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A Systematic Review

Quality Assessment of a Medical Prescription for Antibiotic Therapy

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Abstract:

Objective: Our study aimed to assess the quality of antibiotic prescriptions and identify potential opportunities for improvement in antibiotic use in our setting.

Methodology: This is how we conducted a prospective cross-sectional descriptive study which concerned 404 prescriptions collected in the pharmacy of the HGR mwangeji

Results: The most prescribed antibiotic families were beta lactams with 60.15%, followed by imidazoles with 11.88% and fluoroquinolones or 8.1%; they were more prescribed in INN with 70% in the following galenic forms: tablets 46.8% followed by bottles 17.1% and finally suspensions with 12.6% with an unspecified route of administration in 80.9%. The dosage, dose, total quantity and duration of treatment were specified respectively as follows: 86.9%; 62.4%; 98.3% and 80.4%. Most of the prescriptions bore the name and first name of the patients 82.9%; The age of the patient was indicated at 75.2%; Almost all of the prescriptions did not have the weight of the patient indicated (97%); Almost all of them bore the sex of the patient (97.6%); Not all prescribers wore the patient's size (100%). In 84.4% of cases, prescribers had indicated their name on the prescriptions; A large number of prescription slips did not bear the prescriber status 86.6%; Almost all prescribers had indicated their place of practice 99.5%; 97% of prescribers had not indicated their contact details on the prescriptions; The minority 18.6% of prescribers had not signed on the prescriptions; The order number is shown on the majority of prescription slips 83.7%.

Conclusion: The results of this study remain relevant. They will help improve training programs for health workers by establishing interactive information for practitioners, through visits and intensive supervision by more experienced managers in the hierarchy, this would be likely to optimize the quality of practitioners' prescriptions ; so that they better master the principles of prescribing antibiotics .

Keywords: Prescription, Antibiotics, evaluation, quality, medical, antibiotic therapy.

Introduction

1. Choice and interest in work

Antimicrobials have saved millions of lives since their discovery a century ago [1] and are part of the indispensable therapeutic arsenal of modern medicine. Their use is not free. Specifically, antimicrobials differ

from other drugs in that they are societal drugs: their use by an individual leads to more profound repercussions on society as a whole [2] due to the selection of antimicrobial resistance (AMR).

We believe that antimicrobial prescribing is a shared responsibility across all prescribers and medical specialties; in all settings, from pharmacy to community, outpatient and hospital settings, including animal health and environmental sectors[3].

Given the high proportion of antimicrobial prescribing associated with medical practice, there is a growing need to understand the factors that determine antimicrobial prescribing in order to understand how they can be addressed to increase the appropriateness of antibiotic use[4]. Efforts are needed to ensure that these prescriptions are both necessary and correct, and antimicrobial stewardship (AMS) can be a useful aid to clinical decision-making when used correctly[5], hence the interest in choosing this topic, which is intended to be both a tool for improving the quality of antibiotic prescribing, but also a reference document for any clinician concerned with improving their daily practice.

According to the Center for Disease Control (CDC), 20–50% of all antibiotic prescriptions in acute care hospitals in the United States are either unnecessary or inappropriate. [6] The CDC also stated that most antibiotic prescriptions include nursing homes and long-term care facilities (LTCFs). Similar to the hospital setting, 40–75% of antibiotics prescribed in nursing homes and long-term care facilities may be unnecessary or inappropriate [7]. Current scientific literature emphasizes reducing inappropriate antimicrobial use in all care settings.

Indeed, the World Health Organization (WHO) has recently highlighted the growing threat of antimicrobial resistance (AMR), together with low expectations regarding the development of new antibiotics, as one of the global health issues for the next decade [8]. AMR is already responsible for approximately 25,000 deaths per year in the European Union (EU) [9]. Alongside increasing mortality rates, AMR increases the associated economic costs. In the EU alone, AMR is estimated to cost €1.5 billion per year in healthcare and productivity losses [9]. The World Bank warns that by 2050, drug-resistant infections could cause global economic damage comparable to that of the 2008 financial crisis [10]. For this reason, different strategies have been developed to combat this problem [11,12] ; some actions aim to promote the development of new antimicrobials and others to optimize infection control and the rational use of antibiotics in health centers by using several means among which the quality of antibiotic prescriptions occupies a significant place.

