Drug Prescription Pattern in a Primary Care Clinic, Southwest, Nigeria

Temitope Ilori¹ and Oladipo Odeyinka²

¹ Department of Community Medicine, College of Medicine, University of Ibadan, Nigeria/Department of Family Medicine, University College Hospital, Ibadan, Nigeria

² College of Medicine, University of Ibadan, Nigeria

Abstract

Background: Rational drug use is of the utmost importance in a region such as West Africa, where the prevalence of drug resistance is increasing due to inappropriate use of medications.

Objective: This study aimed to assess the pattern of prescription drug use at the General Outpatient Clinic of the University College Hospital, Ibadan. This study also assessed the knowledge and attitude toward rational drug use among prescribing physicians in the Clinic.

Design: The study was a retrospective cross-sectional review of patients’ records over three years. The medical records were selected by systematic random sampling and subjected to the WHO core drug use indicators. Prescribers at the study site had their knowledge, attitude, and practice (KAP) of rational drug use assessed with a self-administered questionnaire.

Results: A total of 795 medical records were analyzed for drug use indicators. The mean number of drugs per prescription was 2.64 ±1.23. The percentage of encounters in which an antibiotic was prescribed was 20.4%, while 71.6% of all drugs prescribed were in the generic form. From the KAP’s survey, 64% of physicians routinely prescribed both generic and brand names, and 68% admitted they needed further education on rational drug use.

Conclusion: Using the WHO core drug use indicators, this study identified some degree of polypharmacy and poor adherence to the generic prescription of drugs. Continuing Medical Education for health workers is encouraged to stem the irrational prescription of medications in the African sub-region.

Keywords: Prescription Drugs Use, Rational Use of Medicines, Physician’s knowledge, Nigeria

INTRODUCTION

Irrational drug use is prevalent in Nigeria. In a global report, the World Health Organization estimated that half of all medicines are inappropriately prescribed, dispensed, or sold and that 50% of patients do not use the medicine the right way¹. Studies in high-income countries such as Canada and the USA, as well as studies in middle-income countries such as China, have shown that irrational drug use is not limited to low-income countries²-⁴. Governments in Low and Middle-Income Countries spend as much as half of their national health budgets on drugs and medical consumables, most of which are utilized irrationally⁵-⁷. The global menace of irrational drug use has negative consequences on the country’s health indices⁸. This could be due to adverse drug reactions, drug resistance, contraction of infection-related diseases such as hepatitis B, and other adverse health conditions both to the individual and the nation⁹,¹⁰.

In 1985, at a World Health Conference held in Nairobi, Africa, a definition was adopted for the concept of rational drug use, which though it has been in existence for decades, had no standard definition¹¹. It was posited that: Rational use of drugs requires that patients receive medications appropriate to their clinical needs in doses that meet their requirements for an adequate period and at the lowest cost to them and their community¹². This definition was further described as the five rights, which entails prescribing the right drug at the right dosage through the right route at the right time for the right patient. Irrational drug use is defined as the absence of any of these rights¹³. The World Health Organization (WHO), in collaboration with the International Network for Rational Use of Drugs (INRUD), developed a set of core drug use indicators to evaluate the global pattern of drug use in different countries and across different health facilities¹⁴. These indicators were designed to help measure performance in prescribing practices, patient care, and facility-specific factors¹⁵. These indicators have been standardized and revised and are recommended for use in drug use indicator studies globally¹⁶-¹⁷. These indicators aim to help describe current prescribing practices in health facilities and assist prescribers in identifying potential irrational drug use that may affect patient care¹⁸-²⁷. These prescribing core drug use indicators are crucial in examining the prescribing practices of healthcare providers. They include the average drugs per encounter, percentage of drugs prescribed by generic name, percentage of encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed, and percentage of drugs prescribed from essential drugs list or formulary²⁸. Though studies have been conducted globally on the rational use of medicine using the WHO indicators, fewer studies have assessed the knowledge, attitude, and practice of rational drug use among the prescribers. The irrational use of
medication is notably worse in developing countries where weak health systems are the norm and mechanisms of routine monitoring of medicine use are "not well developed or often non-existent". Studies have also reported that the practice of irrational drug use is higher in primary healthcare facilities when compared to secondary and tertiary ones. Teaching hospitals are well known for standard clinical practices based on evidence-based medicine. The General Outpatients Clinics are gateways to these tertiary facilities, providing primary care to all patients. Therefore, this study aimed to assess the pattern of prescription drug use and the knowledge and attitude underlying doctors' prescribing practices in the General Outpatient Clinic of the University College Hospital, Ibadan, Nigeria, using the WHO drug use indicators.

