# Medicines Prescription Pattern in the Management of HIV/AIDS Patients in Public Hospitals, Kwara State, Nigeria

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## Abstract

Appropriate medicine prescription is crucial for optimum medicine use in the management of Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) patients. This study examined the medicine prescription pattern in the management of HIV/AIDS patients. It was conducted in seven public hospitals in six local government areas representing the three Senatorial Districts of Kwara State. Seven hundred and eighty prescription sheets of eligible HIV/AIDS patients were obtained and reviewed. In-depth interviews of ten prescribers who provided healthcare to these patients were also conducted. Quantitative data was analyzed using descriptive statistics. In-depth interviews were audio-taped, transcribed verbatim, analyzed and developed into ethnographic summary. The results showed that prescription of antiretroviral medicines (ARVs) was in adherence to highly active antiretroviral therapy; 96.4% of the patients were on first line ARVs regimen; 56.3% had prescriptions for co-trimoxazole preventive therapy, none for isoniazid preventive therapy while 7.8% had prescriptions for artemisinin-based combination therapy. Proportion of prescriptions that had potential drug interactions was 51.0% while those in accordance with Standard Treatment Guidelines and proportion of medicines prescribed using generic names were lower than the set standards of the Nigeria National Drug Policy (NNDP). Half of the prescribers used both brand and generic names in prescribing medicines. The prescription pattern of medicines in the management of HIV/AIDS patients in public hospitals, Kwara State did not meet up with the set standards of the NNDP. Periodic training of prescribers on standard prescription practices is recommended.

**Keywords**: HIV/AIDS Patients, Antiretroviral and Non-antiretroviral Medicines, Prescription Pattern, Nigeria National Drug Policy

## Introduction

Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) pandemic continues to be a challenge to the healthcare system due to the associated morbidity, mortality and socioeconomic effects. There are more than 35 million HIV-related deaths globally, since its discovery[1]. In 2015, there were 1.1 million HIV-related deaths while HIV newly infected people were 2.1 million. At the end of 2015, there were approximately 36.7 million people living with HIV/AIDS (PLWHA). In Sub-Saharan Africa, there were 25.6 PLWHA (the most affected region) and two-thirds of the global new HIV infections occurred in this region[1]. In Nigeria, there were 3.2 million PLWHA in 2013, 220,000 new HIV infections, 210,000 AIDS-related death and 21% adults on antiretroviral treatment[2].

The use of antiretroviral medicines (ARVs) has revolutionized the prognosis of HIV/AIDS and HIV - related comorbidities[3-6]. The recommended antiretroviral treatment regimen is a combination therapy comprising at least triple ARVs referred to as highly active antiretroviral therapy (HAART)[7]. Some of the ARVs in the management of HIV/AIDS in Nigeria are zidovudine, nevirapine, lamivudine, efavirenz, abacavir, emtricitabine, tenofovir, (first line); lopinavir, atazanavir and ritonavir (second line)[7]. Also active management of opportunistic infections (OIs) as adjunct to HAART in HIV/AIDS patients in order to prevent the spread of these opportunistic infections to others with consequent reduction in the burden of HIV co-infections involves the use of non-antiretroviral medicines (NARVs) such as such as co-trimoxazole preventive therapy (CPT), Isoniazid Preventive therapy (IPT) and other antimicrobial agents[7].

Nonetheless, optimum use of these medicines in the management of HIV/AIDS patients is critically dependent on appropriate medicine prescription. In Nigeria, appropriate prescription of medicines is an essential element of National Drug Policy and has the targets of 80% adherence to Standard Treatment Guidelines by 2008, total adherence to Essential Medicines List in public health institutions by 2008 and the prescribing of medicine by International Non-proprietary names (generic names)[8].

Inappropriate medicine prescriptions (IMP) negate whatever policies, goals, strategies and targets that are in place to ensure appropriate use of medicines. According to World Health Organization (WHO) report, 50% of all medicines are inappropriately prescribed[9]. Only about 40% of all the patients in primary health-care level in Africa, Latin America and Asia were treated in accordance with clinical guidelines for many common conditions[10]. IMP has been identified in different health facilities within Nigeria. Prescribing using generic name were 28.1%, 37.7%; 27.8% and 41.9% in studies conducted in Nigeria[11], Port Harcourt[12], Lagos[13] and Ilorin[14] respectively. IMP has also been identified in different health facilities outside Nigeria. Prescribing using generic name ranged 0.008% - 69.8%[15-22]. Prescribing from EML ranged 45.5% - 67.7%[16, 18, 23-25] while proportion of prescription encounter with clinically significant drug interaction was 27%[26]. There were prescriptions of dual nucleoside regimen instead of at least the triple combination antiretroviral therapy[27]. Irrational prescription of antiretroviral therapy regimens that were outside the WHO and national guidelines for HIV/AIDS treatment in Nigeria has also been reported[28]. IMP could result in huge wastage of limited resources, emergence of medicine therapy problems (MTP) such as life

threatening toxicities, drug interactions[26], antimicrobial resistance[29-34] and patient non-adherence[35] which pose unnecessary health risks. The dearth of information on medicine prescription pattern in the management of HIV/AIDS and HIV-related comorbidities has attracted concerns. This study thus examined the medicines prescription pattern in the management of HIV/AIDS patients in Public Hospitals, Kwara State. It also compared the findings of this study with the set standards of the Nigeria National Drug Policy (NNDP) with regards adherence to STGs, EML and prescribing of medicines by International Non-proprietary names (generic names).

