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Drug prescription pattern in primary healthcare centers in southwest Nigeria. A cohort analysis of primary health workers prescription records

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Abstract

Introduction: Rational use of Drugs is the prescription and dispensation of drugs to the appropriate patients in appropriate doses, for required period and at lowest cost to them and their community. Irrational use refers to inappropriate use of drugs which include prescription and dispensation of too many drugs (polypharmacy), unnecessary and overuse of antibiotics and use of injection where oral drug suffices. A step towards preventing irrational drug use is to document it in a study such as this, so that appropriate corrective steps can be taken.

Methods: This was a cross sectional cohort analysis of the prescribing records of primary health care workers from eight primary health care facilities.

Result & Discussion: There were 513 prescriptions of 2, 590 drugs from the eight facilities;206 (40%) from a cohort of two comprehensive health centres and 307(60%) from a cohort of six basic health clinics**.** 206(40%) was diagnosis-based prescriptions, while 307(60%) was not based on diagnosis. About 426(83%) contain antibiotics prescriptions, while 87(17%) had no antibiotic prescriptions. About 395(77%) prescriptions contained injectable drugs while 118(23%) did not contain any injectable drug.

Conclusion: The average of number drugs per prescription and the proportions of antibiotics and injectables prescriptions in this study were higher than the WHO recommendations. These values were equally higher than values in many studies. Healthcare workers at the basic health clinics did more diagnosis-based prescriptions, prescribed more antibiotics and more injectable than their counterparts at the comprehensive health centers.

Keywords: Drug; Prescription; Antibiotics; Injectables; Polypharmacy; Health workers; Health facilities

1. Introduction

Medicine can be defined as the main active ingredient in pharmaceutical product used for modification or exploration of physiological system or pathological state for the benefit of the recipient [1, 2]. The importance of medicine in health care delivery services can never be over-emphasised and this underscored the listing of provision of essential medicine as one of the components of primary health care. Treatment of commonly occurring diseases in the community and provision of essential drugs are two important components of primary health care when it was declared at Alma-Ata in 1978 [3]. Medicine is a weapon used by man to fight diseases and illness and accessibility to it is a fundamental human right [4]. It is a crucial component of medical care and one of the most commonly used interventions in the management of clients in health care delivery services. It is a commonly used intervention and plays a critical role in health care services in the management of diseases leading to decrease in morbidity and mortality and increase in the quality of life [5, 6] Greater proportion of public health expenditure is on drugs [7, 8].

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As crucial as medicine is in health care delivery services, its inappropriate use has negative effects on public health. Rational use of medicine is the prescription and dispensation of medicine to the appropriate patients in appropriate doses, for required period and at lowest cost to them and their community [3, 8, 9, and 10]. However, irrational use of medicine refers to inappropriate use of drugs which include prescription and dispensation of too many drugs (polypharmacy), unnecessary and overuse of antibiotics and use of injection where oral drug suffices. Just as the importance of medicine in health care services cannot be over-emphasized; the negative effects of its irrational use on public health cannot equally be over-emphasized.

At the global level, half of drugs prescribed and or dispensed are inappropriate and about half of the patients who buy such drugs fail to use them appropriately [8, 9, 10 and 11]. Inappropriate use of medicine lead to unnecessary waste of scarce resources and widespread health hazard [11]. Polypharmacy is associated with increase in dispensing error, poor comprehension on dose and dosages by patient and drug-drug interaction [12]. It also increases unnecessary waste of scarce resources and out of pocket expenses by patients [8]; this is more so in developing countries where most citizens are not enrolled on any form of health insurance.

Irrational use of antibiotics poses serious threat to the health of the global community. Increasing resistance of microbes to anti-microbes drugs which such microbes were previously sensitive to is a growing concern. Irrational use of antibiotics has been observed to be responsible for the development of resistance [12]. The use of second line drugs is not only more expensive but also mostly more toxic and may thus reduce compliance. This is exemplified in the treatment of drug resistant tuberculosis where inappropriate use of anti-tuberculosis has led to emergence of drug resistant tuberculosis which is more difficult to treat. To compound the problem, a patient with drug resistant tuberculosis transmits same to another susceptible member of the community. The resistance of Neisseria gonorrhoea to penicillin is almost 100% while that of malaria to chloroquine has been reported in over 81 countries [7]. Consequent upon resistant of malaria to chloroquine; the national policy on management of malaria in Nigeria where malaria is endemic has since changed to the use of artemisin-combined drug. The use of injection when oral drug suffices can lead to avoidable hepatitis B and HIV /AIDS infections and abscess [7]. In addition to avoidable pain especially in children, it also unnecessarily increases the cost of treatment.

