Research Article

Estimation of the Extent of Rational Drug Utilization in a Nigerian University Teaching Hospital

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ABSTRACT

Prescription pattern studies are drug utilization studies with the main focus on prescribing, dispensing and administering of drugs. reduction of abuse or misuse of monitored drugs. This study was to evaluate the prescription pattern and World Health Organization (WHO) prescribing indicators in Madonna University Teaching Hospital. The study was a retrospective descriptive study using medical records and patients prescriptions. The instrument of data collection was a WHO prescribing indicator form that has been modified to include columns for gender, age, dose, route of administration, duration and names of drugs prescribed. We summarized the data with descriptive statistics. Analgesics were the most commonly prescribed drug classes (156 (63.7%)) of prescriptions followed by antibiotics 136(55.5%), antimalarials (80(32.7%)) (80)), cardiovascular agents 48 (19.6%), and antihistamines 18(7.3%). Among 136 (63.7%) prescriptions which contained antibiotics, the most prescribed groups of antibiotics were Nitroimidazoles 61 (44.9%), Cephalosporins 22 (16.2%), and Fluoroquinolones 21 (15.4%). Among the 80 antimalarials, the most commonly prescribed was Artemisinin based combination therapy which is the artemether-lumefantrine combination 38 (47.5%), followed by artesunate injection 28 (35%) and then quinine 14 (17.5%). The study suggested irrational drug use with high level of polypharmacy.

Keywords: Rational use of medicines, drug utilization, prescriptions, polypharmacy, public health, rational prescribing.

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INTRODUCTION

A prescription is an instruction written by a medical practitioner that authorizes a patient to be issued with a medicine or treatment.[1] It is a written therapeutic transaction between the prescriber and dispenser.[2] Rational drug use is the means by which drugs would be taken for their appropriate clinical needs, in doses that meet patients own individual requirements for an adequate period of time, at the lowest cost to them and their community.[3] Over the years, the rational use of medicines has come to be regarded as one of the key principles in delivering effective and quality healthcare.[4] Rational prescribers should attempt to maximise clinical effectiveness, minimise harms, avoid wasting scarce healthcare resources and respect patient choice. To decrease prescription problems such as the high cost of the medications, indiscriminate and frequent use of injections and antibiotics, use of multiple medications, use of brand instead of generic names in prescribing, the World Health Organization (WHO) developed and validated core drug use indicators for prescribing, patient care and facility-specific studies. The prescribing indicators evaluate the practice of prescribers in five key areas namely; percentage of drugs prescribed by generic name, average number of drugs per prescription, percentage of prescriptions containing antibiotics, percentage of prescriptions containing injectable drugs, and percentage of drugs prescribed from the latest edition of National Essential Drug Lists (EDL) or formulary.[5]

Prescription pattern studies are drug utilization studies with the main focus on prescribing, dispensing and administering of drugs. There is increasing importance of prescription pattern monitoring because of a boost in marketing of new drugs, variations in pattern of prescribing and consumption of drugs, growing concern about delayed adverse effects, cost of drugs and volume of prescription.[6] Prescribing indicators are in evaluating healthcare delivery. But those core indicators fail to assess the completeness of prescriptions (including standards,

presence of patient, drug and prescriber and dispenser related information) which lead to irrational drug use. Common irrational uses of drugs include over or underuse of medications, high cost of the medications, indiscriminate and frequent use of injections and antibiotics, use of multiple medications and use of brand instead of generic names in prescribing. Also, prescribing medications not in accordance to standard treatment guidelines or not from essential drug list are major problems of present-day medical practice.

The consequences of irrational drug use include ineffective treatment, development of antimicrobial resistance (AMR), adverse effects, exacerbation or prolonging of illness and economic burden on patients and society.[7] So, to maximize benefits and to promote human wellbeing, drugs have to be used rationally.[8] More than half of all medicines are inappropriately prescribed or dispensed. This is prevalent in healthcare settings in the developing world where mechanisms for routine monitoring of medicines use are still in early stages of development.[9] This study was to evaluate the prescription pattern and World Health Organization prescribing indicators in Madonna University Teaching Hospital.

