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RESEARCH PAPER

DRUG PRESCRIBING PATTERN IN THREE LEVELS OF HEALTH CARE FACILITIES IN THE NORTH AND CENTRAL SENATORIAL DISTRICTS OF EDO STATE, NIGERIA

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ABSTRACT

This retrospective cross- sectional survey critically assessed the drug prescribing pattern of doctors at the three levels of health care facilities (HFs) in the North and Central senatorial districts of Edo State, Nigeria, and compares the findings with a similar study done ten years ago in the same area. With a combination of random and systematic sampling techniques, 2,500 general outpatient prescriptions in the year 2007 were examined using standards described in the WHO Prescribing Indicators Manual. Thirty percent (30%) of hospitals was selected for the study. The data obtained were analyzed using the SPSS software (version 16). Tests of statistical significance were done using chi square contingency cross-tabulation and goodness of fit. Results showed that there is significant statistical differences in the number of drugs prescribed per patient encounter, percentage of encounter with an injection prescribed, in adherence to WHO prescribing guidelines; prescribing according to drug classes and generic names $P<0.05$. Poly-pharmacy and irrational prescribing appears to be the rule in GH and PH especially with continued prescribing of banned drugs and use of the injection route. The prescribing pattern in the three categories of hospitals fell short of WHO standards, especially in the GH and PH.

Key words: **Drug use, prescribing pattern, Health facilities, prescribing indicators**

INTRODUCTION

Rational prescribing and appropriate drug use are the keys to achieving optimum therapeutic goal. This is because inappropriate prescribing can lead to therapeutic failure, toxicity, drug interactions and even death of the patient (for which the physician and the dispensing pharmacist can be held responsible for professional misconduct), which then provides basis for a claim for compensation (Brahams, 1989). Poly-pharmacy is a recipe for adverse drug interactions (Irshaid *et al*, 2005)**;** increase risk of bacterial resistance (Yousif *et al*., 2006; WHO, 2000); non

compliance (Pearson,1982) and increased burden/ cost to both patient and the health care delivery system (George-Kutty *et al*., 2002).

Inappropriate prescribing is known all over the world to be a major problem to health care delivery; and tactless prescribing is widespread (Rashid *et al*., 1986). It is a feature in health care settings in developing countries and is characterized by poly-pharmacy, excessive use of antibiotics, and injections (Laing, 1990; Isah *et al*., 2001, Ohaju-Obodo *et al.,* 1998; Akande and Ologe, 2007)**.**

Inappropriate prescribing will have an important economic and medical impact on health care as it makes treatment of patients more costly, more risky and less rewarding. Increased generic prescribing would rationalize drug use and reduce cost of treatment to the patient and lessen the burden on the health care delivery system (Quick *et al*., 2002; Hogerzveil, 1995).

Rational drug prescribing has remained a global concern such that countries have established health regulations to guard against irrational, inappropriate or negligent prescribing, which is regardless of the considerable improvements that has been made in the availability and control of drugs in hospitals over time (Laing, 1990; Hogervzeil, 1995).

Outpatient's clinics deliver therapeutic services to a large segment of patients. General Outpatients Departments (in the Teaching and General hospitals), and the outpatient clinics in the private health institutions are the ones that see and treat the patients first. It is only cases that require further medical evaluation that are referred to the specialists. Private health institutions have substantial clientele who patronize them for various reasons; some of which include absence of long queues, convenience of opening/ consulting hours, better attitude of staff, greater confidence in a particular doctor, and increase in likelihood of privacy (Foster, 1995). Consequently large quantities of drugs are prescribed during the clinic encounters. Assessment of prescribing pattern in these important medical facilities is of great relevance to identifying problems regarding rational drug use, so as to propose interventional measures in cases of significant irrational prescribing.

