarily from hospitals and other environments where high amounts of antibiotics are frequently used. An even more serious threat may be the emergence of gram-negative pathogens that are resistant to essentially all of the available agents. Research had time to react against the threat by MRSA. Thus, there are newly developed agents that are active against vancomycin-resistant MRS. However, the emergence of "pan-resistant" gram-negative strains, notably those belonging to Pseudomonas Aeruginosa and Acinetobacter baumanii, occurred more recently, after most major pharmaceutical companies stopped the development of new antibacterial agents. Hence, there are almost no agents that could be used against these strains, in which an outer membrane barrier of low permeability and an array of efficient multidrug efflux pumps are combined with multitudes of specific resistance mechanisms [4].

Multidrug resistance in bacteria occurs by the accumulation, on resistance (R) plasmids or transposons, of genes, with each coding for resistance to a specific agent, and/or by the action of multidrug efflux pumps, each of which can pump out more than one drug type. [1]

II.   METHODS

Design and study area

This research was a retrospective study undertaken in different departments of the Moroccan hospital in Rabat, from September 2001 to October 2002. Study participants who were hospitalized 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) Bacterial species.
3) Sampling site.
4) Department.
4) Risk factors.

Data collection

Data was collected by a trained research doctor. It was based on patient record. We were interested to patients infected.

Data analysis

Data were analyzed using IBM SPSS 19.0 for Windows. Descriptive as well as analytical analyses were employed to determine epidemiological profile of patients infected with MDRB 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 ± 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 September 2001 and October 2002, we administered questionnaire to 200 patients infected with Multi Drug Resistant Bacteria, 72 % (n= 144) were males and 28 % (n= 56) females, Sex Ratio = 2.57. 12 patients had two MDRB. The mean age of participants was 54.6 ± 12 years, [1-80] and the most concerned age group were 50 to 60 years old. (Fig 1).

Bacterial species

The results of the distribution of infections showed that infections with Extended Spectrum b Lactams (EBLSE) were the most frequent 69%, infections caused by Acinetobacter Baumannii came second with 26.5%, followed by Pseudomonas Aeruginosa (PAR) with 8.5% and Methicillin-Resistant Staphylococcus Aureus (MRSA) 2% (Fig 2).

Sampling site

The results also showed that the urine samples were the majority of sampling sites (60% of cases) and the most of these MDRB were acquired at the institution (32.6%). (Fig 3).

Department

The most of MDRB were acquired at the medical and surgical intensive care unit (17% and 15.5%) followed by the department of urology (5.5%). (Fig 4).

Risk factors

The statistical analysis reveals that the risk factors of infection with MDRB were intensive care unit and emergency, diabetes, immunodeficiency, surgical intervention and the notion of trauma.

IV.   DISCUSSION

The male predominance observed in our study (72 %) is consistent with the results of previous studies [5]. the mean age in our study, which is 54.6 ± 12 years, is much lower than that found in another study at the national level and is of the order of 38 ± 19 years old [6].

The results of the present study show that infections with EBLSE are the most important in patients infected, followed by those caused by Acinetobacter Baumanii, Pseudomonas Aeruginosa and MRSA respectively, this result is consistent with that obtained in previous studies [5.7].

In agreement with the results of other studies which have addressed the same subject [5.8] ,the urine samples were the majority of sampling sites (60% of cases) and the most of MDRB were acquired at the medical and surgical intensive care unit.

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.

 It is necessary to develop new antibiotics over time since the selection of resistant bacteria cannot be prevented completely. This means with every application of a specific antibiotic, the survival of a few bacteria which already got a resistance gene against the substance is promoted, and the concerning bacterial population amplifies. Therefore, the resistance gene is farther distributed in the organism and the environment, and a higher percentage of bacteria does no longer respond to a therapy with this specific antibiotic.