**METHODS**

**Study Design**: This was a retrospective cross-sectional study of patients' medical records over three years (January 2015 - December 2017).

**Study Site**: The study was carried out at the General Outpatient (GOP) Clinic of the University College Hospital, Ibadan, Nigeria. Ibadan is the capital of Oyo State, situated in the South-Western region of Nigeria, West Africa. Ibadan is a cosmopolitan city, with a population of about four million where almost all the Nigerian ethnic groups coexist but with a preponderance of Yoruba people.

The University College hospital is the first tertiary hospital in the West Africa sub-region, established in 1957. Due to the poorly funded peripheral health system, the hospital provides primary, secondary, and tertiary health services to Oyo-State and its environs. The General Outpatient Clinic is the entry point for most patients presenting to the University College Hospital, where primary health care services are provided to patients of all ages and both sexes. The health care is provided by the competent Family Physician and supervised Family Physicians in training as first contact frontline doctors, with referral to other specialties as the need arises.

**Study Population**: Medical records of registered adult patients who attended the General Outpatient Clinic of the University College Hospital, Ibadan, from January 2015 to December 2017, irrespective of the reasons for encounter or presentation, were reviewed.

**Sample Size Determination**: According to the WHO Document on investigating drug use in health facilities, at least 600 encounters should be included in a cross-sectional survey to describe the prescribing practices. Therefore, the minimum sample size of 600 was fixed.

**Sampling Technique**: The GOP Medical Records for the period of January 2015 to December 2017 was obtained. A systematic random sampling technique was used in selecting the case notes for the research study. Each month, a suitable sampling interval was chosen to enable systematic random sampling of 20 case notes per month. This gave a total of 720 case notes over the thirty-six months' study period.

Respondents for the Knowledge, Attitude, and Practice study were obtained from the list of doctors who had been working at the Clinic for not less than three months. The list was obtained from the Head of the Department of Family Medicine, and a total sampling of doctors working at the Clinic during the period of data collection was done. Questionnaires were administered to all consenting prescribers.

**Inclusion Criteria**: The inclusion criteria included all registered patients with case notes seen from January 2015 to December 2017, male and female patients aged 18 years and above. For the KAP survey, consenting Resident doctors and Consultants Family Doctors who attended to patients in the Clinic during data collection were recruited. Eligibility criteria were that the physicians should have been prescribing in the Clinic for not less than three months.

**Ethical Approval**: Ethical approval was sought and obtained from the ethical review committee of the University of Ibadan/University College Hospital, Ibadan, with ethical approval number: UI/EC/18/0289. Written permission was obtained from Director, Clinical Services, Research and Training of the hospital and the Head, Department of Family Medicine, UCH, Ibadan before data collection.

**Data Collection**: Data was collected using the WHO Prescription Data Collection Form adopted from the WHO guidelines on investigating drug use. This was used to retrieve sociodemographic information, including age, medication information such as drug name, and dosage regimen. The form also recorded the number of drugs per encounter, the number of generic drugs prescribed, if antibiotics or injections were used or not, and the diagnosis.

The doctors' knowledge, attitude, and practice were assessed using a KAP Questionnaire adapted from a previous study. It assessed the respondents' sociodemographic, professional cadres, awareness of the National Essential Drug List (EDL), and attitudes towards acquiring more knowledge on rational drug use.

