

Evaluation of Antibiotic Prescriptions in the Emergency Department

Abdeslam Elkartouti^{1*}, Sidi Mohamed Hannafi², MoulayAhmed Hachimi³

¹Hospitalary Pharmacist Department, ²Emergency Department, ³Anesthésie-Intensive care Department, Hospital Pharmacy Service at Moulay Ismaïl Military Hospital in Meknes and Teacher in the Basic Sciences Department of the Faculty of Medicine and Pharmacy of Sidi Mohammed Ben Abdellah University in Fez – Morocco

DOI: [10.36348/sjmps.2020.v06i06.008](https://doi.org/10.36348/sjmps.2020.v06i06.008)

| Received: 05.06.2020 | Accepted: 16.06.2020 | Published: 26.06.2020

*Corresponding author: EL KARTOUTI Abdeslam

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 relating 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 was in accordance with the recommendations in 53 patients (58.88%) and the prescribed dosage was in accordance with 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 departement; prospective study; antibiotic prescription; good use of antibiotics.

Copyright @ 2020: This is an open-access article distributed under the terms of the Creative Commons Attribution license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use (NonCommercial, or CC-BY-NC) provided the original author and source are credited.

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 are 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 is 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 ($> 38^{\circ}\text{C}$), hypothermia ($<36^{\circ}\text{C}$) 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).

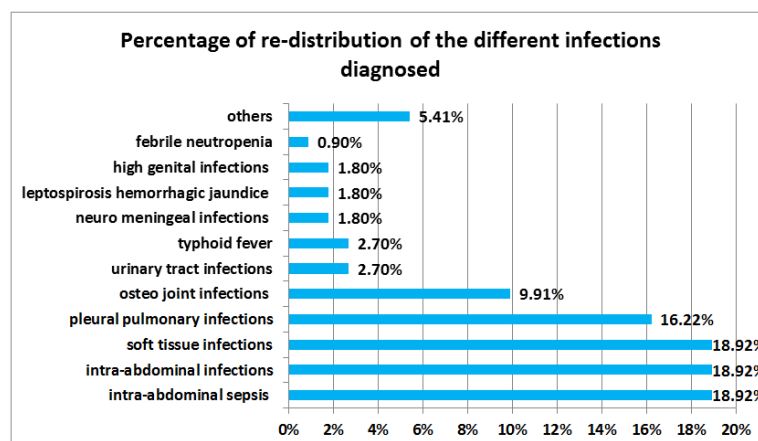


Fig-1: Percentage of re-distribution of different infections diagnosed

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).

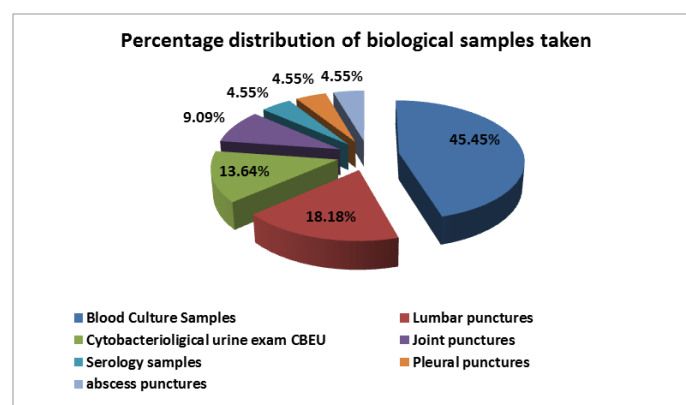


Fig-2: Bacteriological samples percentage distribution

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).

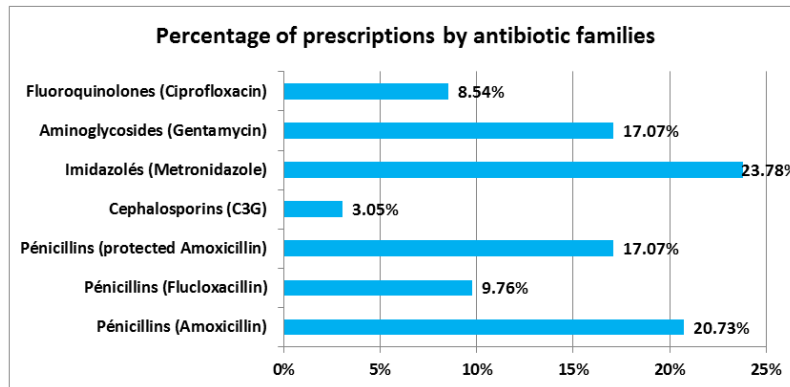


Fig-3: Percentage of prescriptions by antibiotic families

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).

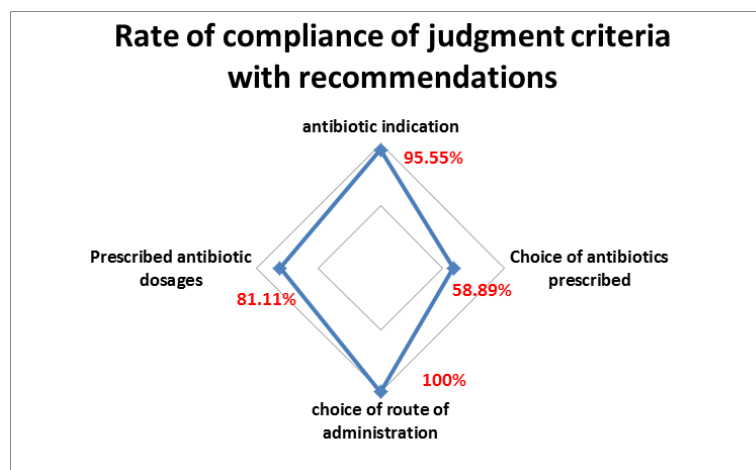


Fig-4: Rate of compliance of judgment criteria with recommendations

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 para-clinical 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-lactam antibiotics 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 pseudomonas aeruginosa 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.

