ORIGINAL PAPER

Investigation and Comparison of Medicine Use in the three Central Referral Hospitals in Sierra Leone

P.T. OSAHON[*1A,D-F], M. SAMAI[2A-C], D.T. THOMAS[3A-D]

[1]Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin City, Nigeria.
[2] Department of Pharmacology, Faculty of Pharmaceutical Sciences, College of Medicine and Allied Health Sciences, University 0f Sierra Leone, Sierra Leone
[3] Directorate of Drugs and Medical Supply, Freetown, Sierra Leone.

A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article.

Abstract

Background: An important goal of National Medicines Policy is to ensure that sufficient quantities of essential medicines are available to health care providers and affordable to patients.

Objectives: To investigate and compare the prescribing indicators, patient care indicators and facility indicators in three central referral Hospitals in Sierra Leone.

Methods: This was a simple randomized retrospective and prospective study. Three groups were obtained to assess prescribing, patient care and facility indicators in the study sites. About 10% of the prescriptions encountered from January to June 2019, were observed retrospectively. Direct observation of 30 randomly selected patients in each hospital was used to assess patient care. Data collected were organized using Microsoft Excel and analyzed using SPSS version 21. Ethical considerations were observed.

Results: The average number of medicines prescribed in the three teaching hospitals (Connaught, PCMH and ODCH) were 4.07, 4.3and 3.3 respectively. Percentage encounter with injections were within standard in PCMT and ODCH. Antibiotics prescribing was slightly higher that WHO recommendation of 30% in all 3 hospitals. Percentage of medicines prescribed by generics were 75.4%, 53% and 77% respectively. The average consultation time was 5.47 minutes while the average dispensing time was 79.7 seconds. Patients that receive their medications at Connaught Hospitals had very little knowledge on how they should take their medicine(s), compared to PCMH and ODCH.

Conclusion: This study has shown that irrational use of medicines is a major problem in the three referral hospitals occurring majorly during the prescribing and dispensing processes.

Keywords: Medicine use, Prescribing indicators, Patient care, Facility indicators.

INTRODUCTION

The Rational Use of Medicines (RUM) in both private and public health sectors is paramount to disease prevention, diagnosis and treatment. Availability and affordability of efficacious medicines in Africa is still a major challenge, therefore must be used rationally to avoid wastage (Laing 1990; Cameron *et.al*, 2009; Ofori-Asenso *et.al*, 2016)

According to the World Health Organization, "Rational Use of Medicine requires that patients receive medicines appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and the community'' (WHO, 1987;1993; Isah *et.al*, 2008).

Irrational Use of Medicines (IRUM) does not conform to standard treatment guidelines which include cases were no medicine is needed, ineffective or unsafe medicines prescribed, effective medicines not administered correctly etc (Lee and Bergman ,2005). In health facilities in developing countries examples of irrational use of medicines include the miss use of antibiotics and anti-diarrhoeal for non-specific childhood diarrhoea, overuse of injections in cases of acute respiratory tract infections, polypharmacy, excessive use of antibiotics for minor acute respiratory tract infections, and failure to prescribe in accordance to clinical guidelines (Walker *et.al*., 1990, Massele *et.al*.,1993)

This study is designed to describe the medicine use situation in the three referral health facilities in a Country in West Africa. These measures or indicators will allow health planners, managers and other researchers to make basic comparisons between situations in different health facilities. Also, when an intervention is undertaken to improve aspects of Medicine use, the indicators can be used to measure impact.

Objectives of this study were; to investigate and compare the prescribing indicators, patient care indicators and facility indicators in the central referral Hospitals in Sierra Leone. Also, to identify appropriate intervention strategies for rational Medicine use.

METHODOLOGY

Setting

This study was conducted in three referral hospitals; Connaught Hospital, Princes Maternity Hospital (PCMH) and Ola-During Children's Hospital (ODCH) which are also the central referral Hospitals in the country. Connaught is located at Percival Street, in the Centre of the Capital City Freetown, while Princes Maternity and Ola-During Children's Hospitals share the same compound at Forabay road in the eastern part of the city. Connaught hospital was opened in 1921, and has a capacity of 300 beds. PCMH and ODCH are both maternal child health hospitals, with 150 bed capacity. PCMH deals mainly with gynaecological cases and Ola During Children's hospital deals with paediatric cases.