## Materials and Methods

### Study location

This study was conducted in seven (7) public hospitals that provided healthcare to adult HIV/AIDS patients in Kwara State. The hospitals comprised of a teaching hospital, a specialist hospital, three general hospitals, a comprehensive health center and a cottage hospital. These hospitals are located in six (6) local government areas representing the three Senatorial Districts of Kwara State.

### Study Design

The study design involved triangulation of both quantitative and qualitative research methods. This made it possible to cross validate the findings of the study. The study involved:

1. Reviews of seven hundred and eighty prescription sheets issued to eligible HIV/AIDS patients on ARVs who received their medicines from the Pharmacies of the HIV Treatment Centers of the afore mentioned public hospitals.
2. In-depth interviews of the prescribers who provided healthcare to these patients.

### Inclusion criteria

The inclusion criteria were:

i. Prescription issued to HIV/AIDS patients who attended public hospitals in Kwara State, with age range 18 – 70 years, who gave voluntary informed consent to participate in the study.
ii. Prescription issued to HIV/AIDS patients who attended public hospitals in Kwara State and were on highly active antiretroviral therapy (HAART) who gave voluntary informed consent to participate in the study.

### Exclusion Criteria

i. Prescription issued to HIV/AIDS patients who were too ill to participate in the study.
ii. Prescription issued to HIV/AIDS patients who had psychiatric illness that might have impaired their ability to give voluntary informed consent.

### Sample Size Determination and Sampling

Fisher's formula[36,37] was used to determine a representative sample size from 4162 registered HIV/AIDs patients on antiretroviral therapy at 95% confidence level, 5% margin of error and the proportion in target population estimated to have a particular characteristic: the antiretroviral therapy coverage of 23% for Nigeria[38]. The obtained minimum sample size was 260. In order to make the sample more representative of the entire population, the obtained minimum sample size was tripled. Hence, 780 prescriptions which met the

inclusion criteria obtained and reviewed. This 780 sample was proportionally allocated to the 7 study sites based on the total population of HIV/AIDS patients on antiretroviral therapy in the 7 hospitals and the number of HIV/AIDS patients on antiretroviral therapy in the individual hospital.

**Study Instruments**

The study instruments which comprised prescribing indicator form and an interview guide adapted from those of previous studies[39,40], were assessed by 4 scholars (2 clinical pharmacists, 2 epidemiologists with medical background) and pre-tested at Civil Service Hospital Ilorin. The pre-testing of the prescription reviews involved the use of 10% (n =78) of the study sample size. One of the researchers and four trained research assistants (2 have tertiary education while the other 2 have senior secondary school education) conducted the pre-testing.

**Data Collection**

Seven hundred and eighty eligible HIV/AIDS patients were systematically recruited on clinic days by one of the researchers and 2 research assistants while their prescriptions were later obtained by 2 research assistants and reviewed on non-clinic days by the authors. Also, the in-depth interviews (IDIs) of 10 purposively sampled prescribers (Physicians and Nurse) who were focal persons in the HIV Clinics of the HIV Treatment Centers were conducted in English language at a time and place convenient to the interviewees by 1 of the researchers. Six of the interviews were conducted in the offices of the prescribers within the HIV treatment Centers (HTCs) while the other four were outside the HTCs. The major thematic areas were prescribing practice with regards to use of generic/brands names, availability and utilization on STGs and EML, availability of fixed dose combination ARVs and occurrence of drug interactions. The interviews were audio-taped and notes were taken. The duration of data collection was January – July 2013.

**Data Analyses**

Quantitative data entry and descriptive statistical analyses were done through the use of Statistical Package for Social Sciences (SPSS) version 17.00. The in-depth interviews were audio-taped, transcribed verbatim, analyzed and developed into ethnographic summary with illustrative quotes.[41]

**Ethical Issues**

Ethical Review Committees of the University of Ilorin Teaching Hospital (UITH), Ilorin and Kwara State Ministry of Health granted ethical approvals of this study. Relevant cooperation and assistance of the various heads of the departments were sought and obtained. Voluntary informed consent of the patients (signatures/finger print) and prescribers (verbally recorded) were obtained before inclusion into the study. Confidentiality of the data and information obtained was ensured. Research ethics such as anonymity and freedom to decline or consent to participate in the research were observed.