Appropriate drug utilization studies are important tools used to evaluate whether drugs are properly utilized in terms of efficacy, safety, convenience, and economic aspects at all levels in the chain of drug use (Dukes, 1993). The importance of rational drug use in clinical practice is underscored by the introduction in 1975 by World Health Organization (WHO, 1977, 1991) of the "Essential Drugs List (EDL) Concept", which was followed up with the drawing up of an EDL in 1977 and setting up of implementation program in 1981(WHO, 1987). These initial critical steps have resulted in the improved supply of essential drugs to health care facilities in developing countries (Hogervzeil *et al*., 1993; WHO/DAP/INRUD/93.1, 1993). With these programs in place, the need to improve rational use of the drugs became imperative and this was highlighted at the WHO sponsored multidisciplinary meeting of experts held in Nairobi in 1985 (WHO, 1987). To this end, a set of objective measures for the evaluation of prescribing practices (Drug Use Indicators: Prescribing Indicators, Patient Care Indicators, and Facility Indicators) were introduced through collaborative work of the Drug Action Program of the World Health Organization (DAP-WHO) and the International Network on the Rational Use of Drugs {(INRUD)(WHO, 1991; 1993) Isah *et al*.,/ICIUM, 1997}.

Federal Ministry of Health (FMOH), Nigeria in collaboration with WHO, launched the maiden edition of National Drug Policy (NDP) in 1990 and published the revised edition in 2005; with the goals of making available at all times to the Nigerian populace adequate supplies of drugs that are effective, affordable, safe, and of good quality; to ensure the rational use of such drugs and to stimulate increase local production of essential drugs at all levels on the basis of health needs (NDP, 2005). WHO Drug Use Indicators are standard measures that have been tested in many settings and found useful in controlling inappropriate prescribing (Hogervzeil *et al*., 1993). They have to a reasonable extent unified and clarified the concept of rational drug use which had until then appeared abstract, making previous research works on rational drug prescribing to be restricted to using methods, expressions and variables that were peculiar to their settings and that did not allow for direct comparison with other settings (Oviawe *et al*., 1989). Availability of EDL at the health care facilities (HFs) and the WHO drug prescribing indices have therefore unified and made more practicable the concept of rational drug use, and enabled comparisons of drug use practices within and between health facilities, regions and countries. They provide useful tools for supervision and monitoring of drug use practices as well as allowing for evaluations of the impacts or changes that interventional efforts might have made over time (Isah *et al.,* 2001).

In the field tests of the WHO Drug Use Indicators, there were significant degrees of irrational prescribing in some HFs in Asia and Africa (Hogervzeil *et al*., 1993), Cambodia (Chareonkul *et al.*, 2002), Pakistan (Najmi *et al*., 1998), Zimbabwe (Trap *et al*., 2002), India (Srishykla *et al*., 1995), and in the United States of America **(** Hong and Shepherd, 1996), all of which showed an average range of 2.2-4.8 drugs prescribed per encounter (DPPE). These figures are higher than WHO recommended limit of 2.0 per encounter (WHO/DAP/93.1, Isah *et al*., 1997). Studies that evaluated the prescribing patterns of drugs at health facilities in Nigeria showed various degrees of over prescribing (Ohaju-Obodo *et al*., 1998; Erah *et al*., 2003), inappropriate drug use (Isah *et al.*, 2001; Chukwuani *et al.*, 2002); deficiencies and poor adherence to National and WHO guidelines (Meremikwu *et al*., 2007), low percentage prescription of drugs by their generic names with resultant high cost to patients (Enwere *et al*., 2007), over usage of injections (Ohaju-Obodo *et al*., 2004), and irrational use of antibiotics (Odusanya, 1999; 2002; Odusanya *et al*., 2000).

Generic prescription is more convenient, makes prescribing and dispensing easier, obviates danger of prescribing the same drug twice at the same time and avoids confusion from existing names (both non-proprietary and proprietary); and enhances the desirability of indicating relationships between similar substances. It is also economical because non proprietary (generic) drugs tend to be cheaper than those sold under proprietary (trade) names and makes stocking of drugs more convenient(Collier, 1988). Prescribing from an Essential Drug List (EDL) takes care of this as drugs there are listed in their generic names only.

This study based on 2007 prescribing data was intended to compare prescribing pattern at three levels of health care facilities and that of previous works, to find out the impacts interventionist efforts have made.

MATERIALS AND METHODS

Study Area: The study was carried out in the North and Central Senatorial Districts of Edo, Nigeria; which lie in the rain forest belt between latitudes 6^{o} 29^{1} N - 7^{o} 35^{1}S and 5^{o} 37^{1} E – 6^{o} 41^{1} E. The health care facilities (HFs) studied included one Teaching hospital [Irrua Specialist Teaching Hospital (ISTH)], 7 General hospitals (GHs) and 22 Private hospitals (PHs); selected retrospectively in a cross sectional survey using a combination of stratified random and systematic sampling. The operations of this HFs are regulated by the government.

