

## Assessment of Medication Prescribing Indicators Using the World Health Organization Standard Indices in a Tertiary Hospital in Ilorin, Nigeria

Olalekan A. Agede<sup>1,2\*</sup>, James A. Ogunmodede<sup>1</sup>, Joseph O. Ole<sup>3</sup>, Matthew O. Bojuwoye<sup>1</sup>, Dapo S. Oyedepo<sup>1</sup>, Nasiru Sanni<sup>1</sup>, Olawale S. Aiyedun<sup>1</sup>

<sup>1</sup>Department of Internal Medicine, University of Ilorin Teaching Hospital, Ilorin, Nigeria.

<sup>2</sup>Department of Pharmacology and Therapeutics, University of Ilorin, Ilorin, Nigeria.

<sup>3</sup>Department of Pharmacy, University of Ilorin Teaching Hospital, Ilorin, Nigeria.

\*Correspondence should be addressed to Olalekan A. Agede: [agede.aa@unilorin.edu.ng](mailto:agede.aa@unilorin.edu.ng)

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### ABSTRACT

**Background:** Drug use is the most common option in treating disease conditions in clinical practice. Irrational prescription and use of medicine have become a major problem in Africa. The patterns of medication prescription in this environment have been under-studied. Evaluating these patterns is essential to provide information that may guide actions towards improving the prescription standards and mitigate the problems associated with irrational prescription and use of medicine. The study aimed to assess medication prescribing patterns by all cadres of doctors in the General Outpatient Department of the University of Ilorin Teaching Hospital (UITH) using the World Health Organization (WHO) prescribing indicators.

**Methods:** It was a six-month retrospective study of medication prescription by all cadres of the doctors attending to outpatients in the General Outpatient Department of UITH between 1st July, 2022 – 31st December, 2022. A validated data capture form was used for the study following the WHO prescribing indicator guidelines. The results were displayed using the arithmetic means, frequencies, and percentages. Results were interpreted by the recommended ideal values by the WHO.

**Results:** 1,650 prescriptions were reviewed, 914 were included in the study. This study found that all the analyzed prescription indices fell short of the WHO-recommended threshold. An average of 2.25 medications were prescribed per patient. The percentages of encounters with injections, antibiotics, and other medications by generic name were 87.2%, 66.9%, and 73.2%, respectively. 53.8% of the medications prescribed came from the essential medicine list.

**Conclusion:** All medication prescribing indicators assessed were found to be below the ideal value recommended by WHO. Therefore, we advocated for the training of prescribers and the formulation of policies that will promote the prescription of medications in line with WHO guidelines.

**Keywords:** Prescribing Indicators, Medications, Antibiotics, WHO, Hospital

## 1.0 INTRODUCTION

When prescribed, drugs are one of the most successful treatments in patient care [1]. It is crucial to the provision of healthcare, notably in the management and treatment of illnesses. For efficient patient care, excellent and quality medications must be accessible, affordable, and used sensibly.

The usage of medications is a complex activity that involves communication between the patient, healthcare providers, and healthcare organizations. In various ways, these relationships influence whether people utilize medicine reasonably or irrationally. Rational medicine use, according to the World Health Organization (WHO), is when a patient takes pharmaceuticals that are appropriate for clinical needs, in doses that fit their specific needs, for an adequate amount of time, and at the least expensive price for them and their family [1, 2]. It is well established that the rational use of medicine benefits the person and society regarding health, economics, and social factors. With the wise use of affordable essential medicines, the majority of the leading causes of mortality and disability in less developed nations can be avoided, treated, or lessened [1]. A notable factor of irrational drug usage is inappropriate prescribing by prescribers like doctors, which happens when drugs are not prescribed following the recommended protocol. Polypharmacy, the use of ineffective or inappropriate medications, or the improper or underuse of effective medications are all examples of irrational medication usage [1, 2]. This raises healthcare expenses, has a detrimental impact on the standard of pharmacological therapy, and could result in serious adverse responses [3]. As with antimalarial and antibiotic resistance, it can also play a role in the emergence and spread of drug resistance [4]. WHO reckons that at least 50% of all drugs are taken inappropriately, which has been recognized as a major issue in healthcare globally [5].