**Results and Discussion**

The socio-demographic characteristics of the HIV/AIDS patients whose prescriptions were reviewed are as shown in Table 1. Only 25% of the HIV/AIDS patients were males while the modal age class was 31 – 40 years. Most of the patients (83.3 %; n = 650) were married and more than one-third (36.1%; n = 282) had no formal education.

**Table 1: Socio-demographic Characteristics of the HIV/AIDS patients (n = 780)**

| Variable | Frequency (%) |
|---|---|
| Gender | |
| Male | 192 (25) |
| Female | 588 (75) |
| Age (years) | |
| ≤ 20 | 10 (1.3) |
| 21 - 30 | 149 (19.1) |
| 31 - 40 | 297 (38.1) |
| 41 - 50 | 190 (24.3) |
| 51 – 60 | 109 (14.0) |
| ≥ 61 | 25 (3.2) |
| Marital Status | |
| Married | 650 (83.3) |
| Single | 44 (5.7) |
| Widow | 65 (8.3) |
| Widower | 5 (0.7) |
| Divorced | 12 (1.5) |
| Separated | 4 (0.5) |
| Educational Status | |
| No formal education | 282 (36.1) |
| Primary education | 153 (19.6) |
| Secondary education | 208 (26.7) |
| Tertiary education | 137 (17.6) |

The most prescribed antiretroviral medicine (41.3%; n = 322) based on prescription per encounter (Figure 1), was Nevirapine (NVP) as part of the triple therapy (HAART) along with a 2 fixed dose combination (FDC) such as Zidovudine + Lamivudine (ZL) or Tenofi vir + Emtricitabine (TE). The prescription of Zidovudine + Nevirapine + Lamuvudine (ZLN) a 3-fixed dose combination (FDC) was the next (35.9%; n = 280). This is in contrast with the findings of an earlier study in Nigeria in which ZLN was the most prescribed (35.89%; n = 1056)[28]. The difference could be due to low availability o f ZLN a 3-FDC ARVs in this study. This finding is also not in agreement with the findings of an earlier study[27] in which most of participants (n = 97; 70%) were on Lamivudine+Stavudine+Nevirapine while 12% of the participants were on Lamivudine+Zidovudine (dual nucleoside regimen). The contrast is due to the change in HIV treatment policy in which dual-therapy is no more recommended in the National Treatment Guidelines for HIV/AIDS[7] due to development of resistance. Secondly, Stavudine has been phased out from the list of ARVs recommended for the treatment of HIV according to the 2010 National Treatment Guidelines[7] due to its toxicity. The prescribers in this study adhered to the recommended triple ARV therapy, HAART[7] compared to earlier study in which 12% of the participants were on dual nucleoside regimen[27]. Also most of the patients (96.4%) were on first line antiretroviral regimen (all the medicines except ATV/R and LPV/R). This finding is similar to that of an earlier study conducted in Lagos[28].

With regards to distribution of the total prescribed medicines, more than half (n = 1341; 56.7%) of the prescribed medicines were ARVs while 43.3% were non-antiretroviral (NARVs) due to comorbidities (Figure 2). This is an indication of high pill burden experienced by HIV/AIDS