**Data Analysis**: The data forms and questionnaires were manually sorted out to check for errors and omissions at the end of data collection on each day. The data was then entered into the computer and analyzed using Statistical Package for Social Sciences (SPSS) version 21. Results were reported using descriptive analyses.

**RESULTS**

A total of 795 case notes were analyzed for drug use indicators. Patients seen in the study period were between 18 and 83.0 years old (mean 37.34±17.8). The male-to-female ratio was 1:1. A total of 2,100 drugs were prescribed from 795 prescriptions, and the mean number of drugs per prescription was 2.64±1.22.

**Table 1**: Characteristics of the 795 Case Records analysed for rational drug use in the General Outpatient Clinic, University College Hospital, Ibadan.

| Age-Group (Years) | Frequency | Percentage |
|-------------------|-----------|------------|
| <18               | 163       | 20.5       |
| 18-35             | 126       | 15.8       |
| 36-59             | 463       | 58.2       |
| >=60              | 43        | 5.4        |
| Total             | 795       | 100        |

| Number of drugs prescribed |          |
|---------------------------|----------|
| 0                         | 79       | 9.9      |
| 1-2                       | 504      | 63.4     |
| 3-4                       | 190      | 23.9     |
| >4                        | 22       | 2.8      |
| Total                     | 795      | 100      |

**Use of Antibiotics**

|                |          |
|----------------|----------|
| No             | 633      | 79.6     |
| Yes            | 162      | 20.4     |
| Total          | 795      | 100      |
A higher proportion of the prescription was to adults aged 18 years to 60 years of age. Table 1 also shows the number of drugs per prescription in the GOP Clinic. It shows that 504 (63.4%) had two or fewer drugs per prescription, while 212 (26.7%) had more than two drugs per prescription. Only 22 (2.8%) had more than four drugs per prescription. The percentage of encounters in which an antibiotic was prescribed was 20.4%, while 71.6% of drugs prescribed were in the generic form.

The reasons for encounter (diagnosis) were categorized using the International Classification of Primary Care 2 classification for ease of reference. The most common diagnoses were malaria and hypertension, categorized under the General and unspecified disease group (25.4%)—followed by neurological with 22.9%. A chart depicting the disease profile of the patients is shown in figure 1.

Figure 1 - Disease Profile of patients using the International Classification of Primary Care (ICPC 2)

Twenty-five prescribers filled out the KAP questionnaire. All the prescribers were medical doctors in the Family Medicine Department who oversees the General Outpatient Clinic. More than half (56%) of the doctors had 10-19 years of professional practice, while 12% had more than 20 years of professional practice. About a quarter of the doctors were Consultants, 60% were Senior registrars, and 16% were Registrars. Though 96% of the doctors were aware of the national essential drug list, only 36% possessed personal copies. Majority (64%) of the prescribers prescribed both generic and brand drugs routinely, while 68% expressed interest in further education on rational drug use. A summary of these characteristics is depicted in Table 2.
Table 2: Knowledge, attitude and practice characteristics of prescribers in the GOPD Clinic, University College Hospital, Ibadan.

| Characteristics                                      | Number (% of total) |
|------------------------------------------------------|---------------------|
| **Duration of professional practice**                |                     |
| -<10 years                                           | 8(32%)              |
| -10-19 years                                         | 14(56%)             |
| ->=20 years                                          | 3(12%)              |
| **Professional status**                              |                     |
| -Registrar                                           | 4(16%)              |
| -Senior Registrar                                    | 15(60%)             |
| -Consultant                                          | 6(24%)              |
| **Awareness of existence of National Essential Drug List (EDL)** |           |
| -Yes                                                 | 24(96%)             |
| -No                                                   | 1(4%)               |
| **Possession of own copy of EDL**                    |                     |
| -EDL                                                 | 9(36%)              |
| -NDF                                                 | 5(20%)              |
| -Neither                                             | 10(40%)             |
| -Did not indicate                                    | 1(4%)               |
| **My prescriptions are mainly**                       |                     |
| -Generic                                             | 7(28%)              |
| -Branded                                             | 2(8%)               |
| -Mixture of branded and generic                       | 16(64%)             |
| **I need education on RDU**                          |                     |
| -Yes                                                 | 17(68%)             |
| -No                                                   | 4(16%)              |
| -Did not indicate                                    | 1(4%)               |

Also, the prescribing practices indicators in this primary care clinic domiciled in a Nigerian Premiere teaching hospital compared to the WHO core drug indicators are illustrated in Figure 2.

