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Identification and Classification of Prescription Errors at a Tertiary Hospital in Southeast Nigeria

Patricia Uche Ogbo[1], Chioma Assumpta Okonkwo[2], Collins Chukwuemeka Magbo[2], Chidimma Maryrose Ononugbo[2], Cyndi Chinelo Ofolebe[2], Nathaniel Chinonso Okafor[2], Charles Chiemela Nwaobilor[2], Ogochukwu Ifeoma Ugwuede[2] and Chimezie William Nnaji[2]*

[1]*Department of Clinical Pharmacy and Biopharmacy, Faculty of Pharmacy, University of Lagos, Lagos State, Nigeria*
[2]*Department of Pharmacy, Alex Ekwueme Federal University Teaching Hospital, Abakaliki, PMB 102, Abakaliki, (postal code: 480102) Ebonyi State, Nigeria*

Abstract

Background: Prescription errors are the most common type of medication errors that occur in healthcare settings, and they are risk factors to adverse effects, drug therapy problems and failure in therapeutic goals.
Objectives: The study was designed to identify, classify, and assess prescription errors in three units of a Nigerian tertiary hospital.
Methods: This was a retrospective screening of prescriptions from patients' case folders in Ophthalmology, General Outpatient Department (GOPD) and National Health Insurance Authority (NHIA) units of Alex Ekwueme Federal University Teaching Hospital, Abakaliki. Prescriptions from these units were conveniently selected for assessment in May 2022. Statistical Package for Social Science (SPSS) Version 23 was used for analysis.
Results: Nine hundred and forty-one (941) case folders were screened, and 840 (89.3%) prescription errors were identified. Of these, there were 470 (56.0%) errors of commission, 165 (19.6%) errors of omission related to prescriber, and 205 (24.4%) errors of omission related to medication. Illegible writing, absence of prescriber's name and signature and absence of diagnosis were the most common errors related to the prescriber. Absence of dose/strength, duration and frequency were the most common errors related to medication. The most common error of commission was drug-drug interaction which occurred in 324 (68.9%) prescriptions. NHIA had the highest prescription errors (429; 51.1%) followed by GOPD (264; 31.4%) and Ophthalmology (147; 17.5%).
Conclusion: There was a high prescribing errors in the study setting. This calls for an urgent need for regular training on prescribing practices in the study setting to reduce prescription errors and improve the achievement of therapeutic goals.

Keywords: Prescription errors; Prescription; Identification; Assessment; Tertiary hospital

Introduction

Medication errors cause at least one death every day and injure approximately 1.3 million people annually in the United States of America alone.[1] The global cost associated with medication errors is estimated at $42 billion which is about half of the total global expenditure.[1] Prescription errors, a subset of medication errors account for an estimated 70% of medication errors that could lead to the occurrence of adverse effects.[2-5] Prescriptions are legal documents that should be complete, legible, precise, and unambiguous in its interpretation with components such as date, prescriber's details, patient's details, body of the prescription (identity of the drug, formulation,

Corresponding Author:

Dr Patricia Uche Ogbo
Department of Clinical Pharmacy & Biopharmacy, University of Lagos, Nigeria

pogbo@unilag.edu.ng

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duration of administration, medication dosage, route and frequency), signature and name of prescriber.[6] Consequently, prescription error is a failure in the prescription writing process; that results in a wrong instruction about one or more of the normal features of a prescription.[4,7]

Prescription error is a major threat and affects approximately 9-15% of medication orders for hospital inpatients in the UK.[8] Notably, studies have shown that prescription error is a recurrent decimal in hospitals in both developed and developing countries.[9-12] An incidence of 500,000 prescribing errors per year was reported in England and in America.[13,14] In India, out of the 1000 prescriptions randomly selected and analyzed for errors, 650 (65%), were found to have a total of 1012 errors with a potential to go higher if steps are not taken to reduce it.[15] Consequently, a study conducted in southwest Nigeria identified 2660 prescription errors.[6] In addition, a national survey of hospitals in Nigeria observed that 35.5% of 2386 professionals reported prescription errors, while 33.4% did not think reporting it was necessary signifying the underreporting of prescription errors in a country where studies have identified high prescription errors.[16-18] Nonetheless prescriptions with inappropriate dosing frequency have remained the highest form of prescription errors.[3]