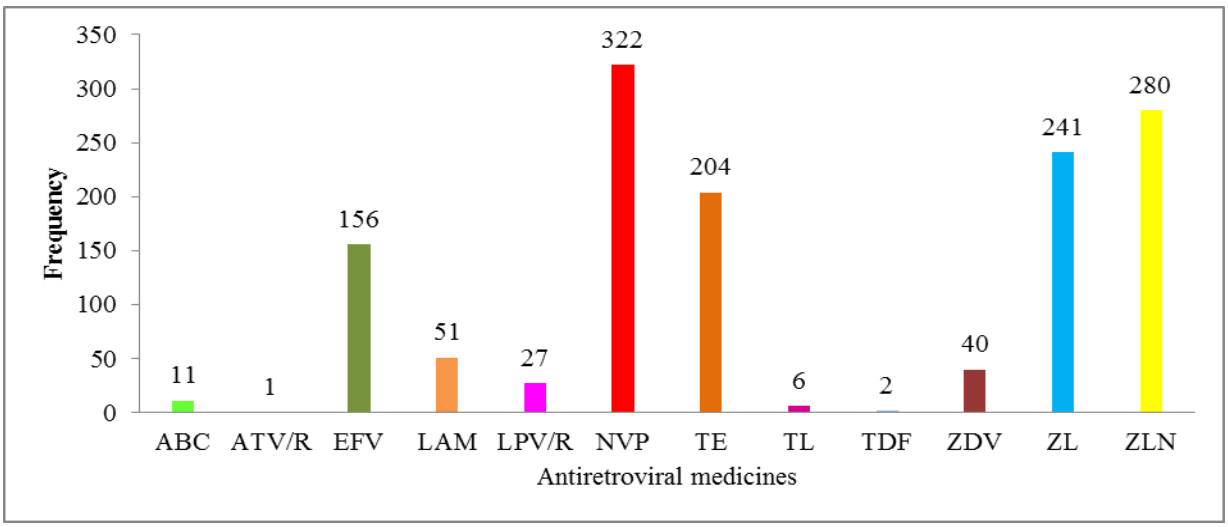



***Figure 1**: Prescribed Antiretroviral Medicines for the Hiv/Aids Patients*

**Legend**

*ABC: Abacavir; ATV/R: Atazanavir/ritonavir; EFV: Efavirenz; LAM: Lamivudine; LPV/R: Lopinavir/ritonavir; NVP: Nevirapine; TE: Tenofovir/Emtricitabine; TL: Tenefovir/Lamivudine; TDF: Tenofovir; ZDV: Zidovudine; ZL: Zidovudine/Lamivudine; ZLN: Zidovudine/Lamivudine/Nevirapine.*

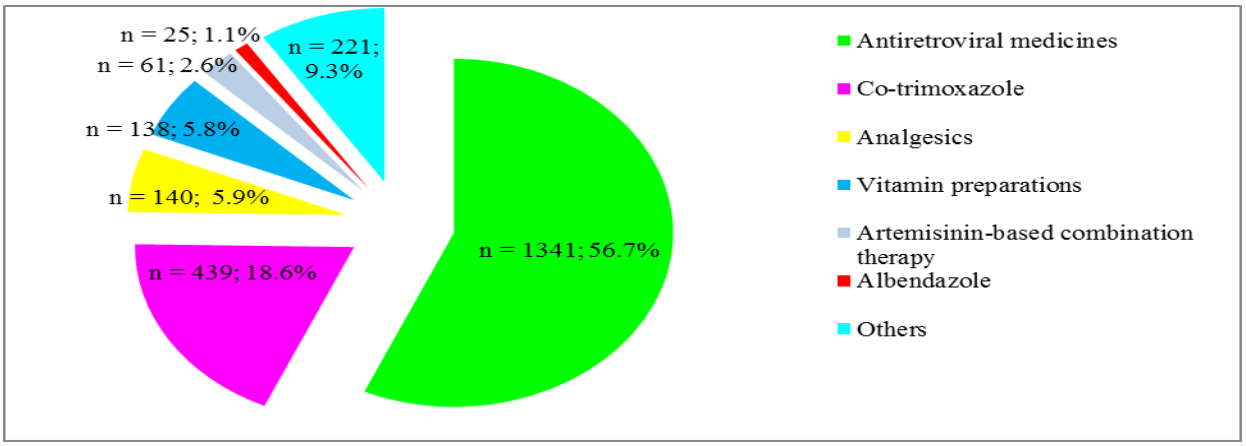



***Figure 2**: Prescribed Medicines for the Hiv/Aids Patients*

patients with comorbidities which could result in inadequate patient adherence to medication and poor therapeutic outcome. Regarding non-antiretroviral medicines (NARVs), co-trimoxazole (Co-trimoxazole Preventive Therapy) was the most prescribed (n = 439; 18.6%), prescription of analgesics was 5.9% while that for

artemisinin-based combination therapy (ACT) was 2.6%. However, of the 780 HIV/AIDS patients, only 56.3% had prescription for Co-trimoxazole Preventive Therapy (CPT); while 18.0%, 17.7% and 7.8% had prescriptions for analgesics, vitamin preparations and artemisinin-based combination therapy respectively. This study's finding that only 56.3% of the study participants were on CPT could be due to eligibility criteria as stated in the 2010 National Treatment Guidelines for use of CPT[7]. None of the patients had prescription for Isoniazid Preventive Therapy (IPT). Further studies will be required to ascertain the use of IPT among HIV/AIDS patients who are on ART.

Of the 2365 prescribed medicines, only 62.2% were in generic names (Table 2) while 96.9% of the prescribed medicines were from the Essential Medicine List (EML).[42, 43] Only 60.8% and 70.0% of the 780 prescriptions were in accordance with Standard Treatment Guidelines (STGs)[7, 44] with regards to dose and frequency of administration respectively. Furthermore, 93.3% of the 780 prescriptions had Fixed Dose Combination (FDC) ARVs (Table 2) while 51.0% (n = 398) had medicines that had potential drug interactions (DIs)[7,45].