Irrational medication prescription has been linked to higher individual and governmental spending, increased patient morbidity and death, and other adverse health outcomes in developing nations where 20–50% of health budgets are spent on medications and other health commodities [6]. Irrational drug usage includes incorrect prescribing that is at odds with clinical guidelines, self-medication, drug abuse and underuse, polypharmacy, and needless use of antibiotics and injections; all of these predispose patients to medication errors and adverse drug reactions [7-9]. Irrational prescriptions can be caused by

a variety of factors, including lack of objective pharmacological information, patient demands or expectations, lack of training and retraining for doctors, and aggressive drug advertising by pharmaceutical corporations [10]. Prescribing according to guidelines encourages safe and effective drug therapy, promoting the rational use of medicines [11, 12]. Patient care indicators provide insight into how medications are administered. To broadly describe and understand the drug use environment in healthcare institutions, the WHO grouped the drug use metrics into three main categories: prescribing indicators, which was the focus of this study, patient care indicators, and facility care indicators [11, 12]. These indicators can be used to design and carry out strategies for judicious medication usage. Problems with general prescribing can be identified using the WHO prescribing indicators. The WHO prescribing indicators identify the following: the average number of drugs per encounter (measuring the degree of polypharmacy), the percentage of drugs prescribed by generic name (which measures the cost-effectiveness of health system to procure and use drugs), the percentage of encounters with an antibiotic and injection prescribed (measures the level of use of two important, but commonly overused and costly forms of drug therapy) and the percentage of drugs prescribed from the national essential medicines list [12].

Health facility indicators are used to determine whether the characteristics of the hospital environment impact the prescribed medications. The two key elements are a sufficient supply of necessary medications and easy access to accurate information about these medications [12].

Even though irrational prescription of medication happens globally, it is more prevalent in Africa, particularly in sub-Saharan African nations like Nigeria [13, 14]. Studies conducted in the United States, Ethiopia, and India revealed instances of irrational prescription, which includes polypharmacy, increasing use of antibiotics and injections, and disregard for national treatment recommendations or Essential medicine lists (EML) [15-17].

Irrational prescribing is known worldwide as a major problem in the healthcare system but peculiar to the healthcare system of developing countries. This practice undermines the articulate efforts of drug supply systems and the provision of good quality healthcare with the limited resources allocated to the healthcare sector in developing countries, including Nigeria [18, 19]. Available data has shown that the majority of healthcare workers (doctors, nurses, pharmacist, etc.) involved in drug pre-

scription, patient care, and management in sub-Saharan African countries has inappropriate patterns of drug prescription. Inappropriate prescription can lead to ineffective treatment, adverse effects, prolonged duration of illness, prolonged hospital stay, increased overhead cost of health care, and increased economic burden to the patient and the society at large [18].

Appropriate medication prescription has a significant contribution to the reduction in morbidity and mortality with its consequent medical, social, and economic benefits. Some patients on treatment have abandoned their treatment because of the occurrence of adverse drug reactions associated with irrational prescriptions. This can lead to the development of treatment failure and drug resistance, which is seen commonly with antimalarial and antibiotic use. Studies on medication prescription patterns will help reduce the overwhelming burden of irrational prescriptions if the findings from such studies are utilized.

There are limited data on prescription practices in this environment, and they are further complicated by the significant burden that irrational prescribing has in terms of increased morbidity and mortality. This study is crucial, especially because WHO is stepping up its efforts to combat irrational prescribing and medication errors. Therefore, it is imperative to conduct research utilizing the WHO prescribing indicators on prescription pattern evaluation to generate the necessary data and close the knowledge gap, as doing so will also make medication prescriptions safer and improve treatment outcomes. The results of this study will help healthcare providers make informed decisions, raise the bar for medication prescriptions, and protect the nation's health.

## 2.0 METHODOLOGY

### 2.1 Study Design

It was a cross-sectional retrospective study designed to describe the current pattern of medication prescription by all cadres of doctors in the General Outpatient Department (GOPD) of the University of Ilorin Teaching Hospital (UITH). The study was for six months between 1st July 2022 to 31st December 2022. The prescriptions were retrieved from the Outpatient Pharmacy Units of the Pharmacy department of UITH.

### 2.2 Study Setting

This study was conducted at the General Outpatient Department of UITH. UITH is a 600-bed hospital situated in

Ilorin, the state capital of Kwara, in Nigeria's North Central geopolitical region. Three Local Government Areas comprise Ilorin: Ilorin-South, Ilorin-West, and Ilorin-East. UITH is a tertiary institution and serves as a referral center for patients from Kwara and the nearby states.