Drug utilization research is a valuable tool for the evaluation of use of drugs in clinical practice to ensure its rational and efficient use in the treatment of patients [13, 14]. Drug use research provides information on how drugs are prescribed and used which can then facilitate discussion and suggestions on how to correct and improve prescribing habit [13]. This it does by describing the prescription pattern, gives early signs of irrational prescription and plausible interventions [13]. WHO and International Network for Rational Use of Drugs (INRUD) have developed measures for the evaluation of drugs use. The drug use evaluation indicators are made up of three components; these are prescribing indicators, patients care indicators and facility indicators 15, 16].

Irrational prescription of drugs has been observed to be a global problem but more in developing countries where both physical and financial access to health care services is low [17]. The health system, quality of health workers and availability of drugs are some of the reported factors affecting the prescription habit of health workers [17]. Drug revolving fund an initiative agreed upon by African Ministers of Health in 1987 to solve the perennial lack of drugs in health facilities called Bamako Initiatives was adopted by Nigeria Government in 1988 [18, 19]. The aim of the initiatives was to ensure regular and steady supply of drugs to health facilities at affordable prices and improving the prescribing habit of health workers [18]. However, while drug revolving fund has been found to improve drug availability in health facility, it has also been found to be associated with irrational use of drug at primary health care level [18].

The Nigerian healthcare system can be divided into primary, secondary, and tertiary healthcare levels. The Primary health care is the foundation of the health care system and is the first point of contact with the health care system for most Nigerians, especially those in the rural areas. It is the level at which short-term, uncomplicated health issues are resolved. It is the level at which health promotion and education services are provided, and where patients in need of more specialized services are referred to secondary healthcare level. Primary health facilities are further classified into Comprehensive Health Center (also known as Primary Health Center), Basic Health Center (also known as Primary Health Clinic) and Health Post (also known as Dispensary) in the order of their decreasing complexity and expertise level of care provided. They are mostly staffed by community healthcare workers who are further classified into Junior Community extension workers (JCHEWs) and Senior Community extension workers(SCHEWs) and very few nurses.

Objectives

The primary objective of the study was to describe the drug prescription pattern of health workers at primary health care level, comparing Comprehensive health centers with Basic health clinics. The specific objectives of the study are

- To determine the average number of drugs per prescription
- To determine the percentage of prescription with antibiotics
- To determine the percentage of prescription with injections
- To determine the proportion of diagnosis-based drug prescription

2. Material and methods

2.1. Study area

The study was conducted in Ikere local government area of Ekiti state, southwest Nigeria. It is semi-urban with an extrapolated population of 148,558 based on 2006 population census. There are 18 primary health care facilities, 1 state specialist hospital and few private hospitals and clinics. It hosts many public and private primary and secondary schools and one state university.

2.2. Study design

It was a cross-sectional cohort analysis of the prescribing records at primary health care workers using out-patient's hospital records from eight primary health care centres.

2.3. Study sites and sample

Study sites were 8 primary healthcare facilities made up of 6 primary health centers and 2 comprehensive health centers. Stratified random sampling method was used to select the 8 study health centres from a sampling frame of 18 primary health centers. The health centres were stratified into two cohorts of comprehensive health centers(cohort 1) and basic health centres(cohort 2).

2.4. Data collection

Data was collected by the researcher and an assistant from two comprehensive health centres and six basic health centres between August and October 2021 using an adopted survey form. Information collected included demographics of patients seen, diagnoses, type of facility, types of drugs prescribed.

2.5. Ethical consideration

Ethical approval for the study was given obtained from the office of the Local Government Medical officer of Health.