![Figure 2: Bar chart comparing the prescribing practices in this tertiary health facility and the World Health Organization standard indices.](chart.png)

**DISCUSSION**

The average number of drugs prescribed per patient was 2.64 ±1.22. Although this falls short of the WHO recommended standard of 2, it is lower than the observed rates in other parts of the country 24–30. This corroborated the finding that polypharmacy is common in the world’s most populous black nation with its attendant consequences 26.

The lower prescription rate observed in our study may be because the study was conducted in a tertiary teaching hospital, and the prescribers were trained doctors in postgraduate training or Consultant Family Physicians. A similar study among Primary Health Care workers in Osun State, Nigeria, reported an average of 6.11 drugs per prescription, which was three times the WHO standard 31. Amadi and Zarei, in a study among Family Physicians in 103
Primary Health Centres, reported an average number of drugs per prescription as 3.14 (± 1.2) 32.

Akande-Sholabi et al., in a study at the Geriatric Centre, UCH, Ibadan, Nigeria, reported a prescription of more than five drugs among 28.3% of the elderly population studied 33. Though polypharmacy is common amongst the elderly, only 5.4% of our study population were over 60 years old.

Other African countries have been shown to fare better than Nigeria in previous studies. A similar study in Hawassa University Teaching and Referral Hospital, Ethiopia, revealed an average of 1.9 drugs per encounter within the acceptable limits of WHO recommendations 34. Studies in Sudan and Zimbabwe likewise reported lower means of 1.4 and 1.3, respectively 35. The lower means reported in these countries could be attributed to better training of the prescribers on rational drug use. However, prescribing practices in the Middle East were consistent with findings in this study, with an average of 2.9 drugs per encounter in a study done in the United Arab Emirates 36.

Antibiotics are a widely prescribed drug in outpatient clinics and among hospitalised patients 30,33. Unfortunately, misuse of these drugs leads to antibiotic resistance, which is fast becoming a public health issue 37,38. We observed that 20.4% of the patients reviewed were prescribed antibiotics within the study period. This is lower than values (50%-75%) reported from other studies conducted in Nigeria 25,26,28,37. Similarly, the percentage of prescriptions involving antibiotics was 52.1% amongst rural Family Physicians practising in Iran 32. In Ghana, Bosu and Ofori-Adjei found that antibiotics are prescribed for malaria and diarrheal diseases where they are ineffective and unnecessary 39. A similar study in a rural district hospital, in India, also reported antibiotics prescription for 84% of patients with diarrhoea disease 40. Similarly, there were indications that prescribers seldom undertook the necessary diagnostic measures before prescribing antibiotics and may also be prescribing them needlessly 30,32. Unnecessary antibiotic use promotes drug resistance, increases the risk of side effects, and is wasteful of medical resources 25,26,28,37.

Prescription of generic analogue drugs over branded substitutes is preferred not only because they are less expensive but also equal potency 24,39. However, lack of proper education on these facts among some prescribers has led to the prescription of branded substitutes only, even when not indicated 22. In this study, 71.6% of the drugs prescribed were generic, lower than the WHO standard of 100%. Other studies in Nigeria have reported lower use of generics in Ilorin (46.2%) and Kano (42.7%) 20,41. This finding contrasts with a study in Tanzania, where 94.0% of drugs prescribed were in generic forms 22. Similar results were reported in studies in Ethiopia and Iran, where 98.7% and 95.1% of medications prescribed were by their generic names 32,34. Also, 50% of prescriptions by Junior Residents in a tertiary hospital in India were brand names 20. However, a study in the United Arab Emirates (UAE) reported that only 7.35% of drugs prescribed used generic names 36. This high prescription of brand names in the UAE might be attributed to the fact that the survey was done in private clinics where patients are likely to be wealthy and has a penchant for brand names, and most of them can indeed afford brands. Also, the growing capitalism in the drug industry and the tapering effects of renowned drug companies in marketing their brands promote prescribing certain brands.