ISTH serves the Ambrose Alli University (AAU) College of Medicine in undergraduate training of doctors and runs specialist program in Family medicine/General practice and other disciplines. It has a busy General Out patient clinic. ISTH is the only tertiary health facility (HF) in the study area and serves as a referral centre for all the other HFs. For this study it was selected on its own merit.

The GHs are run by the Edo state government, via a zonal structure. The thirty three (33) GHs in the state are divided into medical zones (MZs). The eleven (11) local government areas (LGAs) in the study area have seven (7) MZs and twenty one (21) GHs. Each MZ covers one or two LGAs, and in each LGA there is at least one GH (MOH, May 2006). The GHs also have vibrant General Outpatient clinics, especially in ones where there is a doctor.

The PHs are run by various categories of doctors registered with both the Edo State Ministry of Health and the Nigerian Medical and Dental Council (NMDC). There are seventy-five (75) registered PHs in the study area (MOH, 2007), out of which twenty two (22) were selected for the study.

Exclusion Criteria: Case notes of patients less than fifteen years (15) years of age, did not have drug prescription or were referred without prescriptions, Ante-natal cases, well baby clinic attendances, and purely surgical cases, were excluded. Excluded also are HFs: where there was no doctor, no longer functioning at the time, and PHs where the Medical Director also worked in either the General hospital or ISTH, to avoid duplication.

Ethical Consideration: Formal consent, permission and ethical approval were obtained from the Ethical Committees and Management of ISTH, Irrua and Edo State Ministry of Health. The nature, scope and implications of the study were explained to the Directors of the twenty-two (22) selected PHs and the Zonal Medical Directors (ZMDs) of the GHs. They not only gave consent and allowed the research team access to their medical records, but also directed the Senior Medical Records Officer (SMRO) to assist with the data collection. The confidentiality of the Patients records and the clinician's/patient's identity was adequately protected, as neither the Hospital number, name of the patient, nor that of the Doctor was included. The selected case notes were coded (for cross reference purposes).

Data Collection: Using a detailed, modified WHO indicators encounter form, prescriptions as documented in the 2,500 medical case notes of Out-patients from 1st January – 31st December, 2007, made up of:{(Seven hundred (700) from ISTH; seven hundred (700- one hundred (100 each) from 7 GH; one thousand one hundred 1,100 (fifty 50 each) from 22PHs},selected by systematic random sampling, were obtained. Information extracted included age, sex, number of drugs prescribed per patient encounter (DPPE), names of the drugs, dose, route, and frequency of administration and duration of therapy as prescribed; and used to calculate percentage of drugs prescribed by generic name, percentage prescribed by brand name, and percentage of encounters which had: an injection prescribed, analgesic, antimalarial, antibacterial, antifungal, etc and determine how the prescriptions conform to WHO prescribing Indicators or guidelines.

Statistical Analysis: The data obtained were entered into Microsoft excel spread sheet (Microsoft corporation, USA), double checked and then transferred into the SPSS statistical software (version 16.0). This was used to analyze age, sex distribution of the patients and WHO Core Prescribing Indicators (descriptive statistics) as shown below and the results presented in tables and figures. Calculations are itemized below:

1. Average numbers of drugs prescribed per encounter (C) = Total number of drugs prescribed (B) divided by the number of encounters (A).

2. Percentage drugs prescribed by generic name (E) = Total number of drugs prescribed by generic name (D) divided by the total number of drugs prescribed, multiplied by 100.

3. Percentage of encounters with an antibiotics prescribed (G) = Total number of encounters with one or more antibiotics prescribed (F) divided by the total number of encounters A, multiplied by 100.

4. Percentage of encounters with an injection prescribed (I) = Total number of encounters with one or more injections prescribed (H) divided by the total number of encounters (A), multiplied by 100.

5. Percentage of drugs prescribed from Essential Drug List (EDL) or Formulary (K) = Total number of drugs prescribed contained in the EDL (J) divided by total number of drugs prescribed (B), multiplied by 100.

6. Availability of a copy of EDL or formulary in the health institution was ranked YES or NO.

Further analysis of the data provided additional indices such as prescriptions by therapeutic categories- antibiotic prescription, analgesic prescription pattern, antimalarial etc. Cross-tabulation of data and test for statistically significant differences between parameters and the HFs was done using Chi square test of significant associations. Comparisons with significant differences were further confirmed using Chi square goodness of fit, to decipher the points of statistical differences between the HFs. At a confidence interval of 95%, two-tailed p-value less or equal to 0.05 was considered significant in all cases. The values are also expressed in percentages (except for the average number of drugs prescribed per encounter (DPPE).