**Table 2: Parameters for Prescribed Medicines for HIV/AIDS Patients**

| Variables | Yes Frequency (%) | No Frequency (%) | Nigeria National Drug Policy set Standard (%) |
|---|---|---|---|
| Medicines prescribed by generic names | 1472 (62.2) | 893 (37.8) | 100 |
| Medicines prescribed from Essential Medicine List | 2285 (96.6) | 80 (3.4) | 100 |
| Prescriptions in accordance with Standard Treatment Guidelines | | | |
| Dose | 474 (60.8) | 306 (39.2) | 80 |
| Frequency | 546 (70.0) | 234 (30.0) | 80 |
| Encounter with Fixed Dose Combination ARVs | 728 (93.3) | 52 (6.7) | - |
| Potential Drug Interactions | 398 (51.0) | 382 (49.0) | - |

Of the 780 prescriptions only 8.5% of the prescriptions had all the prescribed medicines in generic names (Table 3). However, over 90% of the 780 prescriptions had all the prescribed medicines per prescription from Essential Medicine List (EML)[41,42]. With regards to the dose of the prescribed medicines, only 6.3% of the prescriptions had 75.0% - 99.9% of medicines prescribed in accordance with STGs[7,44]. In addition, 11.8% of the prescriptions had 75.0% - 99.9% of medicines prescribed in accordance with STGs with regards to frequency of

administration of prescribed medicines. Out of the 780 prescriptions, 57.4% had 2 FDC ARVs while 35.9% had 3 FDC ARVs. The modal FDC ARV was 2. Moreover, 7.3% (n = 57) of the prescriptions had treatment regimen that had two potential DIs (Table 3).

**Table 3: Characteristics of Prescriptions and Prescribed Medicines (n = 780)**

| Variable | Frequency (%) |
|---|---|
| Proportion of prescribed medicines using generic names (%) | |
| < 50.00 | 111 (14.2) |
| 50.0 – 74.9 | 517 (66.3) |
| 75.0 – 99.9 | 86 (11.0) |
| 100 | 66 (8.5) |
| Proportion of prescribed medicines from Essential Medicine List (%) | |
| < 50.0 | 1 (0.1) |
| 50.0 – 74.9 | 24 (3.1) |
| 75.0 – 99.9 | 41(5.3) |
| 100 | 714 (91.5) |
| Proportion of Prescriptions in accordance with Standard Treatment Guidelines (STGs) (%) | |
| Dose | |
| < 50.0 | 116 (14.8) |
| 50.0 – 74.9 | 141 (18.1) |
| 75.0 – 99.9 | 49 (6.3) |
| 100 | 474 (60.8) |
| Frequency | |
| < 50.0 | 68 (6.7) |
| 50.0 – 74.9 | 74 (9.5) |
| 75.0 – 99.9 | 92 (11.8) |
| 100 | 546 (70.0) |
| Proportion of Prescriptions with Fixed Dose Combination (FDC) ARV | |
| Nil | 52 (6.7) |
| 2 FDC | 448 (57.4) |
| 3 FDC | 280 (35.9) |
| Potential Drug Interactions (DIs) | |
| Nil | 482 (49.0) |
| 1 DI | 341 (43.7) |
| 2 Dis | 57 (7.3) |

The proportion of medicines prescribed by generic names (PMG) obtained from this study is low (62.2%) while only 8.5% of the prescriptions had all the prescribed medicines in generic names. This is an indication of low level of generic prescribing. These findings are not in line with the Nigeria National Drug Policy (NNDP) strategy for implementing appropriate prescribing which requires prescribing in generic names[8]. The PMG obtained from this study is also lower than

the values obtained from earlier studies in Cambodia: 99.8%[39], Rajasthan: 69.8%[16]and China: 64.12%[23]. However, PMG in this study is higher than values obtained from earlier studies in Ilorin: 41.9%[14]; Nigeria: 49.3%[13]; Kuwait: 17.7%[17], West Nepal: 16.3%[20], Bahrain: 10.2%[15]and Dhaka: 0.008%[18]. The PMG is also higher than values obtained from studies in India: 48.5%[19], Bhopal: 48.4%[24] and West Bengal: 46.2%[22] West Nepal: 15%[21]. The prescription of non-generics could be due to brands of ARVs as either fixed dose combinations or non-fixed dose combinations. Also, location of the studies could have contributed to the observed differences.

The proportion of medicines prescribed from Essential Medicines List (PME) obtained from this study, despite high (96.6%), is not in accordance with the set standard (100%) of NDP[8]. One of the targets for implementation of National Drug Policy (NDP) is total adherence to the use of Essential Drug List (EDL) in public health institutions by 2008[8]. This is about 8 year after the expiration of the target year. Yet, total adherence to EDL by public health institutions has not been attained. Further studies will be required to ascertain the reasons for the deviation from the target. The PME from this study was higher than the values obtained from previous studies in Rajasthan: 69.7%[16], China: 67.7%[23], India: 66.9[19], and Bhopal: 66.8%[24]. The observed differences could be due to geopolitical differences. Despite the deviation from total adherence to the use of EML in public health institutions, 91.5% of the prescriptions had all prescribed medicines from EML[42,43].