Less than 3% of the drugs prescribed in this study were injectable. This is well below the recommended WHO standard of less than 20% injection prescription. This observation could be because our study was conducted in an outpatient clinic, and most of the patients were discharged home after consultation. Also, most acutely ill patients needing faster routes of drug administration (injectable) would rather present to the Emergency Room (ER). However, studies from other centres within Nigeria have reported rates as high as 72.7%, 25,27,28. Similarly, there have been reports of injection prescription rates as high as 48% from other African countries 15. The high rate of injection use among these populations could be due to the erroneous belief that injections are more effective than oral medications. Though injectable has a faster onset of action, this practice is frowned at, as injections are more likely to cause adverse drug reactions when compared to other forms of treatments, and they often require expertise administration 18,34. The injectable is also costlier than oral medications; therefore, should be prescribed cautiously.

The WHO defined essential medicines as those that satisfy the priority health care needs of the population and recommended that a list of such medications should be available in every healthcare setting at all times, and 100% of the drugs prescribed should be from the essential drug list 40. In this study, 56.8% of prescriptions were prescribed from an essential drug list. This might be attributable to the fact that only 40% of the prescribers owned a copy of the essential drug list or the national drug formulary. Interestingly, a similar study in a tertiary hospital in Kano State, North-western Nigeria, reported that 94% of the drugs prescribed were from the essential list even though no copy of the list was available at the points of prescription 28. Dakhale et al in a similar study amongst resident doctors and interns in a tertiary care teaching hospital in India, reported that only 10.5% had the national drug formulary available at their workplace 17.

Studies that reviewed how prescriptions in Nigeria conform to international practices found out that the prescribers knew but hardly practised according to established guidelines 21,26,29. It is, therefore, instructive that 68% of our study respondents expressed interest in further education on rational drug use.

CONCLUSION

There is still some level of polypharmacy and a burden of inappropriate prescription of generic drugs in Primary Care. Hence, the use of essential drug formulary should be encouraged, and copies made readily available at health facilities. Continuing Medical Education on the rational use of medicines among doctors and other health care workers is encouraged with a regular audit of prescription practices in the health facilities.

Conflict of Interest: The authors have no conflicts of interest to declare.

REFERENCES

1. Holloway K. World Health Organization; The World Medicine Situation: Rational Use of Medicines. Geneva; 2011.

2. Hogerzeil H. Promoting rational prescribing: an international perspective. Br J Clin Pharmacol. 1995; 39(1):1–6. DOI: http://dx.doi.org/10.1111/j.1365-2125.1995.tb04402.x

3. Subha Lal L, Vaillancourt Rosenau P. Evaluation of Rational Use of Medications in the United States. J Prim Care Community Health. 2010; 1(1):62–8. https://doi.org/10.1177/21531909356446

4. Wang H, Li NN, Zhu H, Xu S, Lu H, Feng ZC. Prescription Pattern and Its Influencing Factors in Chinese County Hospitals: A Retrospective Cross-Sectional Study. PLoS One. 2013; 8(5). DOI: http://dx.doi.org/10.1371/journal.pone.0063225

5. Panos Kanavos, Prithviraj Das VD, Abegunde RL and DO. World Health Organisation, Discussion Paper. Options for financing and optimizing medicines in resource-poor countries. 2010.
6. WHO. World Health Organization. Health Action International: Measuring Medicine Prices, Availability, Affordability and Price Components. Geneva, Switzerland; 2008.