RESULTS

A total of Two thousand five hundred (2500) prescriptions were evaluable. The values for WHO core indicators are shown in table 1 and Figure 1. Drug prescribing in the three categories of HFs showed a highly statistically significant difference ($p<0.001$). The total numbers of drugs prescribed in the HFs were: ISTH (2092); GH (3585); PH (5841), giving respectively an average number of drugs prescribed per encounter (DPPE) of ISTH 3.0, GH 5.1 and PH 5.3. The DPPE varied from 1 to more than 6 drugs, with tendency to poly-pharmacy in the General (GH) and Private (PH) hospitals, where no prescription contained only one drug and most prescriptions contained more than five drugs per patient encounter.

The highest number of prescriptions in ISTH contained 3-4 (30.10%-31.36%) drugs, while the lowest prescription 93(4.45%) contained only one drug. A paltry 14(0.67%) of the prescriptions here (ISTH) contained more than six drugs prescribed per encounter. The number of encounters with an antibiotic prescribed: ISTH30.7%, GH, 69.7%, PH55.7%, showed statistically significant difference between ISTH and the other two HFs (**b, a, a**). In the number of encounters with an injection prescribed ISTH0.1%, GH33.6%, PH 64.2%; the significant difference was in the three categories of HFs (**c, a, b**). Prescription by generic name was practiced more in ISTH 59.8% and PH60.1% than the GH49.4%, but showed no statistically significant difference in the HFs.

Availability of copy EDL and percentage of drugs prescribed from the EDL showed the same significance pattern (**a, a, b** in). All the doctors in the HFs sampled admitted awareness of the EDL, but only 82% of PH had a copy. 80% of drugs was prescribed from the EDL in ISTH and GH, while in the PH, it was 70%.

Table 1: WHO Indicators-average number of drugs PPE*, Generic name, Antibiotics, Injection, prescription from EDL*, Availability of EDL in the HF*

WHO Indicators	ISTH	GH	PH
Average No of drugs PPE	3.0 [a]	5.1 [b]	5.3[b]
%drugs prescribed by Generic name	59.8 [b]	49.4[a]	60.1 [b]
%drugs prescribed as antibiotics	215(30.7%)[b]	488(69.7%) [a]	613(55.7%) [a]
%drugs prescribed as injections PPE	1(0.1%)[c]	236(33.6%) [b]	706(64.2%) [a]
%drugs prescribed from EDL	1674(80%)[a]	2868(80%) [a]	4085(70%) [b]
Availability of EDL in HF	YES (1;100%) [a]	YES (7;100%) [a]	YES (18;82%) [b]
Awareness of EDL	YES (1; 100%)	YES (7; 100%)	YES (22; 100%)

*PPE- prescribed per encounter; EDL –Essential drug list; HF- Health facility; **a, b, c** in superscripts indicates points of statistically significant differences in the HFs