In hospital settings and recently also in outpatient settings, multidisciplinary programs, i.e. antimicrobial stewardship programs, have been developed to optimize antimicrobial use [13]. One of the requirements of antimicrobial stewardship programs is the ability to measure the quality of antibiotic use with reliable indicators [14]. Quality indicators (QIs) are measurable elements for which there is evidence of their use to assess the appropriateness of antibiotic use [15]. Assessing the quality of medical care and the impact of antimicrobial stewardship programs can help identify intervention and improvement targets [16]. However, QIs can first be tested in clinical practice to identify feasible, valid, and reliable indicators in a specific context [17].

The research question of this work can be summarized as follows: What would be the level of quality of antibiotic prescriptions established in the South of the DR Congo?

2. Objective of the work

In a way, this work sets itself the objective of evaluating the quality of antibiotic

prescriptions and identifying potential possibilities for improvement of antibiotic use in our context.

And specifically, this work sets itself the following objectives:

a. Evaluating the quality of performance of antibiotic prescriptions established in the South of the DR Congo
b. Identify non-conformities and propose an improvement plan

3. Methodology

This is a prospective cross-sectional descriptive study.

Research strategy

A systematic literature search was conducted on antibiotic prescriptions based on antibiotic prescription quality performance indicators.

Integration criteria

For this study, any antibiotic prescription that was established and available either from the patient or in one of the pharmacies around the Mwangeji general referral hospital in the city of Kolwezi during the period of our study will be included.

For this work and in view of the standardized audit tools developed to help healthcare institutions assess the quantity and quality of antimicrobial prescribing available in the literature, we suggested that the core elements of antimicrobial prescribing assessed for appropriateness include antimicrobial initiation (i.e. diagnosis of infection or indication for antimicrobial treatment), choice of antimicrobial treatment, route of administration, dosage, total dose and duration of treatment. As well as information related to the prescriber: their identities (name, surname and first name), department or hospital address, contact details (telephone number or email), their status (general practitioner or specialization), their professional order number, we adapted the definitions: we define an antimicrobial prescription as appropriate when it meets the above-mentioned set of criteria.

Exclusion criteria

Any prescriptions established and available in the city of Kolwezi, but not accessible within our data collection radius or any other prescriptions made by telephone without any paper format were excluded from this study.

Data extraction

We used a standard data extraction format prepared in Microsoft Excel (Microsoft Corp., Redmond, WA, USA).

Quality assessment

To assess the quality of all included studies, two reviewers independently assessed the quality of the included data by checking the completeness of the inclusion criteria. Disagreement between the two reviewers was resolved by discussion.

Data analysis

For data analysis were done using Epi Info 7.2.5 software and Excel, a point estimate of prevalence from each study with a 95% confidence interval was used to estimate the pooled prevalence.

RESULTS

Practical information on appropriate prescriptions is often not available in practice. They often have questions that remain unanswered, thus affecting the quality of a prescription. In this part we present our results in the search for non-conformities on prescriptions developed by doctors in the south of the DR Congo.

Regarding patient information, we observed in the figure below that the patient's gender was reported on 97.52% of prescriptions, followed by identity on 82.92%, then age on 75.24% of cases. Height was absent on all prescriptions and weight was absent on 97.02% of prescriptions. This situation is similar to that observed in African studies including KONATE[18] and Amadou Yaya [19],

their studies reported the patient's identity on 95% and ABDOULAYE OUSMANE [20] on 76.7% of the prescriptions examined. Although the accuracy of the patient's age remains an important factor in the prescription of antibiotics and this would allow to differentiate adults and children, our study only specifies it on 75.24% while the studies of KONATE[18], Amadou Yaya and Abdoulaye Ousmane do not specify the age on respectively on 91.7%, 86.1% and 75.9% of the prescriptions examined. For the same authors the weight was not identified on 97%; in the KONATE study [18] and 98% in the Absdoulaye Ousmane study, which would have an impact on the dosage and would make it difficult to prescribe an antibiotic, particularly in children where the doses administered are a function of weight. As for the information on the patient's sex, the study by Amadou Yaya GUINDO [19] only provided information for 59% and 52.9% in that of Konate; whereas in the study by ABDOULAYE OUSMANE [20] 97.1% of prescriptions were precise about sex.