7. Kanavos P, Das P, Durairaj V, Laing R, Abegunde DO. Options for financing and optimizing medicines in resource-poor countries: WHO DISCUSSION PAPER. 2010.

8. Aina BA, Tayo F, Taylor O. Cost implication of irrational prescribing of chloroquine in Lagos State general hospitals. J Infect Dev Ctries. 2008 Feb 1; 2(1):68–72. https://doi.org/10.1177/215013909356446

9. Kokiwara P. Study of relation between prescribing pattern and antibiotic resistance pattern in a tertiary care hospital. 2016; (May).

10. World Health Organization. Rational use of drugs: A review of major issues. In Proceedings of the Conference of Experts. Nairobi, Kenya; 1985. p. 22–29.

11. World Health Organization. WHO Policy Perspectives on Medicines-Promoting rational use of medicines: core components. 2002.p. 1–6.

12. World Health Organization. Medicines: rational use of medicines. Available at: http://www.who.int/medicines/areas/rational_use/en. 2014.

13. Grissinger M. The Five Rights: A Destination Without a Map. Pharm Ther. 2010; 35(10):542.

14. Ghei P. How to investigate drug use in health facilities. Selected drug use indicators. Vol. 34, Health Policy. 1995. p. 73. DOI: http://dx.doi.org/10.1016/0168-0269(95)90068-3

15. No M, Me EH. Rational Use of Drugs in Egypt According to the WHO prescribing indicators: Pilot Baseline Situational Analysis. Krhrclp. 2017; 3(1):48–53.

16. Prab J, Kizzie-Hayford J, Walker E, Amfo-Asemana A. Antibiotic prescription pattern in a Ghanaian primary health care facility. Pan Afr Med J. 2017; 28(214):1–10. DOI: http://dx.doi.org/10.11604/pamj.2017.28.214.13940

17. Dakhale G, Pimpalbhute S, Bajait C, Raghute L. Evaluation of Knowledge, Attitude and Practice of Rational use of Medicine Among Interns and Resident Doctors in a Tertiary Care Teaching Hospital. 2016; 8(2):114–7. DOI: http://dx.doi.org/10.5530/jtpv.2016.2.10

18. Hogerzeil H V, Sallami AO, Walker GJA. Rational Use: An Essential Drugs Programme on Availability and Rational Use of Drugs. Lancet. 1989 Jan 21; 333(8630):141–2. DOI: http://dx.doi.org/10.1016/S0140-6736(89)91152-5

19. Ahmadi F, Zare E. Prescribing patterns of rural family physicians: a study in Kermanshah Province, Iran. BMC Public Health. 2017; 17(908). DOI: http://dx.doi.org/10.1186/s12889-017-4952-1

20. Hooli Tanuja V, Somashekar SC, Suraj B. Knowledge, attitude, practice of rational use of medicines among junior residents in a tertiary care hospital. JBCP. 2017; 6(9):2001–4. https://doi.org/10.18203/2319-2003jbcp.20173286

21. Adisa R, Aderemi JO, Fakaye TO. Evaluation of outpatient prescriptions in a University-based health care facility in Ibadan. West African J Pharm. 2015; 26(2).

22. Ofori-asenso R, Brhilika P, Pollock AM. Prescribing indicators at primary health care centers within the WHO African region: a systematic analysis (1995 – 2015). BMC Public Health. 2016; DOI: http://dx.doi.org/10.1186/s12889-016-3428-8

23. Ofori-Asenso R, Agymnan A. Irrational Use of Medicines—A Summary of Key Concepts. Pharmacy. 2016 Oct 28; 4(4):35. DOI: http://dx.doi.org/10.3390/pharmacy4040035

24. Babalola CP, Awoleye SA, Akinremi JO, Kotila OA. Evaluation of prescription pattern in Osun State (Southwest) Nigeria. J Public Heal Epidemiol. 2011; 3(3):94–8.