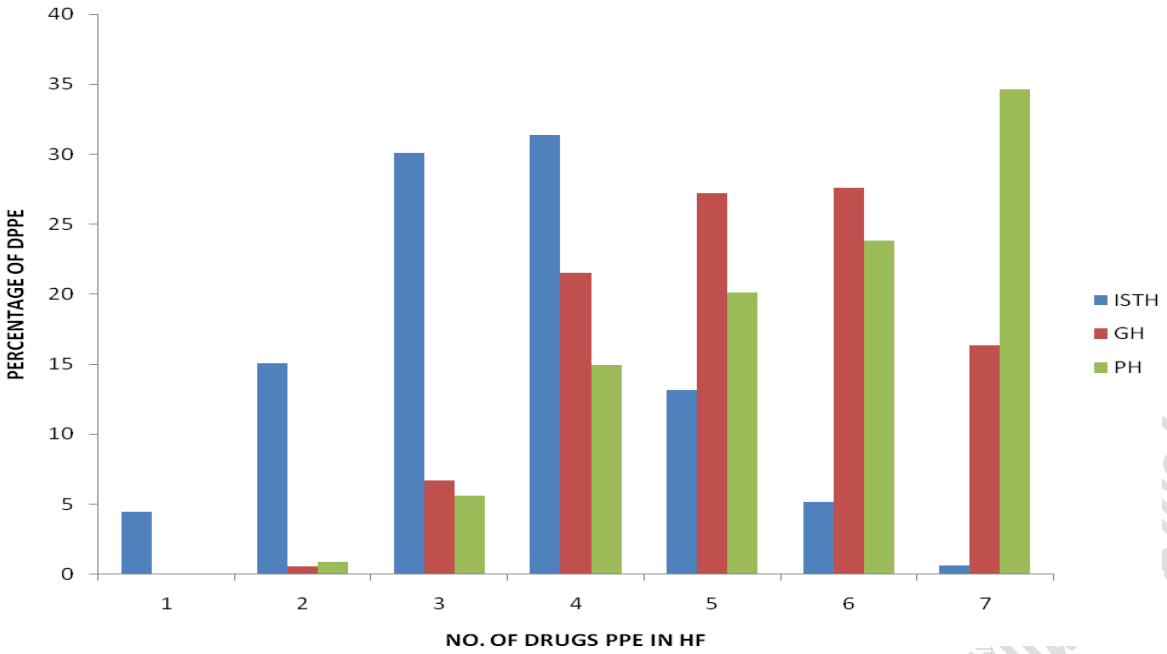

Figure 1: Bar chart showing % Drugs PPE. ISTH prescribed fewer drugs PPE, the highest DPPE being 4 drugs; in GH the highest DPPE was 5 and 6 while for PH ≥7 drugs were prescribed PPE.

Even though the number of prescriptions that contained one or more antibiotics was ISTH30.7%, GH69.7%, PH55.7% (Table 2), a closer evaluation of total prescriptions showed that Antibacterial drugs, Analgesics/antipyretics and multivitamins ranked highest in total number of drugs prescribed in the three categories of HFs; followed closely by anti-malarial drugs. Analgesics/antipyretics ranked highest in PH and GH, taking at least 17% (ISTH 17.8%; GH23.6%; PH24.6%) of total prescriptions, and closely followed by antibiotics, with at least 13.6% (ISTH 13%, GH 21.1%, PH18.5%). The general order of ranking of prescription by therapeutic

categories was Analgesics, Antibiotics, Antimalarials and Multivitamins (table 2). However, more analgesics were prescribed in PH (24.6%) and GH (23.6%) than ISTH (17.8%).

In contrast, Anti-malarial drug prescription pattern showed that more anti- malarial drugs were prescribed in the teaching ISTH (14.6%) than GH (13.0%) and PH (11.1%). Antifungal drugs, Anti-tussives/ cough expectorants and Anti-helminthic drugs were the least prescribed drugs in the three categories of HFs, showing no significant difference among the hospitals (P>0.05). There is no statistically significant difference in prescription according to drug classes among the HFs.

Table 2: Percentage of drugs Prescribed by therapeutic categories (Drug classes)

Therapeutic Group	ISTH		G H		P H		**Cum freq	
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Analgaesic/Antipyretics	373	17.8	845	23.6	1435	24.6	2653	66
Antibiotics	285	13.0	758	21.1	1081	18.5	2124	52.6
Antimalarials	305	14.6	467	13.0	645	11.1	1722	38.7
Multivitamins	220	10.5	428	11.9	890	15.2	1538	37.6
Antihypertensives	275	13.2	294	8.2	313	5.4	882	26.8
Antipeptic ulcer	200	9.6	120	3.4	280	4.8	600	17.8
Haematinics	60	2.9	213	5.9	316	5.2	589	14
Antihistamines	66	3.2	116	3.2	266	4.6	448	11
Anxiolytics/etc[@1]	92	4.4	124	3.5	171	2.9	387	10.8
Minerals etc[@2]	80	3.8	45	1.3	109	1.9	234	7.0
Antihelmintics	60	2.9	17	0.5	56	1.0	133	4.4
Antifungal	16	0.8	17	0.5	50	0.9	83	2.2
*Others	60	2.9	141	3.9	228	3.9	429	10.7
Total	2092	100	3585	100	5841	100	11,581	100

*Anticovulsants, Laxatives, Antidiarrhoeal, Antiviral, Antidiabetics, Anti-asthmatics, Steroids
@[1] Antidepressants; @[2] Cough expectorant/ Antitussives; **Cumulative frequency