### 2.3 Study and Sampling Procedure

For studies assessing medication prescription and prescribing patterns in health institutions, the WHO recommends that the sample size for the study should be at least 600 prescriptions (with a higher number if feasible) because the data generated becomes more trustworthy with a larger sample size. Prescriptions written by doctors in GOPD were stored in the hospital pharmacy after dispensing the medications to the patients.

The study data capture form (DCF) was created using the WHO prescribing indicator manual. The prescribing indicators are The average number of drug prescriptions per contact per patient, the percentage of prescriptions written with the generic name, the percentage of prescriptions written for antibiotics, the percentage of prescriptions written for injections, and the percentage of prescriptions written from the essential medicine list.

This study excluded blood, blood products, intravenous fluids, medical devices or equipment, and prescriptions for patients on admission.

A simple random sampling method was used to choose the sample of prescriptions to be included in the study for six months. Using a modified envelope method, a list of years from 2015 through 2022 was produced [strips of paper labeled each year on it]. The year that was chosen at random was 2022. The same process was repeated to get the first (starting) month to be included in the study; this was the month of July. The successive five months following the first month were included since the study was designed for six months.

### 2.4 Data Analysis

After manual verification and cleaning, data collected from the data capture forms were analyzed using the statistical software SPSS Version 27.0 [Chicago, IL, USA]. The results were displayed using the arithmetic means, frequencies, and percentages. Results were interpreted by the recommended ideal values by the WHO.

### 2.5 Ethical Consideration

Ethical approval was obtained from the Ethics and Research Committee of the University of Ilorin Teaching Hospital with approval number ERC PAN/2022/04/0309

Table 1. Comparison of the World Health Organization prescribing indicators observed with standard reference range

Prescribing indicators	Number	Average/percentage	Ideal WHO value
Average number of Drugs per Encounter Prescription	299	2.25	1.6-1.8
Percentage Encounter with Antibiotics	89	66.9%	20.0-26.8%
Percentage Encounter with Injections	116	87.2%	13.4-24.1%
Percentage of Drugs Prescribed by Generic Name	219	73.2%	100%
Percentage of Drugs from Essential Medicine List	161	53.8%	100%

### 3.0 RESULTS

A total of 1,650 prescriptions were retrieved and reviewed. Nine hundred and fourteen prescriptions were included in the final analysis for the six months of study between July and December 2022. Anti-malarial drugs were the most frequently prescribed drug (62%), followed by antacids (19%) and anti-seizure medications (14%) (Figure 1). About 33% of the examined medication prescriptions comprised 1 drug, and 25% comprised two drugs (Figure 2). The average number of drugs per prescription was 2.25, which is higher than the recommendation by WHO. (Table 1). About three-quarters (73.2%) of the prescriptions were written using generic

names, which was below the ideal of WHO. Antibiotics and injections were prescribed in 66.9% and 87.2% of encounters; these findings showed that both antibiotics and injections were over-prescribed as they were well over the ideal recommended by WHO. The average of the medications prescribed were from essential medicine (Table 1).

### 4.0 DISCUSSION

This study evaluated the medication prescribing indicators, a component of drug use indicators, in the general outpatient department of UITH and found that most of the prescription indices were not in line with the ideal recommended by WHO. This study became imperative because of the enormous burden of pathologic prescription. The prescribing indicators by WHO were used for the study as they are the accepted standard for evaluating prescription patterns in healthcare facilities [1]. The WHO prescription indicators help monitor and evaluate the performance of prescribers and the healthcare system in general. In this study, an average of 2.25 drugs were prescribed for patient per encounter. This marginally exceeded the WHO-recommended upper limit of normal. This finding was similar to the 2.26 reported by Mengistu *et al.*, [19] but at variance with a report by Amaha *et al.*, [20] and Siele *et al.*, [21], whose findings were within the recommendation of WHO. In a systematic review done in African countries, Richard *et al.*, [22] found that the average number of drugs prescribed per prescription was 3.1, about twice the WHO recommended range. Though the average number of drugs prescribed per encounter in our study was outside the ideal WHO recommendation, a significant percentage of the patients (16%) were exposed to polypharmacy, which is the use of 5 or more medications by the patient at the same time. Patients with this number of drugs will have to battle with medication compliance due to the pill burden. There are undesirable pharmacological effects of polypharmacy,

