



## **Prescribing Errors in Nigeria's Healthcare System; Exploration towards Promoting Rational Prescribing for Improved Patient Care**

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### **Author's contribution**

*The sole author designed, analyzed, interpreted and prepared the manuscript.*

### **Article Information**

DOI: 10.9734/JAMPS/2016/26864

#### Editor(s):

(1) Esam Z. Dajani, President, IDDC Corporation, USA and Adjunct Professor of Medicine, Loyola University Chicago, USA.

#### Reviewers:

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(2) Wajiha Iffat, Dow University of Health Sciences, Karachi, Pakistan.

(3) Anonymous, Federal University of São João del-Rei (UFESF), Brazil.

Complete Peer review History: <http://www.sciencedomain.org/review-history/16489>

**Review Article**

**Received 6<sup>th</sup> May 2016**  
**Accepted 28<sup>th</sup> September 2016**  
**Published 8<sup>th</sup> October 2016**

### **ABSTRACT**

Rational prescribing is vital to achieving rational drug use but limited studies exist on the prescription practices, causes, and types of prescription error in developing countries. Prescription error is one of the leading causes of morbidity and mortality globally. However, due to paucity of data, the figures could be alarming in developing countries. This narrative review described retrospectively the causes and types of prescription error in developing countries using Nigeria as a case study. A review of relevant literatures was carried out using PubMed, Medline, and Embase. It covered a period from January 1990 to December 2015. Hand searches of the references of retrieved literature; official search of libraries texts on literature reviews and discussions with experts in the field of reviews of the literature was conducted coupled with personal experience gathered from participating in and writing several reviews of literature. Ethically approved studies written in English Language were used for the study. The study lasted from October 2015 to April 2016. Study revealed incomplete prescription information, poor knowledge of therapeutics and prescription writing poor working condition. Understanding the trends is the first step towards effective prevention and control of the scourge.

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*Keywords: Prescribing errors; pharmacists; prescribers; rational use; drugs; health care; Nigeria.*

## 1. INTRODUCTION

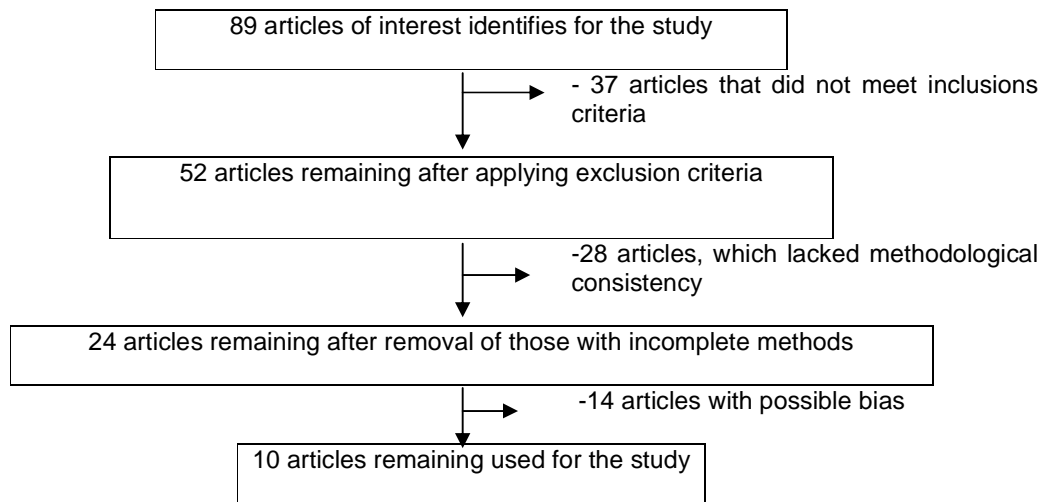
A prescription error is any error associated with prescription writing which could be potentially life threatening or wreck havoc on human lives within the shortest possible time if it goes undetected. It is categorized as potentially serious to patient and consists of four types. Type A is a potentially serious error to the patients; Type B is a major nuisance where the pharmacist/doctors attention and contact are required; Type C is a minor nuisance where the pharmacist must use his or her professional judgment or discretion; while Type D is a trivial error [1-2]. Medication error is, "any preventable event that may cause, or has caused patient harm while the medication is in control of a health care professional or patient. Such events may be related to professional practice, medication order communication, product labeling, packaging, compounding, dispensing, distribution, administration, education, and use" [3]. Rational use of drugs entails that, "Patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community" [3,4,5]. A concerted effort between the pharmacist, patient, and doctor is required to prevent prescription errors and optimize patient outcomes. Unethical and irrational prescribing results in irrational use of drugs, medication errors and the attendant consequences [3-7].