3. Results

Table 1 Types of Facility and Prescription records

Types of facilities	Number	Prescription Records
Basic Health Clinics (Primary Health Clinic)	6(75%)	206(40%)
Comprehensive Health Centers(Primary Health Center)	2(25%)	307(60%)
Total	8(100%)	513(100%)

Eight primary health facilities participated in the study. Two were comprehensive health centers and six were basic health clinics. A total of 513 out-patient (OPD) prescription records from the eight health facilities was analysed. 206 (40.2%) of the records were from the two comprehensive health centres while 307 (59.8%) records were from the six basic health clinics**.**

For the patients whose hospital records were analysed, about 223 (43.4%) were male, 286 (55.8%) females and 4 (0.8%) gender records were missing. The age of the patients ranged between 1 month and 105 years with mean of 26.1 years. Vast majority(n= 152;29.6%) were less than 5 years, followed by 5–19 years (n=103; 20.3%) age group, 20 -34 years age group was about n=93 (18.1%); 35–49 years about n=62(12.1%); 50-64 years age group about n=35(6.8%); 65–79 years about n=40(7.8%); 80 – 94 years about n=26(4.9%)while the least n=2 (0.4%) was above 94 years.

Table 2 Demographic characteristic of patients

Gender	**Frequency**	**%**
Male	223	43.4
Female	286	55.8
Missing	4	0.8
Total	513	100
Age(yrs)	**Frequency**	**% Frequency**
< 5	152	29.6
5-19	103	20.3
20 – 34	93	18.1
35 – 49	62	12.1
50 – 64	35	6.8
65 – 79	40	7.8
80 – 94	26	4.9
> 94	2	0.4
Total	513	100

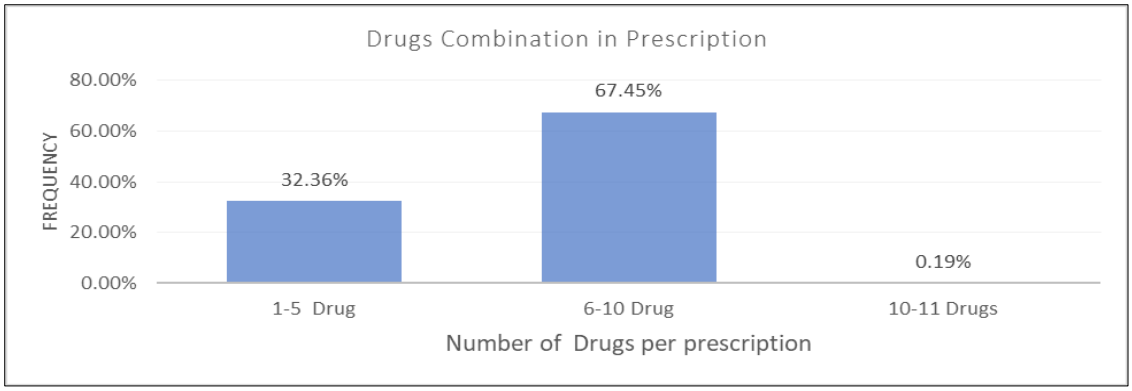

Figure 1 Number of drugs per prescription

A total of 2590 drugs were prescribed for the 513 patients with an average of 5.05 drugs per prescription and range from 1 to 11 drugs per prescription. 32.36%(n=166) of the prescriptions contained 1-5drugs, 67.45%(n=346) had 6-10 drug combination and 0.19%(n=1) had between 10 and 11drugs combination per prescription as seen in fig.1 above.

Of the 2,590 drugs prescribed, 999(38.57%) drugs were prescribed at the comprehensive health centres ranging from 1 to 11 with mean of 4.85 drugs per prescription and 1,591(61.43%) drugs were prescribed at the basic health clinics ranging from 1 to 10 with an average of 5.18drugs per prescription. Health workers at the basic health clinics gave out more prescriptions with 1-5 drugs and 6-10 drug combinations while the comprehensive health centers accounted for all prescriptions with 10-11 drug combination as seen in fig.2.