Connaught hospital which is the main central referral hospital deals with almost all medical and surgical cases. There are various departments in the hospital, some of which are, Surgery, Internal Medicines, Dentistry, Ophthalmology, Out Patients, Radiology, Pharmacy and few others. The hospital deals with cases, most of which are referred from the district hospitals, the satellite clinics, and private hospitals all over the Country. In all departments of the three hospitals, use of medicines is very crucial in the diagnosis, prevention and treatment or management of the diseases for which the people come.

Design: This study was a descriptive cross-sectional study carried out between the 1st of September to 1st of November 2019 in Sierra Leone. Thirty encounters (10%) out of 300 prescriptions dated from January to June 2019, were observed retrospectively from dates recorded in the medical records of each of the three hospitals.

Sampling technique and data collection: A simple randomized retrospective and prospective study was carried out under three groups;

Group 1: Prescribing indicators
WHO, 1993 describes methods for investigation of drug use in health facilities, it describes the selected prescribing indicators used in this study.

The indicators are based on the practices observed in sample of clinical encounters taking place at the out-patient health facility for the treatment of acute or chronic illnesses.

Prescriptions from January to June 2019 were retrospectively assessed. The data on the prescribing indicators were recorded on a form.

i. **Average number of Medicines per encounter:** The average is calculated by dividing the total number of different Medicine products prescribed, by the number of encounters surveyed.

ii. **Percentage of Medicines prescribed by generic name:** The percentage is calculated by dividing the number of Medicines prescribed by generic

name by the total number of Medicines prescribed, multiplied by 100.

iii. Percentage of encounters with an antibiotic prescribed: The number of patient encounter during which an antibiotic divided by the total number of encounters surveyed, multiplied by 100

iv. Percentage of encounters with an injection prescribed: The number of patient encounter during which an injection divided by the total number of encounters surveyed, multiplied by 100

v. Percentage of Medicines prescribe from Essential Medicines list or Formulary: This refers to the total number of products prescribed from the hospital formulary divided by the total number of Medicines prescribed, multiplied by 100

Group 2: Patient care indicators
These indicators address key aspects of what patients experience at health facilities and issues that pertain to Medicine use. The data here were collected by direct observation of 30 patients interactions with the out-patient prescribers, the dispensers, one at a time. Also, a direct interview with patients immediately after receiving their medicines from the dispensers.

Types of data that were collected here include; **i. Average consultation time**
The purpose here is to measure the time that medical personnel spend with their patients in the process of consultation and prescribing.
The average is analysed or calculated by dividing the total time spent for a series of consultations by the number of consultations. That is the time between entering and leaving the consultation room. Waiting time is excluded.

ii. Average dispensing time
The purpose is to measure the average time that personnel dispensing Medicines spend with patients. Waiting time is not included.
This is calculated by dividing the total time for dispensing medicines to patients, by the number of encounters.

iii. Percentage of Medicines actually dispensed
The purpose is to measure the extent/degree to which health facilities are able to provide the Medicines which are prescribed. The percentage is calculated by dividing the number of Medicines actually dispensed at the facility by the total number of Medicines prescribed, multiplied by 100.

iv. Percentage of medicines actually labelled
The purpose is to measure the degree to which the dispensers record essential information on the Medicine packages in which they dispense.