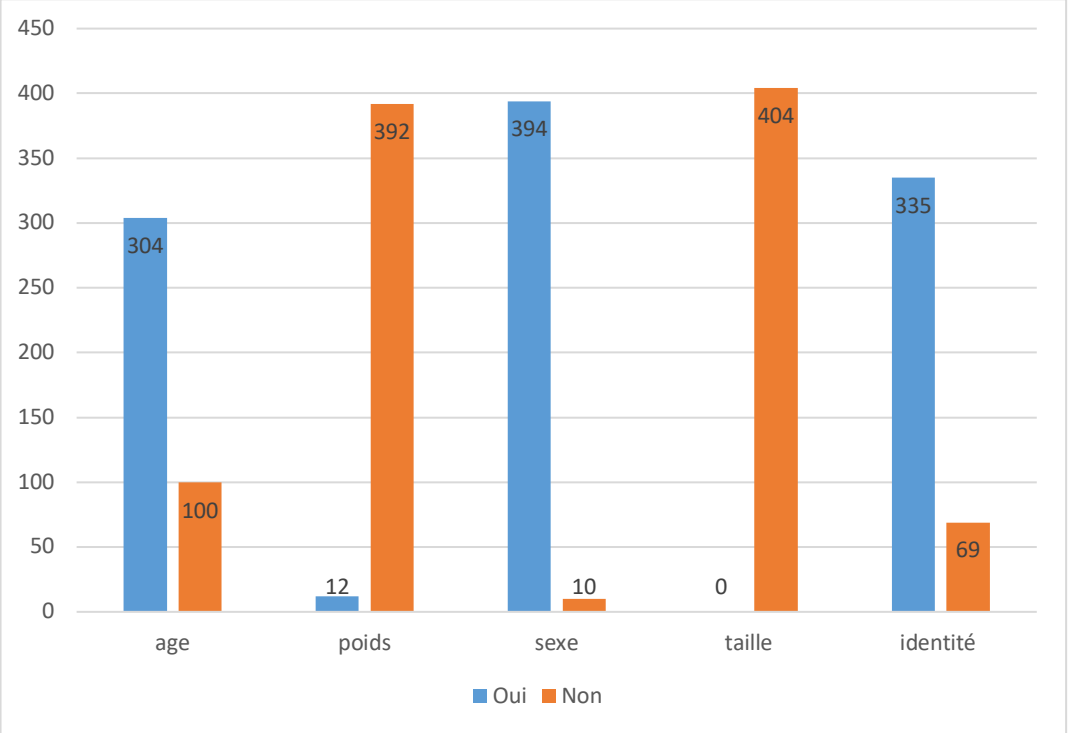

Fig 1: Frequency of patient information

Regarding the information on the prescriber: 84.4% of the prescriptions bear the identities of the prescriber, 99.5% clearly identified his/her assigned department, and 83.7% bore the order number. While 86.6% and 97% did not specify the status or contact number respectively and 18.6% of the prescribers had not signed on their prescriptions. These results are consistent with the observation of Amadou Yaya GUINDO [19] and are different from the results of Abdoulaye Ousmane [20]

Also, gender is a determining factor in antibiotic prescribing, as demonstrated by a meta-analysis of primary care in nine high-income countries which found that women received more antibiotics than men across all age groups[21]. Medication prescriptions for children and adults often require the patient's current weight to determine a safe and effective dose.[22] Without the patient's current weight, the pharmacist is unable to provide the same level of patient care which allows the pharmacist to identify a dosage error[23,24]