Also, about three-fifth (60.8%) and three-quarter (70%) of the prescriptions that were in accordance with Standard Treatment Guidelines (STGs)[7,44] with regards to dose and frequency of administration of prescribed medicines respectively are not in harmony with the recommended standard of 100%[39] and the NNDP target of 80% adherence to Standard Treatment Guidelines[8]. The prescribed doses and frequency were either too low or too high. Non-adherence to STGs is a medicine therapy problem (MTP). Low doses of medicines or low frequencies of administration of medicines can result in sub-optimal medicine plasma level that cannot suppress the microbial replication or achieve a good therapeutic outcome and consequent development of microbial resistance (MR). Conversely, high doses of medicines or high frequencies of administration of medicines could result in excess medicine plasma level with consequent serious side effects, toxicities, inadequate patient adherence to medication and even death[26]. Thus, non-adherence to STGs has epidemiological, medical, social and economic implications. These include occurrence of drug induced diseases; early treatment failure and limited treatment options; development of cross microbial resistance; proliferations of resistant strains; premature obsolescence of highly efficacious and lifesaving ARVs; increased hospital admission, hospital stay, treatment costs, morbidity and mortality; and unwarranted patient suffering. Other implications include huge wastage of limited resources; increased transmissibility of the HIV and HIV related opportunistic infections with consequent increased disease burden; decreased quality of healthcare for and quality of life of these HIV/AIDS patients; and loss of public confidence in the healthcare system.

With reference to FDC, ARVs were readily available as FDC. This resulted in reduced pill burden. Patients who had prescriptions without FDC ARVs (6.7%) were exposed to high pill burden. This could result in

patients' inadequate adherence to medication use (medicine therapy problem) and the attendant epidemiological, medical, social and economic implications.

Moreover proportion of potential ARV drug interactions (DIs)[45] obtained in this study is high. This is another medicine therapy problem (MTP). DIs can result in suboptimal ARV drug plasma level that cannot control the HIV replication with consequent MR which could affect not only the particular ARV involved in the DI but result in the class resistance or cross resistance. DIs can also result in excess drug plasma levels with consequent serious side effects, related toxicities and even death[26]. The proportion of potential drug interactions (PPDIs) in this study is higher than the finding in earlier study in which 27% clinically significant DIs were recorded[26]. Knowledge of drug interactions may assist prescribers in reducing/eliminating the prescribing of medicines that have potential DIs. However, pharmaceutical care interventions by the dispensers could prevent potential DIs from becoming actual DIs.

In-depth interviews were conducted for ten prescribers (P1- P10) from seven public hospitals in Kwara State who provided healthcare for the HIV/AIDS patients had duration range of 17 - 55 minutes while the mean duration was 30.4 minutes (± 11.7). The interviewees comprised of 70 % males and 30% females. The age range was 30 - 51 years with a mean of 40.8 years (± 7) while most of the interviewees (90%) were of Yoruba ethnic group. The minimum tertiary education attained by most (90%) of the interviewees was Bachelor of Medicine, Bachelor of Surgery (MB; BS). Sixty percent of the interviewees had postgraduate qualification of which 30% were Fellows of West African College of Physicians (FWACP) or National Postgraduate Medical College of Nigeria (NPMCN) and 30% had Masters in Public Health (MPH) or Public Administration (MPA). The interviewees' post qualification work experience duration in the hospital ranged 6 – 30 years with a mean of 14.9 years (± 9.2), years of contact with HIV Treatment Center ranged 1- 14 years with a mean of 5.4 years (± 4.2). Only one interviewee had worked in more than one HIV Treatment Center.

The in-depth interviews of the prescribers showed that 50% of the respondents prescribed in both generic and brand names, 30% prescribed using generic names while 20% prescribed using brand names. According to some of the respondents,

"*I prescribe mostly using generic names. Most of our drugs are generic. Branded products are expensive and not as accessible as the generic. The nature of the HIV treatment service is such that it will continue to expand. The exit (through death) is low compared to the entry. Even if a patient is transferred there is still access to the medicines. Though generic medicines are cheaper, a lot of researches have been conducted and the implementing partners will not compromise bioavailability*" (P1);

"*My prescribing practice is using generic name because I do not know the brand available in the pharmacy*" (P2);

"*I love it to be generic but with my experience, branded is the best. I prescribe using branded names"* (P7);

"*My prescribing practice is using generic names most of the time because there are issues of fake drugs" (P8);*

*"I prescribe in generic to avoid out-of-stock syndrome since the drugs stocked in the pharmacy are from different pharmaceutical companies*" (P6); and

"*I prescribe in brand names. For instance I would write septrin® instead of cotrimoxazole or Augmentin® instead of co-amoxiclav*" (P3).