The percentage is calculated by dividing the number of medicine packages containing at least one patient name, medicine name, medicine strength, and how the medicine should be taken, by the total number of medicines packages dispensed, multiplied by 100.

vi. Patients' knowledge of correct dosage
The purpose is to measure the effectiveness of the information given to patients on dosage schedule of the Medicines they received.
The percentage is calculated by dividing the number of patients, who can report the dosage schedule for all Medicines, by the total number of patients interviewed, and multiplied by 100

Group 3: Health Facility Indicators
Data on facility indicators were obtained by direct interview with the chief dispensers who are in custody of the items in question:

i. Availability of medicine information sources such as Essential Medicines List (EDL), Hospital Formulary or Standard Treatment Guides.
The purpose is to indicate the extent to which copies of reference materials are available at the health facility. The answers were Yes or No and these were recorded accordingly in the facility indicators form.

ii. Availability of Medicines on the EDL
The purpose is to measure the availability at the health facility of Medicines on the EDL recommended for the treatment of common health problems.
The percentage is calculated by dividing the number of specified products actually in stock by the total number of Medicines on the check list, multiply by 100 (WHO, 1993)

Data analysis
Data were collected and organized using Microsoft Excel and analyzed using SPSS (Statistical package for social sciences) version 21. Descriptive statistics were carried out on all variables, and the results were presented as frequency of responses and the proportion (in percentage) of the overall population.

RESULTS AND DISCUSSION

All the patients in ODCH were children under 5years, only adult female patients were recruited in PCMH while male and females of various ages were obtained in Connaught hospital for the retrospective study. The average number of medicines prescribed in the three teaching hospitals (Connaught, PCMH and ODCH) were 4.07, 4.3and 3.3 respectively (Figure 1), which are higher than the WHO standard and results from previous researches carried out in two tertiary hospitals in Nigeria (Osahon, et.al, 2016 and 2020). These results indicate that polypharmacy is practiced in all the hospitals surveyed. Polypharmacy is an example of irrational use of medicines and this exposes patients to medicine therapy problems like medicine interactions, toxicity and side effects.
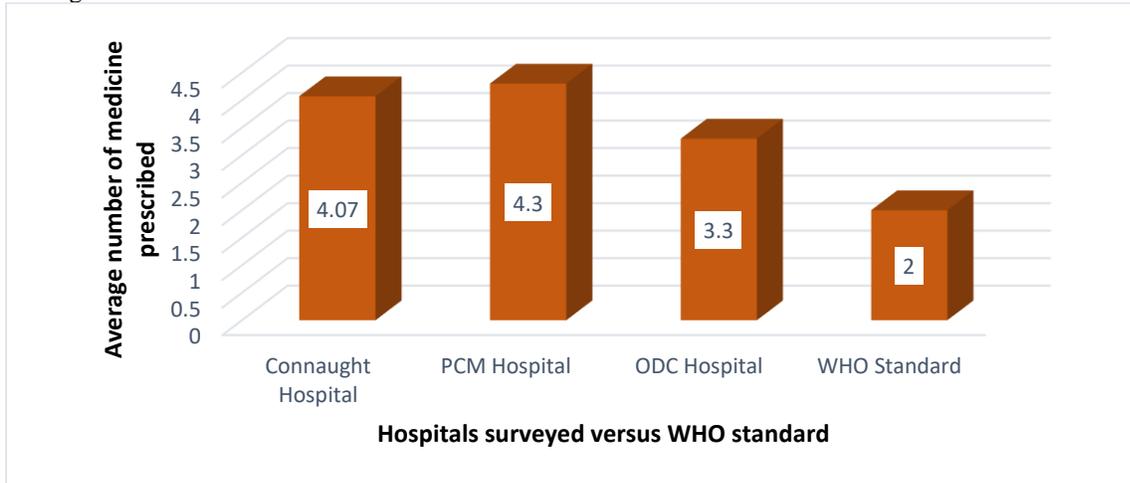
Figure 1. Average number of medicines prescribed.