Evaluation of percentage of an encounter with an injection prescribed in the three categories of HFs was 0.1%ISTH, 33.6%GH, 64.2%PH, showing highly significant differences (figure 2; P<0.001). In totality, drugs prescribed showed that preference for the oral route of drug administration was clearly demonstrated as more than 75% of drugs were administered via this route in the three categories of HFs. However, this trend showed a progressive decline from ISTH to GH to PH: (ISTH 99.4%, GH 88.34%, PH 76.87%) respectively. More drugs were administered via the parenteral routes in PH and GH than ISTH (Figure 2): Intramuscular (IM): ISTH 0.05%, GH 10.82%, PH 19.57%; Intravenous (IV) ISTH 0%, GH 0.53%, PH 2.91% respectively. Topical route of administration was higher in ISTH (0.67%) than the GH (0.2%) and PH (0.21%). There was no significant difference in preference for subcutaneous route of administration between the GH and PH. It is pertinent to note particularly that no drug was administered via the IV and subcutaneous (SC) routes in ISTH (Figure 2).

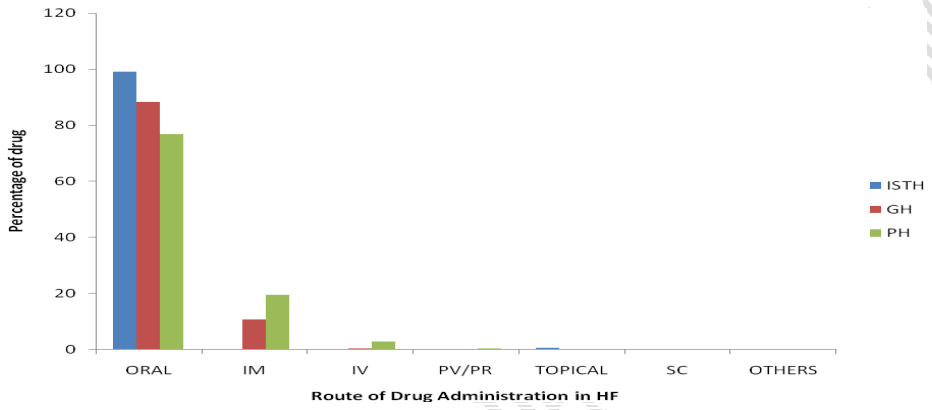

Figure 2: Bar Chart percentages (%) showing routes through which drug was administered.

Though more injections were prescribed PPE in PH64.2%, than GH33.6% and ISTH0.1%, a breakdown of all prescriptions and the routes clearly demonstrates that the Oral route showed a steady decline from ISTH to PH; while IM and IV route showed the reverse.

DISCUSSION:

This study highlights the prescribing practices in the three categories/levels of health care facilities (HFs) in the North and Central Senatorial Districts of Edo state, Nigeria, {(Tertiary (ISTH), General (GH) and Private (PH) hospitals)}. It underpins the usefulness of WHO drug use indicators in evaluating drug use practices, which provides an opportunity to critically appraise adherence of doctors in these health facilities to WHO prescribing guidelines. This is because drug prescription is not only a critical determinant of therapeutic out-come; it is also important in drug and finances management for both the patient, the hospital and the government. Average number of drugs or injections prescribed per encounter is therefore an important index for intervention in prescribing practices (WHO/DAP, 1993); since rational drug use refers to the prescription of the right drug for the right indication, the right dose, route and dosing frequency and for the correct duration (WHO, 1985).

The highly significant association in the number of drugs prescribed per patient encounter (DPPE) in the three categories of HFs {ISTH 3.0, GH 5.1 and PH 5.3. (Table 1; Figure 1), ($p<0.001$)} and increasing tendency towards poly pharmacy from tertiary (ISTH) to secondary (GH), to primary (PH) health facilities (ISTH>GH>PH) indicates more rational prescribing in ISTH. This could result from the fact that as at the time this study was carried out, ISTH doctors (being in a teaching hospital) were constantly exposed to regular seminars, continuous medical education (CME) and refresher/ update courses in therapeutics- an arrangement that is a rarity in GH and virtually nonexistent in PHs. The finding in this study is similar to Enwere *et al*., (2007) at University College Hospital (UCH), Ibadan (3.2±1.47), Erah *et al*., 2003 (3.4) both in Nigeria; and similar studies conducted in some developing countries such as Cambodia (Chareonkul *et al*., 2002); Morocco (Simon *et al.*, 1998), Pakistan (Najmi *et al*., 1998); but lower than that of Ohaju-Obodo *et al*., (1998) in the same setting 10 years earlier where he recorded an average range of 3.1-5.5 drug prescriptions per encounter with a mean of 4.4±0.7; Akande and Ologe in Ilorin (2007) 3.99±1.55; and Kanakambal *et al*., (2001) 3.75.