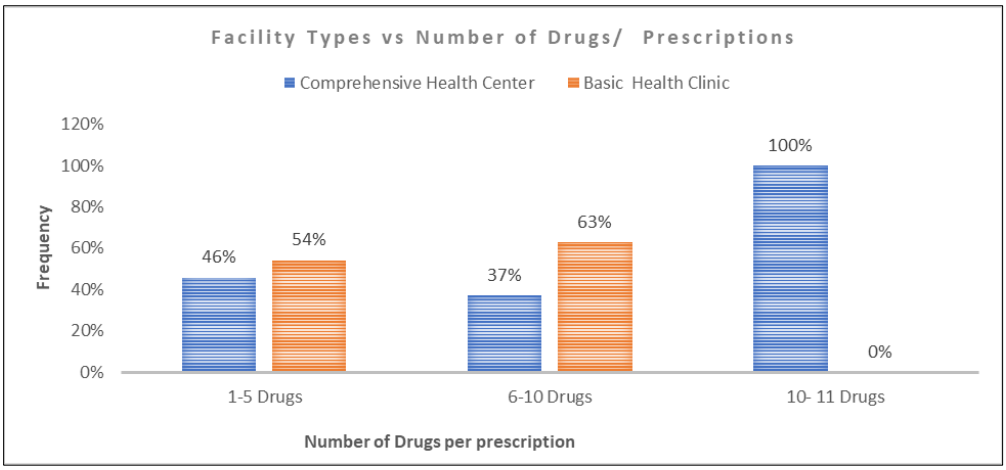

Figure 2 Facility Types vs Number of Drugs per prescription

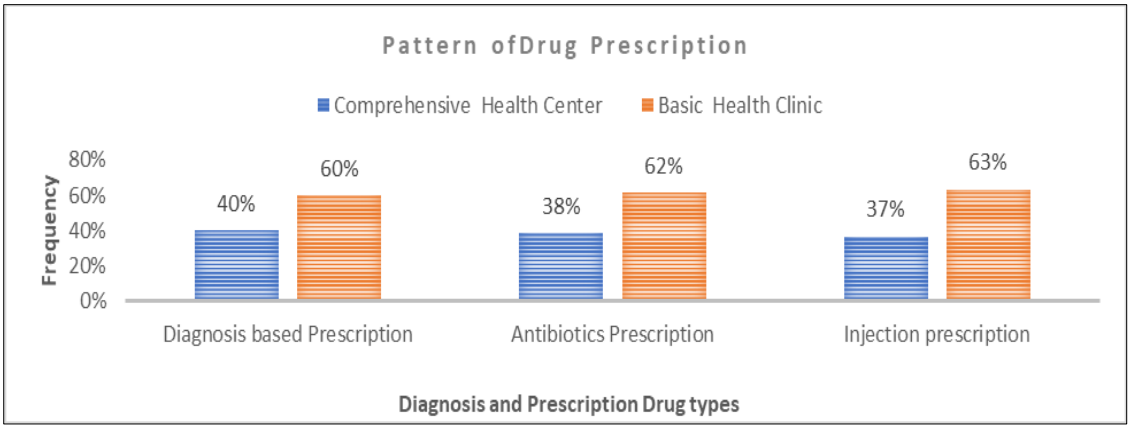

Figure 3 Pattern of Drug Prescription

Table 3 Types of Prescription vs Facility Type

Types of Prescription	**Yes/No**	**Comprehensive Health Center**	**Basic Health Clinic**	**Total**
Diagnosis based Prescription	Diagnosis based Prescription	83(40%)	123(60%)	206(40%)
	No diagnosis-based Prescription	123(40%)	184(60%)	307(60%)
Prescriptions contain antibiotics. (p=0.594>0.005)	Antibiotics Prescription	164(38.50%)	262(61.50%)	426(83%)
	No antibiotics prescription	42(48.28%)	45(51.72%)	87(17%)
Prescriptioncontain injectables (p=0.031>0.005)	Injectable prescription	145(36.71%)	250(63.29%)	395(77%)
	No Injectable prescription	61(51.28%)	57(48.72%)	118(23%)

Of the 513 prescriptions, 206(40%) was based on diagnosis while 307(60%) was not based on diagnosis. While Comprehensive health center had 40% prescriptions based on diagnosis and 60% not based on diagnosis, Basic health clinic had 60% of prescription based on diagnosis and 40% not based on diagnosis.

About 426(83%) of the total prescriptions contain antibiotics while 87(17%) had no antibiotic prescriptions. More antibiotic prescriptions 262(61.50%) were made at the basic health clinics compared with the comprehensive health center 164(38.50%).

About 395(77%) prescriptions contained injectable drugs while 118(23%) did not contain any injectable drug. More injectable prescriptions were made at the basic health center 250(63.29%) compared to the comprehensive health center 145(36.71%).

Generally, healthcare workers at the basic health clinics seemed to rely more on diagnosis for prescriptions, prescribed more antibiotics and more injectable than their counterparts at the comprehensive health centers. This may be due to the larger number of basic health clinics and the greater proportion of prescription records from basic health clinics compared to the fewer number of comprehensive health centers included in this study. It may also be a reflection of the difference in the level of utilization of standing orders and other job aids among health workers in the two cohorts of health centers.