Percentage of Medicines prescribed by generics in this study were lower than the WHO recommended percentage of Medicines prescribed by generics which is 100%. The values the three hospitals (Connaught, PCMH and ODCH) are 75.4%, 53% and 77% respectively (Figure 2). All three hospitals prescribed medicines in branded names especially PCMH. The results here are lower than that obtained in a specialist hospital in Nigeria where an average of 92.53% of Medicines are prescribed by generic names (Osahon et.al, 2016). The result here is however higher than that obtained from a previous study in Sierra Leone where 57% of medicines were prescribed using generic names (Cole and Routledje, 2018). Adherence to generic names in writing prescriptions is one of the ways of promoting RUM.
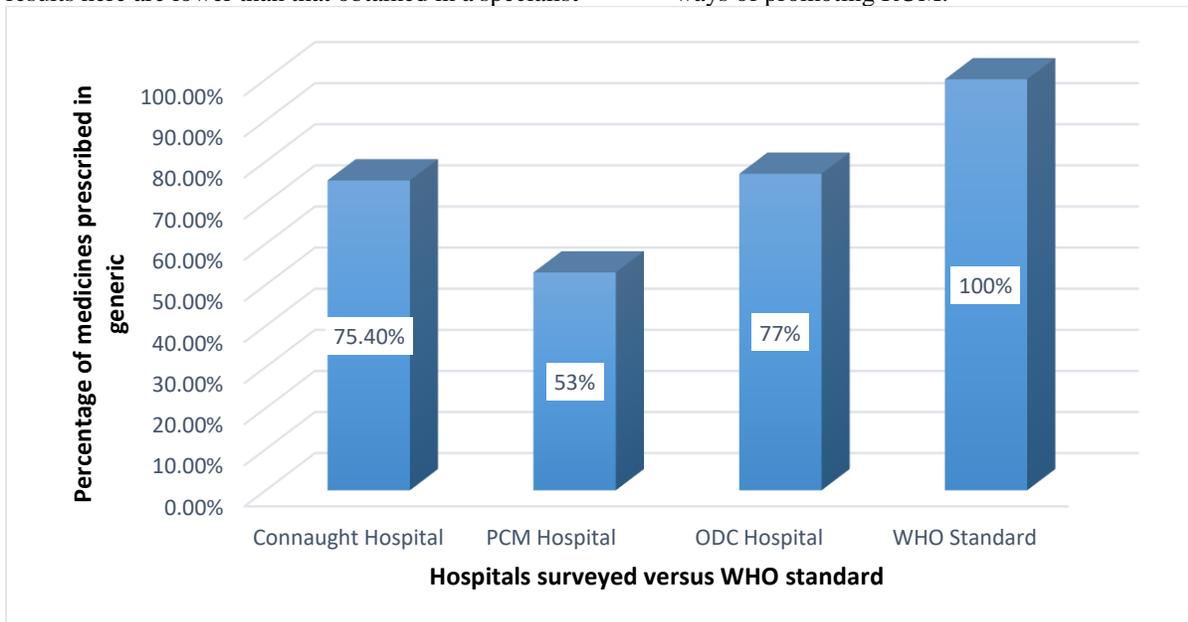
Figure 2: Average number of medicines prescribed using generic name

Percentage of encounters with antibiotics in Connaught and PCMH were slightly higher than the WHO recommendation which is less than 30%. This finding is an improvement on the high value of 72% reported in a previous study in the same Country which surveyed four hospitals including Connaught, the tertiary referral hospital for general medical and surgical cases in the capital city which was included in this study and three secondary hospitals (Cole and Routledje, 2018). The practice of prescribing antibiotics should however be limited, especially with the current emergence of many anti-microbial resistant cases.
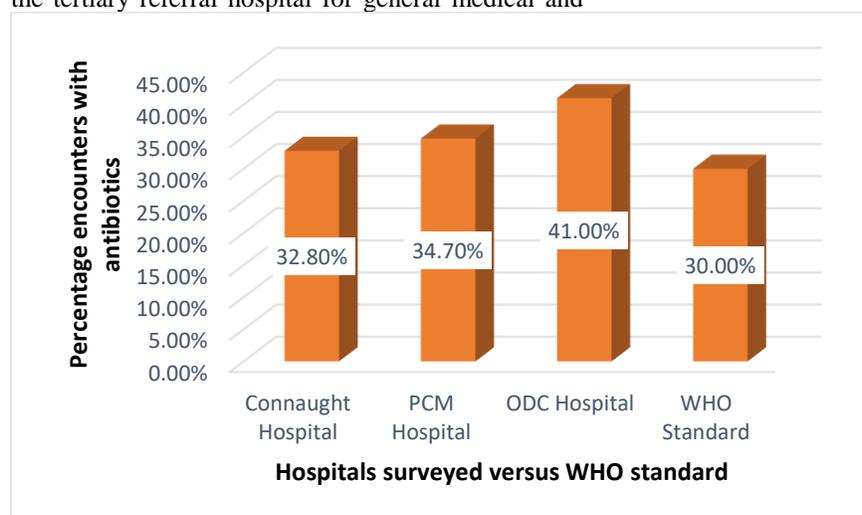
Figure 3: Percentage encounters with antibiotic