The lowest mean figure 3.0 ISTH is higher than the WHO recommended limits of 2.0 drugs per encounter (Isah *et al*., 1997; Quick *et al*., 2002); 1.99 (Lamichhane *et al*., 2006) in a teaching hospital in western Nepal, India; 1.88-2.22 in Ethiopia (Desta *et al*., 2002). In GH and PH, the least no of drugs prescribed per patient encounter was 0.61% and 0.89% respectively (where only two drugs were prescribed). No prescription in this group of hospitals contained only one drug, unlike in ISTH. Poly-pharmacy appears to be the rule rather than the exception in the GH and PHs as over 50% of prescriptions contained six (6) drugs and above per patient encounter. This is a contrast to the finding of George- Kutty *et al.,* 2002 in rural and semi urban hospitals in Madurai, India; a setting similar to the study location, where no prescription contained more than six drugs! This glaring poly-pharmacy may be because of uncertainty of diagnoses in the PH and GHs as a result of paucity of functional diagnostic equipment, making the doctors to resort to empirical treatment and hence prescribe many drugs in an effort to cover different pathological processes at a time in a single prescription (blanket therapy) as reported by Isah *et al.,* 2001; and Odusanya, 2002. This is not without its problems of increase tendency of drug interaction, antimicrobial resistance; and above all, the patient may not comply with dosage instructions because of its cumbersomeness (Magee *et al*., 1999).

Increasing generic prescribing would rationalize drug use and reduce the cost of drugs. Although there is no statistically significant association between generic/brand name prescription in the hospitals, prescription by generic name was practiced more in ISTH (59.8%) and PH (60.1%) than the GH (49.4%) hospitals. The figures is far lower than the 96.5% reported by Kanakambal *et al*., 2001; Karande *et al.,* 2005 (73.4%) in India; 94% in Zimbabwe (MOH/EDL, 1991), but slightly higher than that of Ohaju-Obodo *et al*., 1998 (58.9%), Erah *et al*., (2003) and Enwere, 2007(49.5%) UCH, Ibadan. This is an indication that the clarion call and preference for generic prescription is being adhered to in ISTH and PH. This observation could also be spurious and hence misleading as it could also result from the fact that multivitamins and haematinics were generally prescribed in their generic names, especially in the PH, where Vitamins constituted 15.2% of drugs prescribed. In GH the trend was reversed as there were slightly more brand (50.60%) than generic name (49.40%) prescriptions and may be the result of excessive influence of aggressive marketing by drug companies in the HF that are run by the state government, who invariably they get their drugs from the same source (central drug store) whose primary source of drugs could be contractors with powerful political influence on the Government. Aggressive and unethical marketing is known to negatively influence rational drug use (Lexchin, 1989; Zeigler *et al.,* 1995).

The use of injection route in PH (64.2%) is similar to the finding of Ohaju- Obodo *et al*., (1998; 2004;) who reported a range of 57.4%-62.4% use of injections among Private hospitals in the same setting about 10 years earlier. This is because PHs prescibe dipyrone and chloroquine, and use injections such as vitamin B complex for placebo effects, probably to justify hospital bills as injections are known cost more. This is worrisome in this era of HIV/AIDS pandemic and high incidence of diseases that can be transmitted via injections such as hepatitis B and C, as well as injection abscess and nerve injuries and paralytic poliomyelitis (Isah *et al*., 2001; Hutin *et al*., 2003). Inappropriately high injection prescribing ranging from 17.1% to 80% has been reported in previous works in Morrocco, (Simon *et al*., 1998); Pakistan Najmi *et al*., 1998; and Zimbabwe (Trap *et al*., 2002). Surely, more work needs to be done to sensitize doctors in this area. The value obtained for the injections route in ISTH 1(0.1%) appeared extremely low. This may be due to many factors namely: withdrawal of dipyrone which had been enforced in ISTH; introduction of the artemisinin derivatives in the treatment of malaria influencing the frequency of administration of chloroquine which is mainly prescribed as injections; the high cost of parenteral artemether which discouraged its routine prescription; HIV/AIDS pandemic is also a factor that has discouraged the prescription of drugs by the injection route; severe cases of acute malaria that would have required injections were treated in the accident and emergency unit of the hospital, which was not included in this study. It is of interest collaborating this finding with the fact that in GH and PH, the frequency of chloroquine prescription (often co-administered with dipyrone as injection) was 10.7 % and 28.5% respectively, much higher than the 0.7% in ISTH, and might have contributed to the very low prescription of injections in ISTH, ditto for prescription of aminoglycosides which showed a similar trend.