Factors that influence their prescribing practice include availability, affordability and quality of the drug, duration of therapy, the prescriber's post qualification work experience, prescriber's previous experience and confidence in the drug and the severity of illness. Other factors were the prescribers' training to prescribe in generic names, the peculiarities of the work place, patients' preference, issues of therapeutic equivalence, and poor ability to remember generic names. As stated by some of the respondents, the prescribing practice was influenced by

"*The national guidelines for the treatment of HIV/AIDS; the patient's ARV use status (either ARV naïve or not) and comorbidities. With regards to drugs for opportunistic infections, duration of therapy, severity of infection, availability and affordability of the drug and anecdotal experience influence my prescribing practice. For immune-compromised patients who are severely ill with life threatening complications, I prescribe branded products especially if the patients can afford it. I would rather prescribe Zithromax by Pfizer instead of the generic azithromycin*" (P1);

"*Diagnosis, availability and affordability of the drugs, safety (side effects) and potency affect my prescribing in generic or brand*" (P2);

"*Poor ability to remember the generic names makes me prescribe in brand names. Most generic names are not too easy to remember*" (P3);

"*If I write a particular brand which may not be available in the pharmacy, patient will not get the drug at the right time since there is no accredited community pharmacy in this environment. This could result in complication of patients' illness and increase in disease burden*" (P6);

"*I know the pharmacist will not compromise the issue of standard, when I prescribe in generic the pharmacist will give whatever is available in the pharmacy. However, I sometimes write in brand names depending on the patient's clinical condition and my experience with patient response to other brands. My prescribing practice is influenced by the patients' financial status. While I do not desire to compromise standard sometimes I do not have choice but to prescribe using generic names*" (P8); and

"W*hen generic names are used, I have observed that patients do not benefit therapeutically. I do self-audit by requesting the patients to bring the medicines they are using along with them on the next visit such that any therapeutic failure can be traced to either wrong diagnosis or substandard product. Some Pharmaceutical Companies have good products that cannot be faulted such as Hovid and Pfizer. The reasons for my prescribing in brand names include: prevalence of substandard drugs, when I write using brand names and I encourage the patient to buy that particular brand I am sure the patient will not accept any generic substitution which may be substandard; availability of the drugs, branded products are difficult to find in patent medicine stores, hence the patient will be forced to go to the Pharmacy*" (P7).

Prescribing practice of prescribers were generally influenced by factors that were grouped into institution-related factors such as availability of standard treatment guideline (STGs), drug supply with regards to generic/brand and quality and availability of the product; patient-related factors such as severity of illness and associated

complications and the affordability of the drug; and prescriber-related factors such as prescriber's past experience with medicines that produced desired therapeutic response; prescriber's post qualification work experience and pharmaceutical companies' influence on the prescribers.

As opined by some of the respondents, prescribing practice of prescribers were influenced by "*institution-related factors such as drug supply and availability of drugs. Recently there is problem of out-of-stock of Efavirenz (EFV) and lamivudine (3TC). The prescriber-related factors include: medications that give best results such as Zithromax® (azithromycin); severity of illness, for example Diflucan® (fluconazole) helps in rapid resolution of overwhelming pharyngeal candidiasis and pharmaceutical company's inducement*" (P1);

"*Training of prescribers, since prescribers are trained to prescribe in generic names"* (P2);

*"The severity of the illness and therapeutic outcome experience of a given product also influence prescribing in generic or brand names. For very severe illness, prescribers write the brand they are sure of*" (P3);

"*Prescribers' experience with regards to treatment outcome, patients' preference for a particular brand, cost of drug and patients' financial status, prevalence of the disease, and availability of the drug in the hospital pharmacy or community pharmacy influence prescribing in generic or brand names*" (P6);

"*Training (standard prescribing practice is using generic names), and availability of standard treatment guidelines (STGs)" availability or non-availability of laboratory supportive facilities that aid diagnosis and prescribing influence prescribing in generic or brand names. For example, ready availability of PCV (packed cell volume) will aid my diagnosis and prescribing instead of relying on my clinical judgment. Another factor is volume of patient (patient work load). If this is high, there is no luxury to take risk by using generic names. I would rather write Rocephin® instead of ceftriaxone for severe infection and Lonart® instead artemether+lumefantin for malaria. Also pharmaceutical company's inducement on prescribers can influence prescribing practice*" (P7).

According to the respondents, prescribers will be more motivated to prescribe in generic if "*prescribers receive adequate information about the drug including documented studies and clinical trials both foreign and local since there are genetic and geographical differences in drug response*" (P1);

"*Prescribers have increased knowledge of generic names" (P3);*

*"There are education and monitoring for implementation of the guiding principle of essential medicines (prescribing using generic names)*" (P5);

"*Products are of good quality, affordable and are available" (P6);*

*"Products are of good quality with good therapeutic outcome, affordable and are available either in the hospital pharmacy or community pharmacy in the hospital's vicinity*" (P7); and

"*Prescribers are guided by STGs and remember that the STGs make for uniformity of practice*" (P8).

Other motivating factors were similar bioequivalence between branded product and other generic products; and prescribers' receipt of feedbacks from patient confirming

good quality and good therapeutic outcome of the generic products.