Percentage of encounters with injections: WHO recommends that this percentage should be less than 20%. The values for three hospitals (Connaught, PCMH and ODCH) were 22.9%, 6.25% and 19%. Except for Connaught, both PCMH and ODCH fell within the normal range (Table 1).

Percentage of medicines prescribed from Essential Medicine List in Connaught, PCMH and ODCH hospitals were 100% contrary to the finding by Cole and Routledje, 2018 in Sierra Leone. This indicates good pharmacy practice, which is not only cost effective, but also promotes Rational Use of Medicines.

Table 1:Medicine use core indictors in the three Referral Hospitals (Connaught, PCMH and ODCH)

	Connaught Hospital	PCMH Hospital	ODCH Hospital	WHO Standard
Average number of Medicines prescribed	4.07	4.3	3.3	<2
Percentage of Medicines prescribed by generics	75.4%	53%	77%	100
Percentage of Encounters with Antibiotic	32.80%	34.7%	41%	Less 30%
Percentage of Encounters with Injections	22.9%	6.25%	19%	< 20%
Percentage of Medicines Prescribed on EDL	100%	100%	100%	100%
Average Consultation Time (Minutes)	7.6	6.4	2.4	7
Average Dispensing Time (Seconds)	121.3	62.3	55.8	180
Percentage of Medicines Actually Dispensed	84.8%	75%	82%	100%
Percentage of Medicines Adequately Labelled	69.6%	25%	70%	100%
Percentage of Correct Patient Knowledge of Dosage	22.8%	93%	93%	100%
Percentage of Reference Materials (EDL,STGs, BNF)	60%	60%	80%	100%
Percentage Availability of Key Essential Medicines	100%	100%	100%	100%

Princes Maternity Hospital (PCMH), Ola-During Children's Hospital (ODCH), Essential Drug List (EDL), World Health Organization (WHO), Standard Treatment Guidelines (STGs), British National Formulary (BNF).

Average consultation time (minutes): According to WHO, previous researches have shown that this varies from 1minute to 26 minutes depending on the type of disease condition, but has an average of 7minutes. The average consultation time (minutes) for the three facilities (Connaught, PCMH and ODCH) were; 7.6, 6.4 and 2.4 respectively (Table 1). The average consultation time for this study is 5.47 minutes and is higher than 4.61 minutes reported by Sisay, et.al, in Eastern Ethiopia (2017). CHTC prescribers spent more time to examine, diagnose and draw up their treatment plan for the disease(s) of their patients than the other two hospitals. Prescribers need to spend optimum time with their patients, and this enables them diagnose and treat the patients properly.

Average dispensing time (seconds): WHO recommends average dispensing time of 180 seconds. The average dispensing time (seconds) for the three hospitals (Connaught, PCMH and ODCH) were 121.3, 62 and 55.8 respectively (Table 1). CHTC dispensers spent more with their clients than PCMH and ODCH. This could be due to the fact that PCMH and ODCH deal entirely with patients that benefit from Free Health Initiative, under which certain categories of people (Pregnant women, Lactating mothers, children under five and few others) receive health commodities without payment. Dispensers need to speed optimum time with their patients, and this enables them to counsel the patients and explain how to use their medications. In health centres in Tanzania, patients spend an average of 78 seconds receiving their medicines (Malele *et.al*, 1992). Another study in Eastern Ethiopia reported an average dispensing time of 61.12 secs (Sisay, *et.al*, 2017). This is almost similar to the dispensing times in PCMH and ODCH.