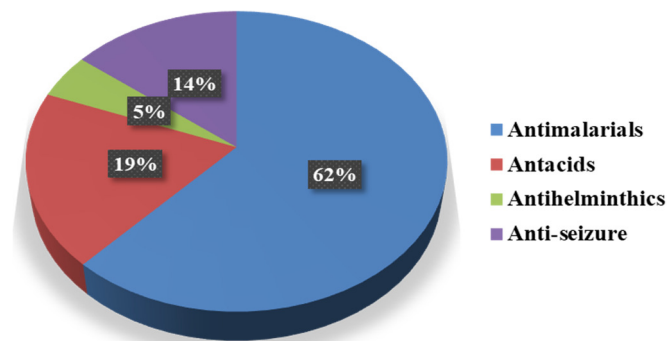


Figure 1. Frequency of medication prescription by group

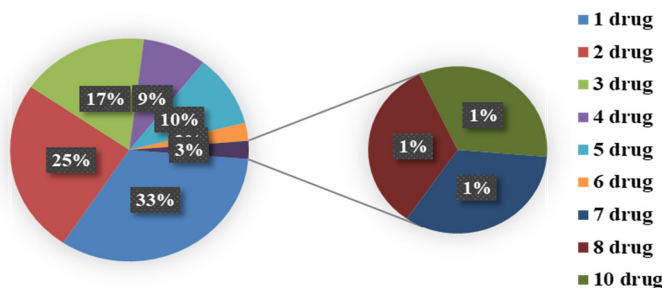


Figure 2. Percentage distribution of number of medications in the prescription

which include drug-drug interactions, poor or non-compliance, treatment failure, and the emergence of drug resistance. Studies have shown that prescribing a patient numerous medications is a risk factor for adding additional medications later in the course of treatment [23, 24].

Researchers have demonstrated that the proportion of the patient population exposed to antibiotics influences the frequency of antibiotic resistance [20, 25]. Drug resistance, particularly antibiotic resistance, is fast becoming a pandemic affecting different nations. Due to repeated illnesses and infestation, this problem is challenging in Africa [25]. In this study, antibiotics were often prescribed, with a percentage encounter of 66.9%, which was about three times the WHO-recommended normal range. This pattern of practice could make the problem of antibiotic resistance worse. Mengistu *et al.*, [19], Richard *et al.*, [22], Assen *et al.*, [26], and Gashaw *et al.*, [27] also reported a higher percentage of antibiotic encounters in their studies (46.8%, 42.6%, 52.8% and 66.9%, respectively). It is, however important to note that Shelat *et al.*, [28] and Shanmugapriya *et al.*, [29] reported an excellent antibiotic prescription practice in their respective studies.

This study found that the injection prescription was well over three times the upper limit of normal recommended by WHO. There is a wrong belief system in our environment that administering injection quickly relieve symptoms and even accelerate the cure rate. The use of injections in patient care has expanded as a result of this wrong belief, leading to over-use of injections as found in this study, and spread of blood-borne illnesses [31].

Medication prescriptions should ideally be from the EML as advised by the WHO; however, this study's findings show otherwise. About half of the prescriptions were from EML, which is worrisome as non-generic prescriptions have a higher cost of care on the patient and healthcare institutions and patients are prone to medication errors [31, 32]. Shanmugapriya *et al.*, [29] (90.7%), Ayenew *et al.*, [33] (94.8%), Bekele *et al.*, [34] (85.3%, 97.4.0%), and Berha *et al.*, [35] (99.3%) reported higher percentages of prescription from EML. With the finding of a significant percentage of prescriptions outside the EML in this study, it is crucial to gear efforts toward increasing the awareness of prescribers, mainly doctors and other healthcare givers, to the clinical significance of prescribing from EML.

The majority of the medication prescribers failed to meet the recommended WHO prescribing indicator guidelines. This study concluded that there was over-prescription of antibiotics and injections and prescription outside the EML. Measures to mitigate against these prescription menace should be instituted to safeguard the nation's health.

### Limitations of the Study

This study was conducted in UITH, a healthcare facility in the North-central geopolitical zone of Nigeria and thus, data generated cannot be extrapolated to other healthcare facilities and geopolitical zones in the country.

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### Conflicts of Interest

The authors declare that there is no conflict of interests.

### Authors' Contributions

**OAA** conceived and designed the study, contributed to data collection, data analysis tools, analysis of data and manuscript writing. **JAO** contributed to study design, data analysis tools, analysis of data and manuscript writing. **JOO, MOB, DSO** contributed to data collection, data analysis tools, analysis of data and writing of manuscript. **NS** contributed to data collection, analysis of data and manuscript writing. **OSA** contributed to data collection, data analysis tools and analysis of data. All authors approved the final copy of the manuscript.

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