Humans are prone to mistakes. However, a comprehensive structure and framework could be put in place to prevent such occurrences which are potentially life threatening. Introduction of the project, "To err is human" was a turning point that signaled the beginning of a medical revolution of improvement in America's quality of health care. This project was embraced by all stakeholders in the health sector and led to continuous improvement in the quality of care. A Colorado and Utah study in the United States suggested that 44,000 Americans die annually from medication errors related problems while another study in New York put the figure at 98,000 (Reference citations). These figures could be more disheartening and devastating in developing countries where there is paucity of data. Medical errors can kill more people

than chronic and infective diseases. It underscored the need for quality improvement and sustainability especially in regions where monitoring and evaluation are not performed. Poor prescription writing is common in government hospitals in Nigeria. In this communication, we describe the types and causes of prescription errors in developing countries using Nigeria as a case study [8-15].

## 2. METHODS

A review of relevant literatures was carried out using PubMed, Medline, and Embase, which covered the period from January 1990 to December 2015. There was a hand search of the references of retrieved literature, official search of libraries texts on literature reviews and discussions with experts in the field of reviews of the literature coupled with personal experience gathered from participating in and writing several reviews of literature. Ethically approved studies written in English Language were retrospectively selected and used for the study. The study period was from October 2015 to April 2016. The search terms were Prescribing errors, Pharmacists, Prescribers, Rational use, Drugs, health care, developing countries, and Nigeria. These words were used singly and in combination using AND/OR. Truncation and use of adjacent search were employed. Studies describing medication-prescribing errors with systematic and logical description of methods and findings were selected. In cases where more than one publication presented similar reports, preference was given to the ones with more detailed findings and explicit description of methods. Data were discussed based on similarities and systematic differences. Additional articles were identified through cross-referencing. A total of 89 articles were identified through the search out of which 37 were eliminated for failing to meet the inclusion criteria. Another 28 studies, which lacked methodological consistencies, were dropped giving rise to 24 studies. Out of these 24 remaining articles, 14 articles with possible bias associated with sponsorship were eliminated giving rise to 10 articles used for the study as shown in Fig. 1 below. Data items summarized were list of articles by author, year, region of Nigeria and common prescription error found.



**Fig. 1. Schematic representation of the articles selection process**

## 2.1 Inclusion Criteria

- Peer-reviewed papers were eligible for inclusion
- Only studies published in English Language were used
- Studies with defined inclusion and exclusion criteria
- Studies that were not sponsored by any medical organizations or group
- Literatures were consistent and unbiased across all the stakeholders
- Full published papers
- Objectives explicitly stated

## 2.2 Exclusion Criteria

- Articles with biased and inconsistent discussions
- Articles without standard methods [9,16].