The two main types of prescription errors are: Error of omission or commission. Error of omission occurs when some essential information is missing in a prescription while error of commission indicates wrongly written information in the prescription.[4] In a bid to reduce medication misadventure, improve quality of life and well-being of citizens, a study recommended that prudent screening of prescriptions at pharmacy units of hospitals and regular trainings of health-care workers on prescription writing are relevant in improving patient safety and help in preventing technical (action-based) prescription errors.[3,7] Knowledge on rational drug use is also pertinent to prevent prescription errors as environmental and individual factors can lead to errors in prescription.[4]

In a review of available literature published between January 1990 to December 2015 on prescription errors in Nigeria, a total of eight works were identified showing that published studies on prescription errors in Nigeria are limited.[18] Although this has improved in recent times, this study was designed to contribute to availability of accurate data which facilitates precise statistics used in healthcare policy development. Indeed, epidemiology of prescription errors in Nigerian hospitals (especially those in the southeast) will enable the development of evidence-based brief for policy to identify effective interventions to reduce prescription errors in tertiary institutions in Southeast, Nigeria.

Methods

Study Design

This study was a retrospective review of prescriptions for patients who attended General Outpatient Department (GOPD), Ophthalmology, and National Health Insurance Authority (NHIA) clinics in May 2022.

Study Setting

This study was conducted at the Alex Ekwueme Federal University Teaching Hospital Abakaliki (AEFUTHA) Ebonyi State, Nigeria. AEFUTHA is one of the tertiary hospitals in Abakaliki, the capital of the state. Medications are prescribed in handwritten format in patient care folders and dispensed in the hospital pharmacy or at community pharmacies outside the hospital when the prescribed medications are out of stock. Records of prescription made in all the departments/units are stored by the medical records department of the hospital.

Study Population

The study population included patients of all ages, both male and female, who received prescriptions from the selected units for the treatment of any disease condition for the month of May 2022.

Data collection

A data collection pro forma was used to collect relevant data from the patients' case notes. Information extracted included date of prescription, number of medications, class of medication prescribed, number prescribed by generic name, category of error. Prescription errors were captured and grouped as error of commission and error of omission. Error of omission was further grouped as follows: error of omission related to the prescriber (patient's name, age, weight, date, prescriber's name, prescriber's signature, diagnosis and illegible prescription); and error of omission related to drugs (route of administration, dose, frequency, strength, dosage form, duration/number of doses, quantity to supply). Error of commission consists of wrong

strength, wrong dosage form, drug-drug interactions, and wrong drug name.

Data analysis

Collected data were coded and analyzed using Statistical Package for Social Sciences (SPSS) Version 23.0. Data were summarized as mean and standard deviation for numeric data and frequencies and percentages for categorical data. Results were displayed in tables and charts.

Ethical considerations

Ethical approval was obtained from the Research and Ethical Committee of AEFUTHA with approval number NHREC/16/05/22/102. The confidentiality of the data obtained was ensured. Neither the names, addresses nor other revealing details of the patients were documented in the pro-forma.

Results

A total of 941 prescriptions were assessed from three pharmacy units: 185 (19.7%) from ophthalmology, 303 (32.2%) from the General Outpatient Department (GOPD), and 453 (48.1%) from National Health Insurance Authority (NHIA). In total, 3,424 medications were found in these 941 prescriptions: Ophthalmology (427), GOPD (1315) and NHIA (972).

Prescription errors

Eight hundred and forty (840; 89%) prescription errors were identified consisting of 165 (19.6%) errors of omission related to the prescriber, 205 (24.4%) errors of omission related to medication and 470 (56.0%) errors of commission. Per unit, there were 147 (17.5%) errors in Ophthalmology unit, 264 (31.4%) in GOPD, and 429 (51.1%) in NHIA (Table 1).