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
Availabality 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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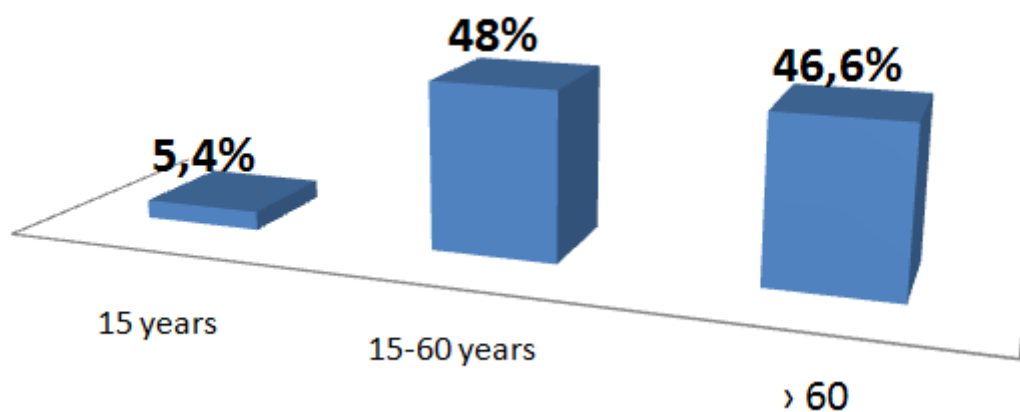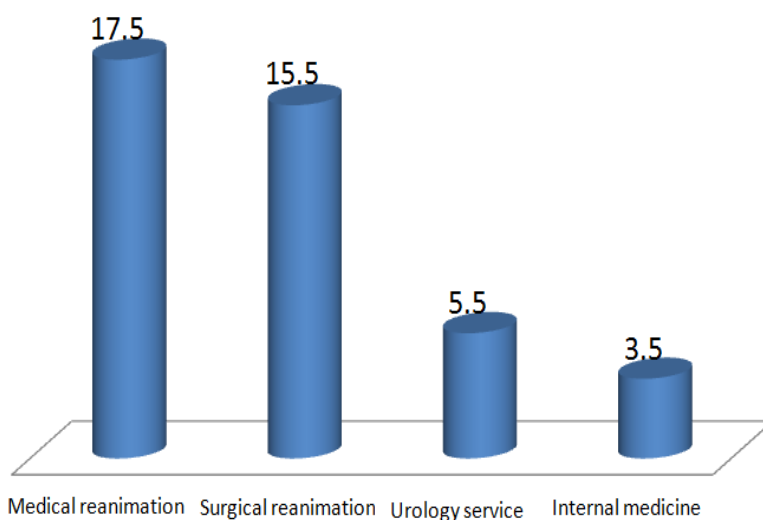
(Fig 1) Distribution of infection according to the age group in the patients of the hospital of Rabat (N= 200).
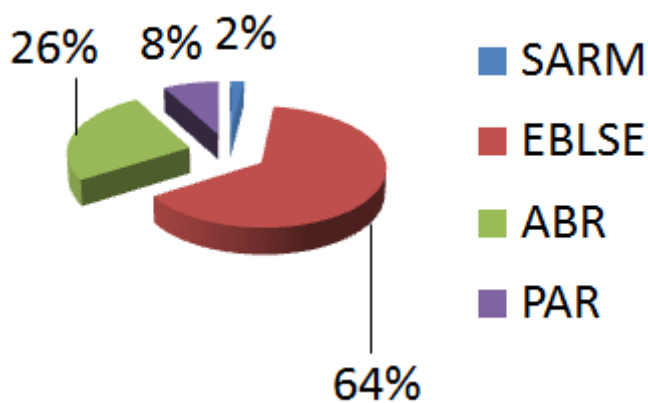
(Fig 2) Distribution of infection according to the bacterial species in the patients of the hospital of Rabat (N= 200).
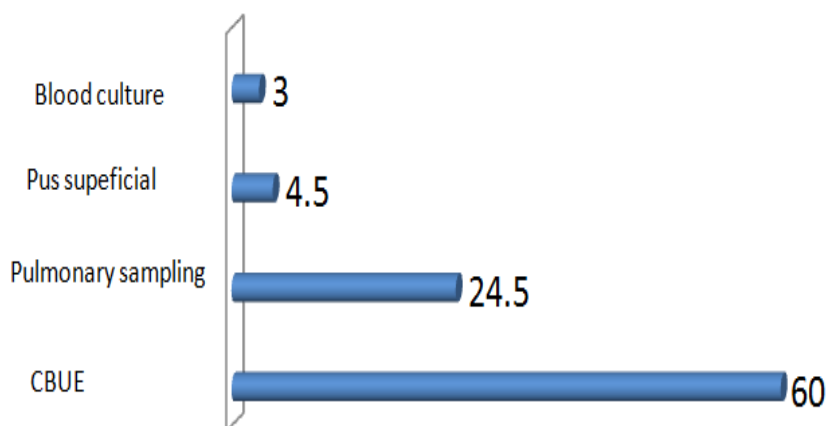
(Fig 3) Distribution of infection according to the sampling site in the patients of the hospital of Rabat (N= 200).

(Fig 4) Distribution of infection according to the department in the patients of the hospital of Rabat (N= 200).

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