## 3. RESULTS AND DISCUSSION

A study in a tertiary hospital in southwest Nigeria using the Nigeria Standard Treatment Guidelines (STG) showed a prescribing error rate was 40.9%. The STG for Nigeria which was further validated by the WHO's "Guide to Good Prescribing" indicated that, "A prescription order should specify: the identity of prescriber, date of prescription, identity of patient, elements of medications being prescribed, prescriber's signature and identification data. It stated that only standard abbreviations should be used while avoiding abbreviations of drug names and doses should be written in metric systems of international units [17]. Most prescribing errors

are intercepted and reported before causing harm to patients. However, this is usually with some adverse effects already initiated. The work of the health care team centers around the patients and their safety should be paramount to the health care teams of physicians, nurses, and patients. Tasks should be done better and differently to achieve desired change [18,19]. The World Health Organization (WHO) drug utilization core indicators forms the basis for description of prescribing pattern and include average number of drugs per encounter, percentage of drugs prescribed by a generic name, percentage of encounters with prescribed antibiotic, percentage of encounters with prescribed injectable drugs and percentage of drugs prescribed from the essential WHO drugs list [20,21].

Medication errors can occur during prescribing, dispensing, or administration. However, the stage of prescription is known as the initiation stage due to errors associated with omission, erroneous, unethical prescribing, and/or the influence of pharmaceutical companies who sometimes encourage brand prescription. Identification of the major sources of errors is vital to prevent them [22,23]. A study in Oman indicated that poor knowledge of the correct use of drugs was a leading cause of prescription errors despite being noted as the first country to establish global regulations for the rational use of drugs [24-26]. A study in Cameroun indicated that most health care professionals have poor knowledge of drug utilization and pharmacovigilance unlike in Europe and the United States where the knowledge is widespread especially in the 21<sup>st</sup> century [27-29].

**Table 1. List of articles/publications associated with prescription errors**

No.	List of articles/publications and authors	Year	Region in Nigeria	Common prescription errors encountered
1	Ajemigbitse AA; [17]	2016	Southwest	Wrong dose, omission of route of administration, over dose, ambiguous orders, drug interaction
2	Oshikoya KA; [63]	2007	Southwest	Drug interaction, wrong dose, under dose, over dose, omission of duration, wrong duration
3	Agu KA; [70]	2014	Southwest, Southeast, South-south, North central, Northeast	Drug interactions, contraindications, wrong duration, wrong frequency, incorrect regimen,
4	Ajemigbitse AA; [71]			Omission of the duration of therapy, omission of direction of use and administration, wrong dose, wrong duration, ADR, drug interaction, wrong instructions, wrong frequency, absence of strength and dosage, omission of patients information, omission of dosage forms, omission of routes of administration and frequency of administration
5	Oshikoya KA, et al. [77]	2009	Southwest	Wrong drugs, wrong dosage, adverse drug reaction
6	Ojeh VB; [78]	2015	North central	Wrong indications, unnecessary drugs, wrong dosage
7	Ajemigbitse AA, et al. [80]	2013	Southwest	Omission of duration of therapy, unsafe abbreviations, adverse, wrong drug, omission of duration, wrong dosage, omission of age, omission of duration of therapy
8	Ogunbodede EO; [93]	2005	Southwest	Wrong dose, wrong frequency, wrong time of administration with regard to meals, drug interaction

**Table 2. Types of prescription error**

No.	Types of prescription error	n (%)
1	Type A (potentially serious to patient)	31 (63.3)
2	Type B (major nuisance - pharmacist/doctor contact required)	13 (26.5)
3	Type C (minor nuisance - pharmacist must use professional judgment)	4 (8.2)
4	Type D (trivial)	1 (2.0)
	<b>Total</b>	<b>49 (100.0)</b>

A study in India suggested curriculum development and expansion to incorporate greater aspect of pharmacology and therapeutics, pharmacoconomics, prescription

writing at undergraduate and postgraduate physicians' training with constant review of teaching and evaluation methods, as way of curbing the menace of prescription error [27-29]. It led to marked improvement in prescribing knowledge and skills of prescribers in United Kingdom, United States, Nepal, Netherlands, and India [30-35]. Prescription writing was generally seen as a weakness for most prescribers at undergraduate and postgraduate levels. It was tailored to address the lack of exposure and preparation for clinical practice of new prescribers. It can be improved by increasing prescription training at undergraduate and postgraduate educational levels and the opportunities to maximize those opportunities and drills on effective and safe prescribing methods [36-39].