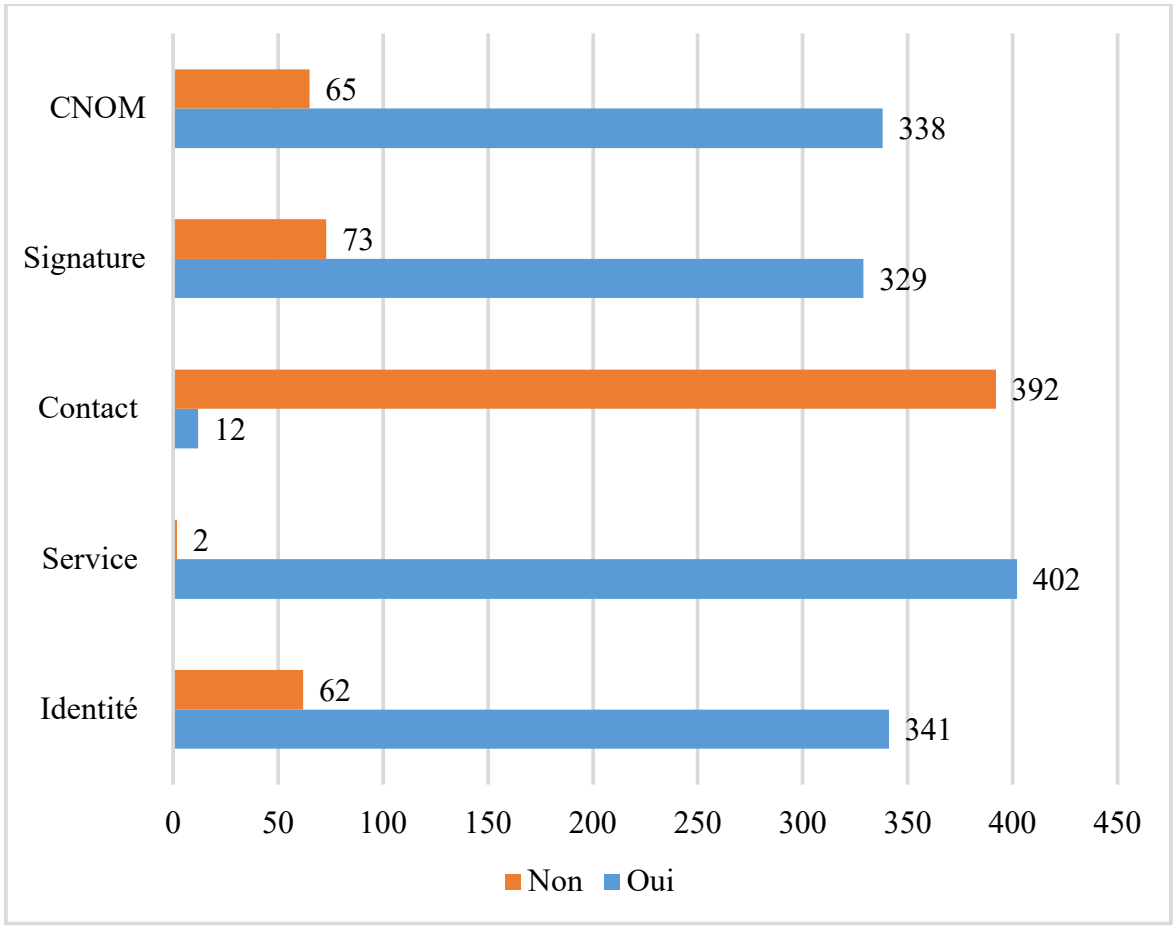

Fig 2: Prescriber information

The dosage of antibiotics was indicated in 62.4% of prescriptions; 85.4% of prescribers indicated the time of taking the antibiotics; The duration of treatment was indicated in 80.4%; Almost all prescriptions included the total quantity of the antibiotic with 98.3%; In 86.9% of cases the dosage of the antibiotic was indicated

Accurate and well-indicated dosing ensures that most antimicrobial compounds produce their effects by acting on specific microbial targets [25] and it is known that inadequate exposure to the drug, these targets can be corrupted due to the active concentration of the drug available to interact with the bacterial site of action and is generally considered from the perspective of duration and extent of exposure which leads to the amplification of drug-resistant subpopulations [26]. Alteration of the target may result in loss of bacterial killing effect [27]