Topical route of administration was higher in ISTH (0.67%) than the GH (0.2%). and PH (0.21%). There was no significant difference in preference for subcutaneous (SC) route of administration between the GH and PH. No drug was administered via the subcutaneous route in ISTH and this may be due to the highly specialized nature of the tertiary hospital, whereby administration of drugs that would require that route is left for the specialists {this study was carried out in the general outpatient (general practice) setting}. Perhaps, for this same reason no drug was administered via any other route in any of the three levels of HF.

There was statistically significant association in the three categories of HFs on the number of encounters with antibiotic prescribed with the GH leading the pack {GH (69.7%), followed by PH (55.7%) ISTH30.7%}; which is still apparent when viewed against the background of total prescription of drugs by therapeutic categories or (Drug) groups. Analgesics/antipyretics ranked highest in the private and the General hospitals, taking at least 17% (TH 17.8%; GH23.6%; PH24.6%) of all prescriptions, and closely followed by antibiotics with at least 13.6%. The general order of ranking of prescription by therapeutic categories: analgesics, antibiotics, antimalarials and multivitamins is similar to previous findings in public and private health institutions (Ohaju-Obodo *et al*., 1998; Isah *et al*., 1997) and the 11.1%, 21.4%, and 49.1% reported by Desta, 2002 in three levels of hospitals in Ethiopia.That more analgesics were prescribed in the private (PH24.6%) and GH23.6% than ISTH178% could be more of an indication of overzealous response to pander to patient's emotions by doctors in GH and PH rather than the actual relief of physical pain; and may not be a reflection of the morbidity.

Antibacterial drugs ranked second in the general drug prescription profile. More antibiotics were prescribed per encounter in General (GH69.7%) than the Private (PH55.7%) and teaching (ISTH30.7%) hospitals. These figures exceed the WHO recommended values of 20-25% encounters with antibiotics prescribed, but similar to findings in previous studies- 48% in dispensaries in Nigeria (WHO/DAP/93.1,1993); Erah *et al*., 2003 who reported an average of 75.% and 55% antibiotics prescription in public and private hospitals respectively in Warri South-South, Nigeria; 50% (Akinyede *et al*., 2000; Odusanya *et al*., 2004; Enwere *et al*., 2007; Fehintola, 2009) in South West, Nigeria; and reports from other countries Moghadamnia *et al*., 2002 (61.9%); Otoom *et al*., 2002 (60.9%). Desta, 1977 in a similar study in three categories of hospital in Ethiopia recorded antibiotics prescription of 36.9%, 41.9% and 64.1% in a central referral hospital, regional and rural hospital respectively; and in India (Karande *et al*., 2005) antibiotics constituted 39.6%% of total number of drugs prescribed, suggesting a similar trend of antibiotics prescription in hospitals- irrational prescription of antibiotics in the setting!

This study has confirmed the presence of known irrational prescribing practices and the discrepancies in general prescription pattern in three major levels of health care facilities, and highlighted the need for concerted efforts to close the gap, as whatever interventional efforts made has not yielded the desired results.

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AUTHORS CONTRIBUTION

OKOLI, R.I.: Designed the study, sponsored it and participated in data collection, analysis and writing the manuscript. ISAH AO: Supervised the overall study, made very useful contributions in design and proof reading of the final work. OZOLUA RI: Supervised the overall study, made very useful contributions in design and proof reading of the final manuscript. OHAJU-OBODO JO: Contributed in the design of the study, proof reading of the manuscript. NWOKIKE OC: Made useful contributions during the design and data collection stages, and proof-read the manuscript. OVIIENRIA WA: Made useful contributions during the design and data collection stage, and proof-read the manuscript. All the authors sponsored the publication.