25. Adedayo ET, Hussain NA. Pattern of prescription drug use in Nigerian army hospitals. 2010; 9(3). DOI: http://dx.doi.org/10.4103/1596-3519.68366

26. Alfa J, Adigwe OP. Rational Use of Medicines in Nigeria: A Critical Review. 2014;4(16):89–99.

27. Odusanya O. Drug use indicators at a secondary health care facility in Lagos, Nigeria. J Community Med Prim Heal Care. 2005; 16(1):21–4. DOI: http://dx.doi.org/10.4314/jcmph.v16i1.32402

28. Tamuno I. Prescription pattern of clinicians in private health facilities in Kano, Northwestern Nigeria. Asian Pacific Trop Dis. 2011 Sep; 1(3):235–8. DOI: http://dx.doi.org/10.4103/S2222-1008(1)60037-6

29. Tamuno I, Fadare JO. Drug Prescription Pattern in a Nigerian Tertiary Hospital. 2012; 1(1):46–52. https://doi.org/10.4314/tjp.v1i1.19

30. Umar LW, Isah A, Musa S, Umar B. Prescribing pattern and antibiotic use for hospitalized children in a Northern Nigerian Teaching Hospital. Ann Afr Med. 2018 Jan 1; 17(1):26–32. DOI: http://dx.doi.org/10.4103/aam.aam_44_17

31. Babalola CP, Awoleye SA, Akinremi JO, Kotila OA. Evaluation of prescription pattern in Osun State (Southwest) Nigeria. 2011; 3(March):94–8.

32. Ahmadi F, Zare E. Prescribing patterns of rural family physicians: A study in Kermanshah Province, Iran. BMC Public Health. 2017; 17(908). DOI: http://dx.doi.org/10.1186/s12889-017-4952-1

33. Akande-Sholabi, Wuraola Adebusoye, Lawrence Olowookere O. Polypharmacy and factors associated with their prevalence among older patients attending a geriatric centre in South-West Nigeria. West African J Pharm. 2018; 29(1):35–45. DOI: http://dx.doi.org/10.2139/ssrn.3508322

34. Desalegn AA. Assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia: a cross-sectional study. 2013; http://dx.doi.org/10.1186/1472-6963-13-170

35. Hogerzeil H, Liberman J, Wirtz V, Kishore S, Selvaraj S, Kiddell et al. Promotion of access to essential medicines for Communicable Diseases: Practical implications of the UN Political Declaration. Lancet.. 2013; 381(9867):680–9. DOI: http://dx.doi.org/10.1016/S0140-6736(12)62128-X

36. Abdul Rasool BK, Fahmy SA, Abu-Gharbieh EP, Ali HS. Professional practices and perception towards rational use of medicines according to WHO methodology in United Arab Emirates. Pharm Pract (Granada). 2010; 8(1):70–6. DOI: http://dx.doi.org/10.4321/S1886-36552010000100009

37. Krivoy N, El-Ahwal WA, Bar-Lavie Y, Haddad S. Antibiotic prescription and cost patterns in a general intensive care unit. Pharm Pract (Granada). 2007; 5(2):67–73. DOI: http://dx.doi.org/10.4321/S1886-36552007000200003

38. Olayinka AT, Jimoh O, Ejembi J, Ige OT, Lamido Z, Ibrahim A, Aganabor V OB. Antimicrobial prescription pattern in a tertiary care hospital. Sahel Med J [serial online]. 2023; 23(2):103–8. DOI: http://dx.doi.org/10.4103/aam.aam_44_17

39. Bosu WK, Ofori-Adjei D. An audit of prescribing practices in health care facilities of the Wassa West district of Ghana. West Afr J Med. 2000; 19(4):298–303.

40. Alvarez-Uria G, Zachariah S, Thomas D. High prescription of antimicrobials in a rural hospital district in India. Pharm Pract. 2014; 12(2):0–0. DOI: http://dx.doi.org/10.4321/s1886-36552014000200003

41. Akande T, Ologe M. Prescription pattern at a secondary health care facility in Ilorin, Nigeria. Ann Afr Med. 2007;6(4):186. DOI: http://dx.doi.org/10.4103/1596-3519.55699