When it comes to dosage, it is important to differentiate: a dose is the amount of medication you take at one time. Doses are usually measured in metric mass units such as milligrams. Dosage is a set of instructions on how to take the medication. It includes how much to take, when to take it, and how long to take it.[28]. Indeed, the main reasons for inappropriate antibiotic treatment reported in several studies include noncompliance with prescribing guidelines, lack of indication for antimicrobial therapy, excessive duration of treatment, incorrect dosing, and delay in switching from intravenous to oral administration.[29]. These large variations not only in total consumption but also in antibiotic prescribing patterns are mostly unexplained and suggest opportunities for improving prescribing.[30]

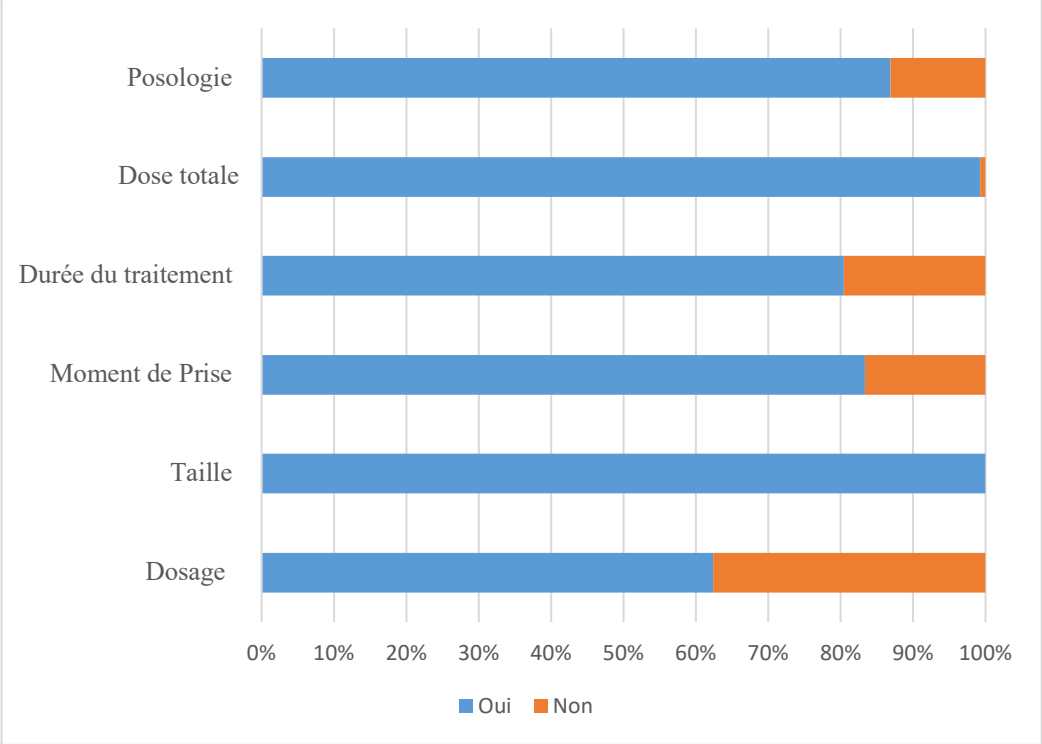

Fig 4: Antibiotic information

Generic prescribing was reported at 70.04% in our study while in Ethiopia [31] it was reported at 97%, in Iran at 95% [32] and in Ghana at 93% [33]. The International Nonproprietary Name (INN) of antibiotics ensures appropriate prescribing of antibiotics so that the right patient receives the right antibiotics at the right time to ensure optimal clinical outcomes while helping to limit further increases in AMR [35]. In the community, prescribing antimicrobials under the generic name ensures better availability and allows dispensers to substitute therapeutic equivalents in case of unavailability of a particular brand [35].