Table 1: Prescribing errors identified per selected hospital unit

Type of prescription errors	Ophthalmology n (%)	GOPD n (%)	NHIA n (%)	Total n (%)
Error of omission related to the prescriber	55(6.5)	23(2.7)	87(10.4)	165(19.6)
Error of omission related to medication	73(8.7)	44(5.2)	88(10.5)	205(24.4)
Error of commission	19(2.3)	197(23.5)	254(30.2)	470(56)
Total errors per unit	147(17.5)	264(31.4)	429(51.1)	840(100)

Subtypes of error of prescription

In errors related to the prescriber, illegibility of prescription (54; 33.3%) was the highest occurring subtype followed by absence of prescriber's name and signature (47; 28.5%) then absence of diagnosis (43; 26.1%) (Figure 1).

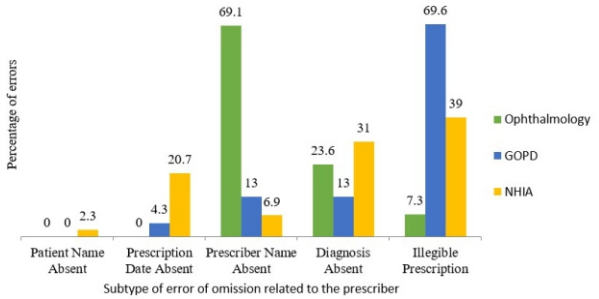

Figure 1: Subtypes of errors of omission related to the prescriber

For error of omission related to the medication, absence of dose/strength (86; 41.9%) was the highest occurring error found in NHIA, followed by absence of duration of drug administration (68; 33.2%), then absence of frequency of administration (29; 14.1%) (Figure 2).

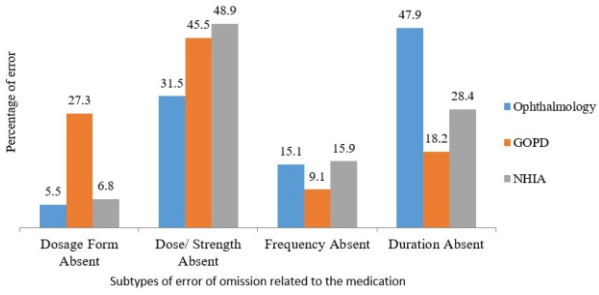

Figure 2: Subtypes of errors of omission related to the medication

For error of commission, 324 (68.9%) files had at least 1 drug-drug interaction thus being the highest occurring error of commission followed by wrong/nonstandard abbreviation (34; 7.2%). Figure 3.

Other results

Of the total medicines assessed, 1920 (56.1%) were prescribed by their generic names, and 424 were antibiotics (45.1%). Each prescription had a minimum of one medicine and a maximum of twelve resulting in an average of 3.6 per encounter.

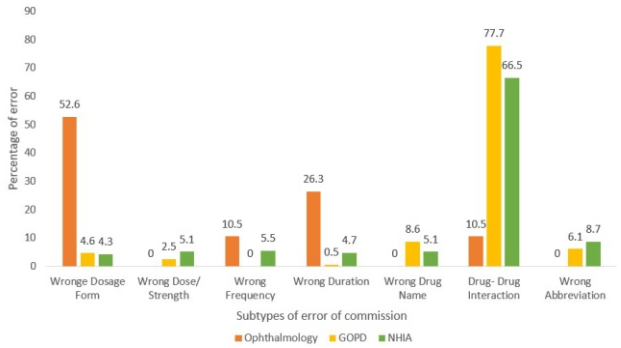

Figure 3: Subtypes of error of commission

Discussion

This study identified, classified and assessed prescription errors in Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Southeast Nigeria. The study identified high rate of prescription errors with error of omission related to medication being the most type of error and National Health Insurance Authority (NHIA) contributing to most of the errors.