REFERENCES

- Carod, J. F., Floret, N., Draou, B., Daucourt, V., Sakho, A., Blanc, E., ... & Leroy, J. (2013). Analyse rétrospective de l'antibiothérapie probabiliste des infections respiratoires basses chez des patients admis aux urgences du centre hospitalier Louis-Jaillon (Saint-Claude, France). *Journal Européen des Urgences et de Réanimation*, 25(3-4), 141-146.
- Carod, J. F., Floret, N., Draou, B., Daucourt, V., Sakho, A., Blanc, E., ... & Leroy, J. (2013). Analyse rétrospective de l'antibiothérapie probabiliste des infections respiratoires basses chez des patients admis aux urgences du centre hospitalier Louis-Jaillon (Saint-Claude, France). *Journal Européen des Urgences et de Réanimation*, 25(3-4), 141-146.
- Massin, M. M., Montesanti, J., & Lepage, P. (2006). Management of fever without source in young children presenting to an emergency room. *Acta paediatrica*, 95(11), 1446-1450.
- Velasco, M. A., Rubio, L. C., Casas, A. M., Martín, M. S., Gamez, S. D., Delgado-Iribarren, A., ... & de Casasola García, G. (2010). Appropriateness of empiric antibiotic therapy in urinary tract infection in emergency room. *Revista clinica espanola*, 210(1), 11-16.
- Woodhead, M., Blasi, F., Ewig, S., Garau, J., Huchon, G., Ieven, M., ... & Read, R. (2011). Guidelines for the management of adult lower respiratory tract infections- Full version. *Clinical microbiology and infection*, 17, E1-E59.
- Badiaga, S., & Gerbeaux, P. (2006). Antibiothérapie aux urgences. *Réanimation*, 15(7-8), 514-522.
- Mandell, G.L., Benett, J.E., Dolin, R. (2000). editors. Principles and practice of Infectious Diseases. 5e ed. Philadelphia, PA: Churchill Livingstone.
- XV Conférence. (2006). de consensus en thérapeutique anti-infectieuse de la Société de pathologie anti-infectieuse de langue française. Prise en charge des infections respiratoires basses de l'adulte immunocompétent. *Med Mal Infect*, 36: 235-44.
- Tunkel, A. R., Hartman, B. J., Kaplan, S. L., Kaufman, B. A., Roos, K. L., Scheld, W. M., & Whitley, R. J. (2004). Practice guidelines for the management of bacterial meningitis. *Clinical infectious diseases*, 39(9), 1267-1284.
- Mandell, L. A., Bartlett, J. G., Dowell, S. F., File Jr, T. M., Musher, D. M., & Whitney, C. (2003). Update of practice guidelines for the management of community-acquired pneumonia in immunocompetent adults. *Clinical Infectious Diseases*, 37(11), 1405-1433.
- Stevens, D. L., Bisno, A. L., Chambers, H. F., Everett, E. D., Dellinger, P., Goldstein, E. J., ... & Wade, J. C. (2005). Practice guidelines for the diagnosis and management of skin and soft-tissue infections. *Clinical Infectious Diseases*, 41(10), 1373-1406.
- Solomkin, J. S., Mazuski, J. E., Baron, E. J., Sawyer, R. G., Nathens, A. B., DiPiro, J. T., ... & Chow, A. W. (2003). Guidelines for the selection of anti-infective agents for complicated intra-abdominal infections. *Clinical infectious diseases*, 37(8), 997-1005.
- Denes, E., & Bergogne-Bérézin, E. (2008). Les bases de l'antibiothérapie aujourd'hui: diagnostics rapides, nouvelles méthodes, innovations. *Antibiotiques*, 10(3), 128-133.
- 14e Conférence de Consensus organisé par la Société de Pathologie Infectieuse de Langue Française. «Comment améliorer la qualité de l'antibiothérapie dans les établissements de soins». «Qualité = préserver l'intérêt collectif sans nuire à l'intérêt individuel du patient». Du 6 mars Institut Pasteur - Paris, soutien institutionnel de (AFSSAPS et InVS)
- Mettler, J., Simcock, M., Sendi, P., Widmer, A. F., Bingisser, R., Battegay, M., ... & Bassetti, S. (2007). Empirical use of antibiotics and adjustment of empirical antibiotic therapies in a university hospital: a prospective observational study. *BMC infectious diseases*, 7(1), 21.
- Benoît, V. (2008). MISE AU POINT: Conduite de l'antibiothérapie probabiliste. *Le Praticien en anesthésie réanimation*, 12 ; 78—84
- Haute Autorité de Santé. (2008). Stratégie d'antibiothérapie et Prévention des résistances bactériennes en établissement de santé. Recommandations Avril 2008
- OKRANI, S., & HAMDANI, S. (2017). Evaluation de la consommation des antibiotiques au service de Réanimation Médicale du CHU de Tizi-Ouzou.
- Guide bon usage des antibiotiques aux urgences (v 2 février 2004) C.H.U. Jean Verdier
- Bonnin, P., Karibian, J., Savary, D., Janssen, C., & Vitrat, V. (2017). Prescription d'antibiotiques aux urgences: impact de la formation des urgentistes. *Médecine et Maladies Infectieuses*, 47(4), S34.
- Elbouti, A., Rafai, M., Chouaib, N., Jidane, S., Belkouch, A., Bakkali, H., & Belyamani, L. (2016). Evaluation des prescriptions antibiotiques au service des urgences de l'Hôpital Militaire d'Instruction Mohammed V (HMIMV). *The Pan African Medical Journal*, 25.