MATERIALS AND METHODS

Study design

A retrospective survey designed to describe the prescribing practices.

Study setting and location

The study was conducted at Madonna University Teaching Hospital situated in Elele, Rivers state. Rivers State is a state in the southern region of Nigeria. Rivers state borders include; Anambra and Imo on the north, Abia and Akwa-Ibom on the east, and Bayelsa and Delta on the west. Elele is a town in Rivers state. Madonna University Teaching Hospital has a General Outpatient Department, Surgical ward, Male and Female general ward, Accident and Emergency ward, Obstetrics and Gynaecology department, Paediatric ward, Radiology department, Psychiatry ward and a Pharmacy. There are over 300 medical and non-medical staff in the hospital. The hospital is affiliated with Madonna University Elele campus which was founded on the 10th of May1999.

Study population

Population are the patients treated in Madonna University Teaching Hospital. The patients are mostly students and staff from the University and also pilgrims to the pilgrimage centre located within the same premises. A small number of patients are from the villages close to the hospital. The study population includes all patients treated in the hospital from January 2020 to December 2021.

Eligibility criteria

Inclusion criteria

All complete prescriptions issued in the hospital between January 2020 and December 2021.

Exclusion criteria

All complete prescriptions which werenot very clearly written and issued in the hospital between the period under study.

Data collection

The instrument for data collection was a WHO prescribing indicator form that has been modified to include columns for gender, age, dose, route of administration, duration and names of drugs prescribed. Data was collected from patient case files, folders and prescription records. The modified prescribing indicator form was used to collect data on number of medications per prescription, number of drugs prescribed in generic names, number of prescriptions with antibiotic drugs, number of prescriptions with injectables, number of drugs prescribed from essential drug list, names of drugs prescribed, age, gender, dose and route of administration of the drugs. The data source was case files of patients consulted in the hospital from January 2020 to December 2021 and pharmacy records.

Data analysis

All the data was analyzed using Microsoft Excel and summarized with frequencies, averages/means and percentages were obtained. The following calculations were made:

1. The average number of drugs per prescription was calculated. We divided the total number of different drug products prescribed by the number of encounters surveyed. This was done to measure the degree of polypharmacy.
2. Percentage of drugs prescribed by generic name was calculated by dividing the number of drugs prescribed by generic name by total number of drugs prescribed and multiplied by 100 to measure the tendency of prescribing by generic name.
3. Percentage of prescriptions in which an antibiotic was prescribed was calculated by dividing the number of patient encounters in which an antibiotic was prescribed by the total number of encounters surveyed and multiplied by 100 to measure the overall commonly overused forms of drug therapy.
4. Percentage of prescriptions with an injection prescribed calculated by dividing the number of patient encounters in which an injection was prescribed by the total number of encounters surveyed and multiplied by 100 to measure overused forms of drug therapy.

5. The percentage of drugs prescribed which are in the essential drug list was calculated by dividing the number of the drugs from the essential drug list by the total number of drugs prescribed and multiplying by 100.
6. The percentage of each therapeutic class of drug was calculated by dividing the number of each therapeutic class of drug by the total number of drugs prescribed and then multiplying by 100 to determine the prescribing pattern
7. Percentage of drugs with route of administration was calculated by dividing the number of drugs with route of administration by the total number of medications and multiplying by 100 to determine completeness of prescription information.
8. Percentage of drugs with dose was calculated by dividing the number of drugs with dose by the total number of medications and multiplying by 100 to determine completeness of prescription information.
9. Percentage of drugs with duration was calculated by dividing the number of drugs with duration by the total number of medications and multiplying by 100 to determine completeness of prescription information.

Ethical approval

The research proposal was approved by the Ethical Committee of Madonna University Teaching Hospital. Written permission of the ethical committee before commencement of the study. Confidentiality was maintained by excluding every form of patient identification during data collection.