Pharmacists should be greatly involved in prescription reviews and vetting to prevent potential drug interactions, dosage problems, etc. which could have serious consequences. Unit dose dispensing systems helps to minimize prescription, medication errors and the cost of treatment is important in developing countries like Nigeria. Electronic learning and prescribing should be introduced and encouraged at all levels of care to reduce or prevent prescription errors [40-42]. Sometimes prescription errors arise because of fatigue, workload, or psychological stress of the prescribers. In this case, it is incumbent on the pharmacist to uncover the error before it reaches to the patient. Good communication between the doctors and pharmacists should be encouraged at all levels for the safety of the patients. Difficult patients can contribute towards prescribing errors. Several studies indicated that good working environment minimizes prescription errors [43-46]. This is a challenge to the governments of most developing countries plagued by very poor working conditions.

Studies in Nigeria and most African countries indicated non-agreement between prescribers and official treatment guidelines as a cause of wrong prescription. This was particularly common in anti-malarial prescriptions [47-51]. A study in Nigeria showed a negative relationship between increased workloads and quality of care [52]. Several studies suggested that other prescription errors, which are common in Nigeria, include incomplete prescribing information related to patient demographic data such as age, sex, body weight, and use of abbreviations in writing these items. Other missing items include doctor's signature, illegible handwriting, dose of medications, drug therapy problems, dosage schedule, duration, polypharmacy and drug-drug incompatibility in the prescriptions [53-56]. These findings were consistent with similar studies in Ethiopia, Nepal, India, and Spain [57-61]. A non randomized intervention study in an ophthalmic clinic in Thailand suggested that preprinted errors usually associated with legibility and incomplete information could be eliminated using preprinted prescription forms backed up with adequate training for users especially doctors and pharmacists [62-64]. Rational dispensing based on the principles of ethical dispensing serves as a quality control measure towards prevention and control.

The doctor-patient ratio for Nigeria is 28 per 100,000 people, which translates into 1 doctor

per 3,571 individuals. The value for Ghana is 15 doctors per 100,000 people. The physician to patients ratios in several African nations such as Egypt 1:54; Gabon 1:49; Seychelles 1:151; Malawi 1:2, and Tanzania 1:2 [65]. The value for Nigeria is very poor considering its population of over 170 million people. In the United States, the State of Massachusetts has 315 doctors per 100,000 patients while in the State of Mississippi the value was 159.4 per 100,000 representing the maximum and minimum limits [66]. The value for United Kingdom is 271 per 100,000 people; Spain- 378; Greece- 613; and Denmark- 248 [67]. However, these are countries with less population than Nigeria. The physician-to-patient ratio is very significant because it is one of the indexes for measurement for predicting the health status of nations. Nations with better ratios tend to be healthier than those with poor ratios. The implication is that those with better doctor-to-patient ratio will have better life expectancy than countries with poor values. Massachusetts is among the states with an average life expectancy of 78.6 years while Nigeria has a life expectancy of 54.5 years. In Nigeria, the 20 leading causes of mortality are malaria, diabetes mellitus, HIV/AIDS, cardiovascular accident, meningitis, prostate cancer, diarrhea, road traffic accident, and malnutrition. Other causes include low birth weight, poor maternal conditions, tuberculosis, breast cancer, birth trauma, falls, violence, and fire accidents [68].

A study in southwest Nigeria indicated heavy workload (71%) was the leading cause of prescription error, followed by stress- 43%, distraction- 38%. Poor knowledge of medications, distractions, poor working condition, and poorly furnished non-conductive consulting rooms were all contributory factors [69]. This underscores the need for proper funding of health care institutions for proper service delivery and curriculum review to incorporate the expanded and dynamic aspects of prescription writing at undergraduate and postgraduate levels. In a large tertiary care study conducted in Nigeria, results suggested high incidence of prescription error in a tertiary HIV/AIDS clinic. The incidence of prescription error in the clinic was 41 per 100 persons per year. Prescription errors ranged from prescription of incorrect dosage, duration, and drugs combination [70-72].

