Evaluation of Antibiotic Prescriptions in the Emergency Department

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Abstract

The objective of this study is to assess the prescription of antibiotic therapy in the emergency department, which is an overview of our hospital training and to reflect on the development of corrective measures. A working group was responsible for developing the methodology. The data collection was prospectively for each patient. This data related to the characteristics of the patients (age, sex), the reasons for emergency consultations, the data concerning the patient field, the elements of the clinical and paraclinical examination and prescribed antibiotic treatments and analysis of these data. This study included 542 patients consulting for different reasons; including 347 men (64%) against 195 women (36%); of which 90 patients benefited from the prescription of antibiotic therapy, is 16.60% of the patients included. Antibiotic therapy prescribed in the emergency room was justified in 86 patients (95.55%); the choice of the molecule (36%) of which 90 patients benefited from the recommendations in 73 patients (81.11%). The quality of the choice of probabilistic antibiotic therapy conditions the patient's prognosis. To reduce this risk, the emergency physician must base his decision on probabilistic reasoning and reassess the treatment based on the antibiogram and systematically use the antibiotic therapy protocols recommended by learned societies which must be adapted to the local ecology; to ensure the proper use of antibiotics.

Keywords: Emergency department; prospective study; antibiotic prescription; good use of antibiotics.

INTRODUCTION

Community infections are an important part of emergency room admissions. In these services, antibiotic therapy is most often decided and initiated. The constraint of unscheduled operation of emergency services is sources of certain difficulties for the teams working there. In particular, the diversity of pathologies and their severity, the variability of the influx over time, the large number of doctors as well as the diversity of their specializations are sources of variability in diagnostic and therapeutic decisions. Several studies have shown a tendency for emergency room physicians to overuse antibiotics [1-5].

The objective of our work is the evaluation of the prescription of antibiotics in the emergency department from My Ismail Military Hospital and the reflection on the development of corrective measures.

MATERIALS AND METHODS

This is a prospective study aimed at evaluating the prescription of antibiotics in the emergency department of our hospital training. This study was carried out in three phases over a period of 3 months; data collection, data analysis and presentation of results and finally reflection on the development of corrective measures.

INCLUSION CRITERIA

Emergency room patients with hyperthermia (> 38 °C), hypothermia (<36 °C) or two criteria for systemic inflammatory response syndrome.

DATA COLLECTION

After the development of the support sheet for our study; emergency physicians began the first phase of the study, which allowed for the prospective collection of data for each patient, these data relating to the characteristics of the patients (age, sex), the reasons for emergency consultations, the data concerning the patient field (patient history, allergies to drugs, recent antibiotic treatment), elements of clinical examination, non-microbiological biological diagnostic orientation data such as (NFS, CRP,...); orientation of
microbiological biological diagnostics such as (Blood cultures, ECBU, etc.); Radiological diagnostic orientation data such as (radio lung, ultrasound, etc.) and data concerning antibiotic treatments prescribed in emergencies, namely (monotherapy, associations antibiotics, dosages and rates of administration).

**RESULTS ANALYSIS**

The second phase consisted in the analysis of the results collected on the patient files, allowing the determination of the average age of the population being studied, the main antecedents to be taken into account during treatment, the possible allergies to take into account, the main diagnoses retained after clinical examinations and the data of the different diagnostic orientations and the antibiotic therapy protocols adopted.

The third phase was devoted to a review of the literature to judge the conformity of decisions to indicate antibiotic therapy in emergencies in relation to the specific recommendations for each diagnosed pathology and on the conformity of prescribed antibiotic therapy protocols according to pathology and according to the choice of the antibiotic molecule, its dosage and its rhythm of administration.