Percentage of medicines actually dispensed: Although it is recommended that 100% of the medicines prescribed should be dispensed, the percentages of those actually dispensed at the three hospitals were: 84.8%, 75% and 82%. These values are higher than 75.77% reported by Sisay, *et.al*, 2017. Free Health Initiative was introduced by Sierra Leone government in 2010. The initiative is greatly increased the availability of key essential health commodities in the health facilities in the country. This is however due to the support from the donor partners. Availability of the appropriate health commodities promotes RUM.

Percentage of medicines adequately labelled: Similarly, the recommended percentage of medicines to be adequately labelled should 100%. The percentages for Connaught, PCMH and ODCH are 69.6%, 25% and 70 %. Inadequate labelling of dispensed medicines before being handed over to the consumers is one of the major causes of wrong drug administration and non-adherence to therapy. Medicines have to be properly labelled to encourage patients to take up responsibility in promoting their own health. Adequate labelling of the medicines provides patients with adequate knowledge on how and when to use their medicine(s) in order to achieve expected therapeutic outcomes.

Percentage of correct patient knowledge of dosage: With proper patient education and counselling at the point of collection of dispensed medicines, it is expected that patients should have full knowledge of the dosage of their medications. The percentage knowledge of the patients on dosages in the three hospitals were 22.8%, 93% and 93%. Patients that receive their medications at Connaught Hospitals had very little knowledge on how they should take their medicine(s), compared to PCMH and ODCH.

In selected health facilities in Eastern Ethiopia, 75.7% of patients had adequate knowledge of the medicines they had received.

Percentage of Reference Materials (EDL, STGs, BNF): In order to promote rational use of medicines, the availability of relevant reference materials at service delivery points must be 100%. The percentage of the reference materials in three health facilities were 60%, 60% and 80% (Table 1), none of the facilities had all the relevant reference materials. Sisay *et.al*, (2017) reported unavailability of Reference books in all the health facilities included in their study, this is contrary to the hospitals referenced in Nigeria which recorded 83.3%.

Percentage availability of Essential Medicines: The recommended percentage of availability of Essential Medicines for the treatment of the most common diseases in health facilities is 100%. In the three health facilities, the percentages were 100% which is a good step in preventing IRUM.

The average consultation time at CHTC (121seconds), is relatively longer than those at PCMH and ODCH (62.3 and 55.8 seconds respectively), but the percentage of correct patient knowledge of dosage at CHTC (22.8%) is lower than those at PCMH and ODCH (93% and 93% respectively). One would have expected the opposite of the above, which is not the case. The most obvious reason for this is that both PCMH and ODCH operate mainly on Free Health Care Initiative (FHCI), wherein the dispensers have no cash transactions, so they spend more time to interact with their patients and care givers, counselling them on their medications. At CHTC, the dispensers have both Cost Recovery (RC) and FHCI cases. The dispensers tend to pay more attention to the cash transactions rather than counselling the patients on their medications, hence the patients have little knowledge on the dosage of medicines dispensed to them.

Percentage of medicines adequately labelled vs patient counselling: At CHTC, 69.6% of the dispensed

medicines were adequately labelled, but the percentage of patient knowledge of dosage was lower (22.8%). However, at PCMH, percentage of the medicines adequately labelled is 25% but the percentage of patient knowledge of dosage is higher (93%). These findings show that counselling of patients on the use of their medications is more effective in promoting RUM than merely labelling the medicines' packages.