4. Discussion

The WHO and International Network of Rational Use of Drugs (INRUD) derived standard for prescribing indicators stipulated 1.6 to 1.8 drugs per prescription, 20 to 26.8 % of antibiotics and 13.4 to 24.1% of injection prescription for out-patient cases [7]. An average of 5.1 drugs per prescription in this study was higher than the maximum recommended by the WHO. It was equally higher than average of 3.03 and 3.92 in studies at university teaching hospitals in Nigeria [20, 21], average of 2.25 in a study in Saudi Arabia [22], average of 3.4 in evaluation of rational prescribing in paediatric clinic in Nigeria [23] and average of 2.9 in a study at a primary health care level in Tamil Nadu [3]. The range 0 – 11 drugs per prescription in this study was also very wide in comparison with 2.12 – 4.56 drugs per prescription in the Tamil Nadu study [3]. However, the average 5.1 drugs per prescription are similar to the 5.3 drugs per prescription in primary health care facilities that operated Bamako initiatives in study in south- east Nigeria [18]. The Bamako initiative is similar to the Unified Drug Revolving Fund (UDRF) being operated by primary health facilities in southwest Nigeria. Both Bamako initiatives and UDRF were designed to ensure continuous and stable availability of drugs at the facilities at reasonable cost. It thus therefore seems that availability of drugs encourages poly-pharmacy at such facilities at the primary care level. In a comparative study on drug use pattern between primary and secondary health facilities in northern Nigeria, average number of drugs per prescription of 3.62 and 2.97 for primary and secondary level respectively were lower than the finding of this study [14]. The high average number of drugs per prescription in these studies showed that prescription habit was better at higher level of care than at the primary health care level. This might not be unconnected with the difference in the skills and knowledge of health workers in making correct diagnosis before prescribing drugs for patients at the primary and secondary levels. Doctors are mostly the prescribers at the secondary and tertiary level while community health extension workers are the major prescribers at the primary health care level. While doctors are trained in the act of making diagnosis before making prescriptions; community health extension workers are trained to use standing order to make 'diagnoses or classification [25]. Making diagnosis before making prescription is expected to enhance accuracy of treatment and prevent treatment of mere symptoms rather than diseases leading to better prescription habit. In this study diagnoses were made only in 40% but not in 60% of the cases. The low utilization of standing order by community health extension workers as shown in a study by Adepoju and Afe [26] might be responsible for the low percentage of diagnosis in this study. Also comprehensive health centres generally have higher level and more experienced health workers than the basic health clinics and this is expected to translate to better quality of care including prescription practice as supported by less number of non-diagnosis based prescription at the comprehensive center compared to the basic health clinic. Surprisingly, the proportion of diagnosis based prescription was higher at basic health clinics. The negative consequences of poly-pharmacy which include increase risk of non-compliance, raised health care expenditure, drug interaction and elevated risk of adverse drug reaction [27] should therefore be of serious concern in the face of the high number of drugs per prescription in this study.

The percentage of antibiotics and injectables prescriptions in this study were 83.9% and 76.8% respectively and were higher than recommended values by WHO which are 20% - 26.8 % for antibiotics and 13.4% - 24.1% for injectables prescription for out-patient [7]. These values were equally higher than values in many studies. It was higher than the 32.7% and 1.5%, 12.8% and, 35.3% and 9% and 81.3% and 17.5% respectively for antibiotics and injection in studies across general outpatient clinics in Nigeria tertiary hospital [20, 21, 23, and 28]. The values were also higher than those obtained in other studies in primary health facilities. Percentage of antibiotics and injection were 72.8% and 64.7% and

54.4% and 56.8% respectively in studies in primary health facilities in southeast Nigeria and Tamil Nadu [3, 18]. However, making diagnosis before prescriptions, prescription of antibiotics and injections prescriptions had no statistically significant relationship with the type of facility.

5. Conclusion

Findings of large number of drug combination per prescriptions and high prevalence of antibiotic and injectable prescriptions against the background of less than average diagnosis-based prescriptions at the study centers, demonstrated high consumption of medical consumables including drugs which may not be medically indicated. This can be traced to the less use of job aids like standing orders for making correct diagnosis and drug prescription. Therefore, there is an urgent need to educate primary healthcare workers on the importance of making correct diagnosis before prescriptions which will also limit the number of drugs per prescription within the standard approved number of drug combination. This will inadvertently lead to judicious use of the lean resources and reduce all the complications of polypharmacy as mentioned earlier.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The Authors declared no conflicting interest.

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