**RESULTS**

The results showed that this study included 542 patients consulting for different reasons; including 347 men (64%) against 195 women (36%). The average age of the patients was 47 years with extremes (13-87 years) Analysis of the results showed that only 90 patients benefited from the prescription of antibiotic therapy, or 16.60% of the patients included in the study. Only one case of beta-lactam allergy was included in the prescription of antibiotics. For the pathologies diagnosed, our results showed a distribution predominantly by intra-abdominal sepsis in 21/90 patients (23.33%), followed by soft tissue infections in 21/90 patients (23.33%), then the pleuro-pulmonary infections in 18/90 patients (20%) and trauma in 8/90 patients (8.88%) (Figure 1).

![Fig-1: Percentage of re-distribution of different infections diagnosed](image1)

The non-microbiological biological examinations prescribed for diagnostic orientation were the blood count with 82/90 patients, ie (91.11%), the results of which revealed hyperleukocytosis in 58/82 patients (70.73%); protein C reactive with 60/90 patients (66.66%), with high results compared to normal values in 48/60 (80%); 22 biological samples were prescribed, blood cultures represented 45.45%, lumbar punctures represented 18.18% (Figure 2).

![Fig-2: Bacteriological samples percentage distribution](image2)
Analysis of the 37 monotherapies prescribed, shows the predominance of penicillin A in 21/37 patients (56.76%), followed by the association amoxicillin-clavulanic acid in 7/37 patients (19%). While the molecules belonging to aminoglycosides and metronidazoles are only prescribed in combination with molecules from other therapeutic classes.

For the conformity of the indication for antibiotic therapy; antibiotic therapy prescribed in the emergency room was justified in 86 patients (95.55%) whose infectious diagnosis was established in 84 patients (93.33%) and in 2 patients the infectious site was not specified and the antibiotic treatment was established in front of clinical and para-clinical stigmas of bacterial infection. Antibiotic therapy was unjustified in 4 patients (4.44%) whose diagnoses were (2 cases of hemorrhoidal thrombosis, acute edema of the OAP lungs and one case of rhabdomyolysis) (Figure 3).

![Figure 3: Percentage of prescriptions by antibiotic families](image)

For the compliance of the prescription of antibiotic therapy with the recommendations; our study shows that the choice of the molecule was in accordance with the recommendations in 53 patients, i.e. an appropriate antibiotic therapy rate of (58.88%). The prescribed dosage was in accordance with the recommendations in 73 patients, i.e. an appropriate dosage rate of (81.11%) (Figure 4).

![Figure 4: Rate of compliance of judgment criteria with recommendations](image)

**DISCUSSIONS**

Infectious pathology is a reason for frequent admission to the emergency room where it leads to a large and sometimes inappropriate prescription of antibiotics. This high consumption of antibiotics promotes the emergence of resistant bacterial strains [1, 2]. However, the seriousness of certain clinical conditions imposes an immediate antibiotic therapy [3]. Emergency physicians are therefore often confronted with the general problem of controlling antibiotic therapy in order to prevent the emergence of resistant pathogens but also with the problem of the urgent start of antibiotic therapy adequate in life-threatening situations. To solve these problems, the doctor must master the probabilistic reasoning leading to the decision to prescribe and also to systematically use the antibiotic therapy protocols recommended by groups of experts.

Our results have shown that the patients included in our studies have different types of history...
on the one hand from chronic diseases such as diabetes, cardiac pathologies and high blood pressure and on the other hand from patients recently operated for different causes such as limb amputations, gallbladder stones, inguinal hernia and prostate adenoma. The decision to prescribe antibiotic therapy must be justified by the benefit it brings to the patient in terms of mortality or morbidity. The prescription of antibiotic therapy should therefore be limited to infections whose bacterial origin is highly probable and for which other measures are not sufficient. Certain situations require immediate probabilistic antibiotic therapy because of the risk of rapid spread of germs or an increase in the bacterial inoculum favoring the development of septic shock with high mortality [6]. In our study, antibiotic treatment was started immediately, particularly in intra-abdominal sepsis, neuro-meningeal infections and febrile neutropenia. The results of our study confirm the interest of the various elements of clinical and paraclinical diagnostic orientation, in particular biological examinations such as (C-reactive protein, blood count and microbiological examinations such as (cytobacteriological examination of urine, examination of cerebrospinal fluid LCR); most often necessary [6], these elements effectively contributed to limiting the excessive prescription of antibiotics, thus among the 542 consultants for various reasons, only 90 patients benefited from a prescription of antibiotics or 16.60% with a compliance rate of the indication for antibiotic therapy of 95.55%.