The implication is the development of resistance, which negatively affects the treatment outcomes. In a study carried out in a tertiary hospital to

identify the underlying causes of prescription error among junior doctors, in western Nigeria, slip in attention, prescribing habit of senior doctors in their unit and inadequate prescription training and insufficient official books, were the leading causes of prescription error [73-75]. The study revealed that type A prescription error, which is potentially serious to patients as the leading error, followed by type B and C, while type C was the least error committed. The clinical implication is that patients are exposed to potential and actual drug therapy problems which complicate patients problems and when unresolved prevent them from realizing the total benefits of pharmacotherapy. This is a very strong reason for the institutionalization of Pharmaceutical Care Services (PCS) in our health care delivery systems for prevention of actual and potential drug therapy problems, which was evident in the study with accompanying reduction in cost of therapy [76-80].

Drug therapy problems compound the problems being treated leading to complications, reduction in humanistic outcomes, increased cost of therapy, which can lead to medication non-adherence and treatment failure in cases of catastrophic spending. Potentially deadly prescribing problems in Nigeria such as prescribing wrong drug, formulation blunders, drug-drug interactions, drug allergy alerts, failure to adjust dosage appropriately, especially in patients with chronic kidney disease, is devastating and compounds the already deplorable state of their victims especially the geriatrics and people with organ impairment while endangering the lives of vulnerable people. Human and computer errors, wrong dosage, wrong treatment duration errors, etc. The availability of prescription computerized system and other technology-based systems in Nigeria scarcely obtainable and still evolving especially in most public hospitals. This has not lessened the errors in the prescription orders given their experience with the Nigerian prescribing information. Prescription errors encompass those related to the act of writing a prescription, whereas prescribing faults encompass irrational prescribing, inappropriate prescribing, under prescribing, overprescribing, and ineffective prescribing, arising from erroneous medical decisions concerning treatment or treatment monitoring. These are still very common prescription problems in Nigeria. Due to the slow adoption of the evolving prescription computerized systems, human errors associated

with abbreviations and decimal points are sometimes leading to dispensing errors [81-88].

These errors include incomplete prescription such as columns that are not filled properly for dose or direction, contra-indication, drug allergies. Some examples are the use of abbreviations (e.g., CPZ has intended meaning of pro-chlorperazine possible misrepresentation may be chlorpromazine). Decimal points are used inappropriately e.g. 25 instead of .25 and 25.0 instead of 25, this may lead to confusion. Giving of prescriptions orally where prescription orders are given verbally or through telephone. However, these orders are prohibited in systems except in cases of emergency. Prescription error can cause dispensing error. Drug name and potency present together Inderal 40mg mistaken as Inderal 140 mg leading to overdose. Large doses with improperly placed commas could be misleading. Prescription orders should be clearly written and all columns should be properly filled and signed by the physician during writing of the prescription. Any deviation from this causes this type of error [89-93]. A standard prescription should contain at least the basic minimum requirement of a good prescription order to minimize errors [94-101].

#### **4. STUDY LIMITATIONS**

The limitation of the study includes the incomplete retrieval of identified studies at review level and reporting bias. The study was retrospective and relied on information from previous studies whose authenticities depended on the validity of research methods used. The number of cited articles may not have been enough.

#### **5. CONCLUSION**

The article highlighted the growing trend of prescription error, the causes, and ways of preventing and controlling. When the errors are well identified and articulated, the solutions and prevention become easier to resolve. A healthy communication between the members of the health care delivery system is invaluable towards prevention of prescription error along the value chain. Government should provide conducive working environment for her workforce while ensuring that the prescribers-patient ratio, which is presently lopsided, is bridged to discourage unhealthy health care staff-patient ratio that encourage unhealthy practices. A comprehensive and pragmatic monitoring

and evaluation framework, research, and development should be institutionalized with a functional feedback mechanism for corrections, reforms, and sustainability. These will lead to substantial improvement in the prescribing practices of our health care development system.

## CONSENT

It is not applicable.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

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