The rate of prescription errors identified was higher compared to other studies which found 75% and 43.8% of prescription errors identified in a kidney hospital in Nigeria and among nine hospitals in Western England respectively.[16,19] Inclusion of some characteristics such as name of patient, prescriber's signature, and date of prescription as part of our criteria for prescription errors may have contributed to the higher prescribing errors compared to other studies that did not include these characteristics. It has been noted that most prescribers consider these characteristics as unimportant in prescription writing.[16] Other studies have reported lower prevalence of prescription errors (53%) where the criteria for prescription errors were less strict.[20]

Generally, error of commission was more prevalent than error of omission with a difference of 12%. Error of omission related to the medication was higher than that related to prescriber as seen in other studies on prescription errors.[16, 21] Poor working environment such as poor lighting, high noise levels and inappropriate temperature; imbalance of prescriber to patient ratio resulting in excess workload, stress and long working hours are factors that contribute to prescription errors.[22,23] Other factors include interruptions, lack of organizational supervision and poor communication.[24]

Illegible prescription in the present study formed most errors related to the prescriber (32.7%). This differs from the study conducted in Kaduna State, Nigeria which reported that most of the prescriptions reviewed were legible.[25] In South Africa, pharmacy personnel reported making errors in interpreting and dispensing prescriptions. They attributed these errors to prescriber's illegible or bad handwriting consequently this led to delay in prescription filling time and harm to patient when incorrect medication or dosage is dispensed.[26] Intervention techniques such as the use of printed or electronic prescriptions and Computerized Physician Order Entry (CPOE) can be employed to solve the issue of prescription legibility and completeness of documentation by prescribers.[19,25,27]

A high number of the prescriptions in this study contained prescribers' details such as prescriber name and signature. This depicts prescription completeness in prescriber details and an improvement compared to a similar study conducted in Tertiary Care District Hospital, Central Nepal.[4] Prescribers have a duty of care to their patients and a professional duty to pharmacists to ensure drug prescriptions have all the necessary information, are legible and readily identifiable. This is to prevent serious inadequacies in prescription writing with unacceptably high values of absence of prescriber details and low levels of prescription completeness as was reported in the Kaduna study.

Failure to mention diagnosis occurred in 39.2% of the prescriptions. Providing pharmacists with the clinical indication or diagnosis is an important first step that is long overdue as it plays a major role in prescription interpretation and dispensing of correct drug.[28] Furthermore, treatment would not be achieved if the diagnosis were not accurate or entirely left out and can lead to economic waste and patient health hazards.[29] Therefore, diagnosis is an important part of any prescription and shows rational prescribing, after which therapeutic objectives must specify and choose treatment of proven efficacy and safety.[28]

Absence of dose/strength was the highest (42.0%) occurring error of omission related to medication in our study and higher when compared to other studies in Pakistan[30] and Northern Nigeria where less than 20% errors regarding absence of dose/strength of medications were reported.[25] Consequently, errors due to absence of dose/strength are a major concern because they can lead to incorrect dosing and inappropriate use which will further have serious

consequences for health such as dependence, impacting the effectiveness of the medication (adverse effects), decreased patient satisfaction and a growing lack of trust in the healthcare system.[2,31] Inadequate work force of medical practitioners in southeastern Nigeria is also a major determinant of prescription errors as physicians working in public health sectors in eastern Nigeria are 2.5 times less satisfied than their counterparts in non-public health sectors.[32] The high occurrence of absence of dose/strength also suggests a need for increased emphasis on complete and accurate prescribing by healthcare professionals.[33]

Drug-drug interaction was seen as the most prevalent subtype of prescription error of commission especially in National Health Insurance Authority (NHIA) pharmacy unit where more work load due to increased number of patients was observed. This was followed by absence of dosage and wrong abbreviations. The study setting is a major centre in the state where most indigenes access care under the health insurance scheme, a pocket friendly scheme. Other authors have reported similar findings where drug-drug interactions was the highest occurring prescription error subtype.[4] The high percentage error for drug-drug interaction could be because of increased work pressure, polypharmacy and the inclusion of both significant and insignificant interactions. Increased workload and time pressure have given rise to the inability of prescribers to crosscheck with medical reference tools concerning drugs that interact when prescribed together.[20] In addition, prescriber experience, drug knowledge gradient, perception of risk, poor knowledge of the patient and poor documentation of previous prescribing decisions by the prescriber, form part of the factors leading to drug-drug interaction prescription errors.[34]