In the emergency department, the vast majority of infections observed are for the most part community-based with germs in general sensitive to the antibiotic indicated and monotherapy is often sufficient. The use of combinations of antibiotics has the objective of reinforcing the effectiveness of treatment by increasing bactericidal activity thanks to the synergistic effect of the combination, the case of combinations of beta-lactams with aminoglycosides or fluoroquinolones [7]; combinations of antibiotics may aim to broaden the antibacterial spectrum in the treatment of severe microbiologically undocumented infections such as purulent meningitis, severe pneumonia [8-10] or potentially multiple microbials such as necrotizing cellulitis and intra-abdominal infections [11, 12]. The use of combinations of antibiotics may also have the objective of preventing the foreseeable emergence of resistant mutants during the eradication of certain bacterial species by certain antibiotics such as the use of fluoroquinolones, rifampicin, fusidic acid, in the eradication of staphylococci and the use of fluoroquinolones, beta-lactams in pseudomonasaeruginosa infections [7]. Analysis of the results of our study showed that the use of monotherapy took place in 41.11% of the cases. The most commonly prescribed antibiotics as monotherapy were penicillins A (amoxicillin, ampicillin); however, the aminoglycosides and metronidazoles have been prescribed in combination with beta-lactams or fluoroquinolones.

The choice of an antibiotic depends on its foreseeable activity on the suspected microorganisms, on its good diffusion in the infectious site as well as on the absorption, elimination and tolerance capacities of the infected subject. In mild infections, choose the best tolerated and narrow spectrum antibiotics because of their less impact on the commensal flora. However, in severe infections, efficacy should be favored and willingly use bactericidal and broad spectrum antibiotics [6, 13]. The results of our study showed that the rate of maladjustment of the choice of molecules prescribed to the recommendations was 41.12%, which confirms the data in the literature. In fact, numerous studies report that antibiotic prescriptions are inappropriate in 20 to 50% of cases, in the city as well as in the hospital [14]. Other studies confirm the unsuitability of antibiotic prescriptions, such as a series of 2,943 patients admitted to the emergency room, in 2007 the prescription was inappropriate in 22% of prescriptions [15]. These results require careful information from each practitioner to obtain an adequate prescription for any probabilistic antibiotic therapy.

Furthermore, the prescription of antibiotics requires compliance with the recommended dosages and absorption rhythms in order to ensure the appropriate concentrations at the site of the infection and to avoid overdoses. The dosages must be adapted to the physiological state of the subject. The intravenous route should be preferred in serious infections because it allows rapid attainment of high concentrations as well as in the event of swallowing disorders or vomiting [6]. Our results showed that the prescribed dosages were adapted to the recommendations in 81.11% of the cases.

The re-evaluation of antibiotic therapy must take place around the second or third day, the date on which the bacterial identification of the responsible germs and their sensitivity profile is most often available, provided that adequate samples have been taken initially. It is sometimes necessary to know how to decide to stop probabilistic antibiotic therapy when all the microbiological data are negative and then orient diagnostic research towards a non-infectious etiology [16]. Awareness-raising and staff training measures must be undertaken on the need to respect the general rules of prescription and the proper use of antibiotics [17-21].

**Conclusion**

Finally, discussing probabilistic antibiotic therapy requires identifying situations where any delay in antibiotic therapy can be life-threatening for the patient due to a specific location, an immune deficiency, or clinical signs and or biological gravity.
Our study found an inappropriate antibiotic therapy rate of 41.12%. Hence the interest in developing antibiotic therapy protocols based on the recommendations of learned societies which must be adapted to local ecology.

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