Limitations

CONCLUSION
This study has shown that irrational use of medicines is a major problem in the three referral hospitals occurring majorly during the prescribing and dispensing processes. We have reported a deviation from four out of the five WHO standards for prescribing; overuse of antibiotics and injections, polypharmacy and failure to prescribe in accordance to standard treatment guidelines. Patient care indicators were poor, inadequate consultation time, incomplete labelling, insufficient time to talk with patients about their medicines were observed in these hospitals. Only one healthcare facility indicator was optimal, none availability of all the relevant reference

The indicators described in this study do not measure all the dimensions of the appropriateness of the pharmaceutical care, or even necessarily the most important ones. The Medicine use indicators are best understood as first-line measures, intended to stimulate further questioning and to guard subsequent actions.
Some of the dispensing times (in sec.) in the patient care indicators form include time for collection of cash payment for the medicines they dispense.

materials (EDL, STGs, Hospital Formularies, etc.) were observed in this study.
This study has provided a basis for identifying and understanding the underlying the medicine use pattern in these three important hospitals. Pharmacy regulatory bodies and Medical Directors are recommended to enforce adherence to Standard Treatment Guidelines by healthcare providers in order to ensure Rational Use of Medicines in their hospitals. Provision of current Reference books in the hospitals and a functional medicines and therapeutics committee in hospitals to monitor medicine use is highly recommended.

ETHICAL CONSIDERATIONS
This research work was approved by the office of Sierra Leone Ethics and Scientific Review Committee on the 16th of August 2019. Informed consent was obtained from the respondents. They were made to

understand that participation was voluntary and there was no consequence for non-participation. All information obtained were kept confidential.

REFERENCES
Cameron, A., Ewen, M., Ross-Degnan, D., Ball, D. and Laing, R.O. (2009). Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis. Lancet; 373 (9659):240–9.
Cole, C.P. and Routledje, P. (2018). An evaluation of rational prescribing in hospital outpatient practice in Sierra Leone and assessment of affordability of a prescription as an outcome. Pan Afr. Med. J.; 31:174.
Isah, A.O., Ross-Degnan, D. and Quick, J. (2008) Developing Standard Values for WHO Drug prescribing Indicators, Geneva: WHO.
Laing, R.O. (1990). Rational Medicine use: an unsolved problem. Trop Doc.; 20:101-3.
Massele, A.Y., Ofori-Adjei, D. and Laing, R.O. (1993). A study of prescribing patterns with special Reference to Medicine use indicators in Dar es Salaam Region, Tanzania. Trop. Doc.; 23:104-107.
Melele, R.S.R. and Senya, S.S. (1992). A prospective Survey of prescribing habits in the ODP of Muhimbili Medicines Hospital, Dar es Salaam Tanzania in East and Central African Regional Essential Medicines Programme Training Project 1991-1994: 99-114.
Ofori- Asenso, R., Brhlikova, P. and Pollock, A.M. (2016). Prescribing indicators at primary health care centers within the WHO African region: a systematic analysis (1995- 2015). BMC Public Health; 16: 724.
Osahon, P.T., Baye- Osagie, C. and Erah, P.O. (2016). Prescription pattern and cost analysis of antipsychotics in a tertiary hospital in south- south Nigeria. J. Pharm. All. Sci.; 13(1): 2344- 2353.

Osahon, P.T., Chukwu, C. and Chukwu, C. (2020). Prescription pattern in the Eye Clinic of a Tertiary Health Facility in South- East Nigeria; J. Bas. Soc. Pharm. Res., 1 (5), 46-52.

The Rational use of the Medicines (1987). Report of the conference of Experts, Nairobi, 25-29 November 1985. Geneva, World health Organization, 1987.

The use of Essential Medicines (1990). Model list of essential Medicines (seventh list). Geneva, World Health Organization Technical Report series 825.

Walker, G.J.A., Hogerzeil, H.V., Sallami, A.O., Alwan, A.A., Fernando, G. and Kassem, F.A. (1990). Evaluation of rational drug prescribing in Democratic Yemen. Soc Sci Med; 31:823-828

World Health Organization (1993). WHO and International Network for Rational use of Medicines. How to investigate Medicine use in health facilities: selected Medicine use indicators, Geneva, Switzerland (WHO/DAP/98.1).

*Address for correspondence: P T Osahon
Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin City, Nigeria.
E-mails: penaere.osahon@uniben.edu