The use of abbreviations that are not standard as seen can be detrimental to the patient as it could lead to misinterpretation of prescription by other health care professionals.[35] Improper documentation of frequency, dosage, duration, and drug name by the prescriber either due to negligence, lack of experience or inadequate knowledge can lead to underdosing or overdosing patients, shortened length of therapy, and abuse thus causing drug resistance, adverse reactions, and treatment failure.[28] Different medications come in different doses and strengths. Therefore, not specifically stating dose and strength in patient's prescription poses a problem while dispensing except for medications which come in single strengths and doses.[28]

Notably, General Outpatient Department (GOPD) pharmacy unit also had fewer errors. Unlike NHIA, physicians in GOPD at the study setting are more in number and have monthly training on medical related cases and prescriptions. Studies have shown that regular educating and training of general practitioners, pharmacists, and junior doctors regarding the similarities and differences between similarly named preparations has led to reduced errors.[36]

Ophthalmology, a specialty in the study centre, had fewer errors with absence of prescriber name and signature as the most errors. This differs from previous studies in ophthalmology prescriptions where absence of frequency of usage, wrong dose and strength were the major errors in the ophthalmology clinics.[36] The low errors in Ophthalmology could be because of more consultants and very few resident physicians. Occurrence of prescription error is adjudged to be highest among house officers and junior doctors but lowest among consultants. This was most likely because consultant physicians are specialist with more years of theoretical and experiential knowledge; and proper communication and supervision of prescriptions written by junior physicians will lower the rate of prescription errors.[16,21,36] Audits conducted in Saudi Arabia,[36] and in the United Kingdom,[37] optimized the check and counter check method, use of prescription guide along with more training at prescribing for physicians and this reduced the rate of errors made in ophthalmic practice.[36,37]

Prescription of medicines in generic was observed in 56.1% of the prescriptions and this falls short of the World Health Organization (WHO) standard of 100%.[38] The choice of drugs by generic name may be influenced by several factors. One is the propensity of prescribers to favor brand-oriented prescribing because generic names are difficult to remember, whereas prescribers are easily reminded of brand names through advertisements by medical representatives.[39] Other authors have various levels of compliance with generic prescribing: in Nellore, India (12.8%), Ibadan, Nigeria (71.6%) and Kano, Nigeria (42.7%).[40-42] Values in our study and that of Ibadan serve as a positive finding because it indicates that healthcare professionals are heading towards best practices in generic prescribing thereby reducing the risk of prescription errors as each drug has only one

international chemical name rather than many brand names.[41,43] Errors can be reduced by using generic names when possible.[44]

Antibiotics prescription (45.1%) was above the WHO value of 20%.[45] This is significant because antibiotics are often over-prescribed, leading to the risk of development of antibiotic resistance, which can be a serious public health concern.[46,47] Similar studies on prescription errors conducted in Lagos and Kano States Nigeria, reported 28.1% and 43.8% respectively.[48,49] In hospital-based settings more than half of the patients encountered antibiotics in their prescriptions[50]. It is however salient to note that this figure does not necessarily indicate overuse of antibiotics. However further analysis would be required to determine if the rate of antibiotic prescribing is appropriate for the population being studied.

The study also found that each prescription included an average of 3.6 medicines also falling short of WHO recommended standard of two.[38] Other studies had higher rates in other parts of Nigeria.[42,48-50] Other authors reported an average of 2.8 drugs in each prescription;[48] Ilori and colleagues in the research carried out in University College Hospital (UCH), Ibadan reported an average of 2.64 drugs per encounter;[42] while Tamuno in 2009, reported an average of 3.2 drugs in each prescription.[49] These studies have further shown that polypharmacy is common in Nigeria.[51] While an average of 3.6 may seem high, it is important to note that some conditions of co-morbidities may require multiple medications for effective treatment. However, healthcare professionals should always strive to prescribe the fewest number of medications necessary to achieve the desired therapeutic goal and outcome.

The study has a few limitations. Data were collected from only three units of the hospital within a short time and so may not be representative of the whole facility. However, it gives a snapshot of the true picture across the three units.

Conclusion

This study showed that prescribing errors are high at the study centre. Error of commission was the most occurring. Error of omission related to the medication was higher than that related to the prescriber. There is an urgent need for regular monthly training on prescribing practices to reduce prescription errors and improve therapeutic outcomes .

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Conflict of Interest

The authors declare no conflicts of interest.

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