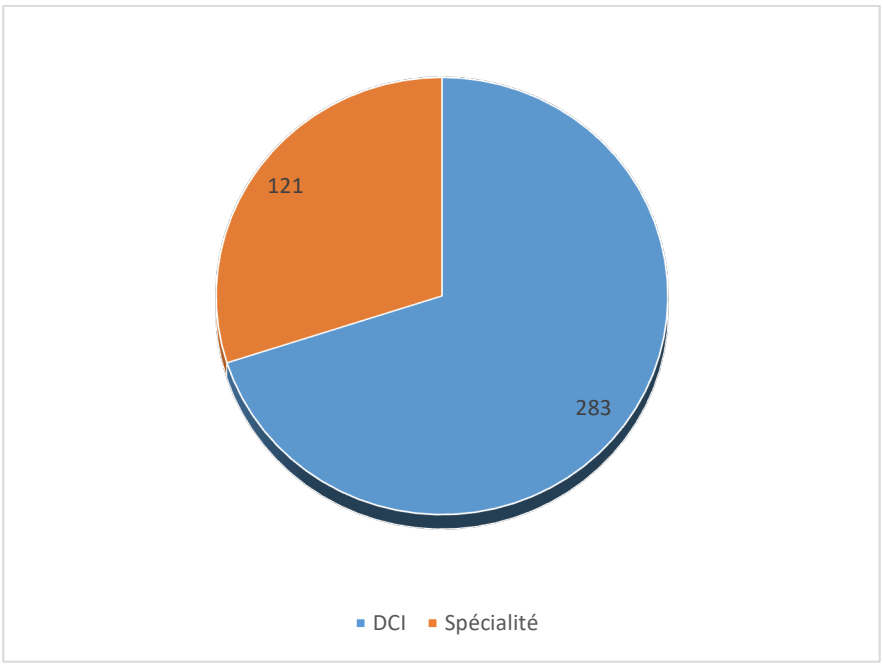

Fig 5: Distribution of antibiotic name indication

Table 4: Associative table of Dosage form and Route of administration

	No details	IM	IV	IVDL	PER OS	Total	
Bulb	19	7	0	1	0	28	
Capsule	33	0	0	0	5	38	
Eye drops	1	0	0	0	0	1	Pv = 0.6
Compressed	156	0	0	0	32	189	
Bottle	53	2	1	12	0	69	
Capsule	8	0	0	0	2	10	
Infusion	15	0	0	2	0	18	
Suspension	37	0	0	0	13	51	
Total	325	9	1	15	54	404	

The dosage forms or route of administration were specified as tablets with 46.8% followed by bottles or 17.1% and suspensions with 12.6%. It is very sad that the route of administration of antibiotics is not specified for 325 prescriptions or 80.4% of cases.
Drug delivery is about more than just handing out pills or giving injections. It's about getting the right treatment, at the right dose, to the right patient, at the right time. Patient outcomes depend on it.[36]

The route of administration should be identified if there is a risk of confusion[37] and the choice of routes of drug administration depends not only on convenience but also on the properties and pharmacokinetics of the drug. [38] because each of the routes can affect the bioavailability (the amount and rate of active drug that reaches the bloodstream).[39], due to metabolism which consists of the breakdown of drugs and their conversion into different compounds after they enter the body [40]. It is particularly important when prescribing drugs for intravenous administration to clarify the precise intentions.[37]

CONCLUSION

Our study is a prospective work that focused on the evaluation of the quality of a medical prescription for antibiotic therapy. This analysis of the prescription is only an imperfect representation of the quantitative evolution of the distributions and prescriptions of antibiotics.

The study showed gaps in prescription writing. This is due to the lack of information about the prescriber, the patient, and the drug. The main measure to be taken is to raise awareness among prescribers about the importance of compliance with prescriptions for the well-being of patients. Repeated assessments are necessary to induce permanent changes in prescribing practices.

Effective antibiotic treatment is an essential component of universal health care. It is the global collective responsibility to use antibiotics appropriately to maintain their effectiveness. Although there are also significant disparities in antibiotic use across the world. The World Health Organization (WHO) describes antimicrobial resistance (AMR) as one of the greatest threats to global public health,1 stating that "the world urgently needs to change the way it prescribes and uses antibiotics

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