PMG obtained from the quantitative data is supported by the findings from qualitative data of this study in which 50% of the respondents used both generic and brand names in prescribing. Thirty percent of the prescribers used generic names while 20% used brand names only. According to the qualitative findings, the prescribing practice of the prescribers (use of generic or brand names) were influenced by factors such as severity of illness, the prescriber's previous experience and confidence in a particular product, availability, affordability and quality of the product, the prescriber's post qualification work experience, ability to remember generic names, training of the prescribers and patient's preference. Also, prescribing practice of prescribers with regards to use of brand names was influenced by pharmaceutical companies' inducement. This finding is in support of the finding of an earlier study where over two-third of the doctors agreed that medicine promotion materials served as incentives to prescribe the promoted medicines in preference to the alternative[46]. These studies suggest that generic prescribing in still an unpopular practice in different countries despite generic medicines are cheaper and generic prescribing can reduce the cost of providing medication without reducing the quality of care. Institutionalized mechanisms should be put in place to implement generic prescribing as a strategy to implement NDP.

With reference to availability and utilization of STGs and EML, all the prescribers and 90% of them had STGs and EDL respectively which they said guided their prescribing. Despite this, the findings of the quantitative data are not harmony with the NNDP set standards.

Regarding prescribing of fixed dose combination, all the prescribers felt that the patient pill burden had improved due to fixed dose combination (FDC) with subsequent improvement on medication adherence and reduction in stigmatization. As stated by some of the respondents, "*Pill burden has been reduced drastically due to fixed dose combination (FDC) with subsequent improvement on patient adherence to medication and reduction on stigmatization. Previously when patient come to the clinic it is like they have gone to super market. For instance a patient on zidovudine (ZVD), lamivudine (3TC) and nevirapine (NVP) would have 60 tablets each in separate packs resulting in 180 tablets in 3 packs. If the patient has 3 months hospital appointment, the total packs of medicines would be 9. This is quite bulky resulting in stigmatization. Moreover the patient has to take 1 tablets of each medicine (3 tablets) 12 hourly, resulting in 6 tablets daily. However, with the FDC of ZVD+3TC+NVP, the patient would take 1 tablet 12 hourly (2 tablets) daily*" (P1);

"*The pill burden has now improved due to the availability of fixed dose combination (FDC) such as tenofovir+emtricitabine (TDF+FTC); tenofovir+lamivudine (TDF+3TC) and zidovudine+lamivudine+nevirapine (ZVD+3TC+NVP). The patients are happy with the FDC*" (P7). However, "*the pill burden is still high due co-morbidities associated with HIV/AIDS. There is still psychological issue of life long use*

The prescribers' knowledge of the advantage of fixed dose combination of ARVs is in harmony with their prescribing practice. This would result in patient adherence to medication with subsequent improvement in patient quality of life.

With reference to drug interactions, all respondents agreed that drug interaction could occur in HIV/AIDS patients. However, potential for drug interactions was higher for HIV/AIDS patients with co-morbidities since patients received different medications for the different morbidities. According to a respondent, "*drug interactions (DIs) are likely to occur in HIV patients that have comorbidities due to resultant poly therapy. For example, there is interaction between rifampicin (anti-tuberculosis drug) and nevirapine (antiretroviral). Hence, there is need for a lot of therapeutic maneuvering to prevent DIs*" (P5).

ARVs-herbal product interaction was also a challenge. As stated by a respondent, "*there was a case of ARVs-moringa interaction. The patient experienced Stephen Johnson Syndrome (SJS) in which the skin sloughed off as if the patient had burns all over the body. The patient was hospitalized for months*" (P1).

Twenty percent of the respondents felt the drug interactions (DIs) were not recognized by prescribers. According to these interviewees, "*there is high potential for DIs in poly therapy. Most doctors do not pay attention. The way out is that Doctors should be well educated on the pharmacology of ARVs. Pharmacists should point out to the Doctors when there is potential drug interaction and patients should be alert to 'strange feelings' while using their medications and report to the health care providers immediately*" (P4); and

"*Drug interactions (DIs) may not be recognized. But there are concerns about drug interactions in patients using antiretroviral drugs and moringa products*" (P3).

"*Patients are counselled to show their ARVs to the Doctors in case of another hospital visit for another morbid condition. They are also counselled to avoid self-medication*" (P7).

Despite the knowledge of the prescribers about potential drug interactions, more than half (51.0%) had potential drug interactions. This could be due to the poly therapy associated with HIV/AIDS co-morbidities and prescribers not paying keen attention as stated by one of the prescribers. This calls for educational intervention for prescribers providing healthcare for HIV/AIDS patients.

## CONCLUSIONS

The pattern of prescription of medicines in the management of HIV/AIDS patients in public hospitals in Kwara State, Nigeria, did not meet up with the set standards of Nigeria National Drug Policy (NNDP) with regards to generic prescribing, prescribing from Essential Medicine List/Essential Drug List (EML/EDL) and prescriptions in accordance with Standard Treatment Guidelines (STGs). This calls for periodic training and retraining of prescribers in adherence to the set human resources development strategy for implementation of the Nigeria National Drug Policy (NNDP). However, the prescription of ARVs (HAART) was in adherence to the Nigeria National Guidelines for HIV and AIDS treatment and care in adolescents and adults.

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