RESULTS AND DISCUSSION

Two hundred and forty-five prescriptions and a total of 924 drugs for both inpatients and outpatients of Madonna University Teaching Hospital were collected and analyzed in this study. The average number of drugs per prescription was 3.8. The number of drugs prescribed by generic name was 816 (88.3%). Antibiotics were prescribed in 136 (63.7%) prescriptions, 245 (26.5%) injections were prescribed and 799 (86.5%) drugs were prescribed from the essential drug list as shown in Table 1.

Table 1: Drug prescribing indicators in Madonna University Teaching Hospital (n = 245).

Prescribing indicators	Number	Average/ percentage	Ideal WHO value
Average number of drugs per encounter	924	3.8	1.6-1.8
Percentage of drugs prescribed by generic	816	88.3%	100%
Percentage of antibiotic drugs	392	42.4%	20.0-26.8%
Percentage of injections	245	26.5%	13.4-24.1%
Percentage of drugs from Essential drug list	799	86.5%	100%

Table 2: Therapeutic classes

Therapeutic class	n (%)
Analgesics	156 (63.7%)
Antibiotics	136 (55.5%)
Antimalarials	80 (32.7%)
Cardiovascular agents including antihypertensive	48 (19.6%)
Vitamins and minerals	44 (18.0%)
Antihistamine	18 (7.3%)

Table 3: Completeness of prescription information (n=245)

Variables	Number (%)	Ideal WHO value (%)
Prescriptions with age	234 (95.5)	100
Prescriptions with sex	242 (98.8)	100
Prescriptions with dose	241 (98.4)	100
Prescription with route of administration	236 (96.3)	100
Prescriptions with duration of therapy	209 (85.7%)	100

Table 4: Percentage of number of drugs per prescription (n=245)

Number of drugs	Number of prescriptions	Percentage of prescriptions (%)
1 drug	44	18.0
2 drugs	48	19.6
3 drugs	59	24.1
4 drugs	40	16.3
5 drugs	32	13.1
≥6 drugs	22	9.0

A total of 245 prescriptions were collected from the patient case files of Madonna University Teaching Hospital. The prescriptions were analyzed for the presence of information with regard to patient and the prescribed drugs employing drug use indicators described by WHO and guidelines for safe prescribing. The average number of drugs per encounter was higher than the ideal WHO standard value of 1.6-1.8. This is in line with other studies such as the assessment of drug prescribing pattern in Pakistan[10] and some primary health care centres in the African Region such as Nigeria and Ghana.[11] Polypharmacy is a common defect in prescription writing which contributes to the risk of increased incidence of adverse drug reactions, antibiotic resistance and harmful drug interactions. Generic prescribing accounted for 88.3% which is lower than the ideal WHO standard which is 100%. This was also noticed in other studies performed in some Primary Health Care centres in the WHO African Region.[11] The low percentage generic prescribing in this study can be

attributed to the lack of emphasis on that aspect in medical training and practice and also to the influence of promotional activities of drug industry in the country. Introduction of concepts of list of essential drugs, generic prescribing and good prescription writing in medical curriculum should be a must. The percentage of drugs which were antibiotics was significantly higher than the ideal WHO standard. This could be accounted for by the fact that there is a high burden of infectious diseases in the African region as evidenced by a study in 11 countries in Africa namely; Nigeria, Ghana, Tanzania, Kenya, Gambia, Zambia, Zimbabwe, South Africa, Ethiopia, Burkina Faso and Botswana.[11] This needs to be addressed as it could lead to antibiotic resistance. The percentage of injectables was slightly higher than the WHO standard. This could be as a result of the fact that most of the patients are on admission.

In addition, route of administration, and duration of treatment was slightly less than the ideal WHO standard of 100% but it is a good starting point. The low rate of compliance with the WHO prescribing indicators seems to be common in developing and under developed countries as evidenced by the studies performed in Ethiopia, Pakistan[10], and the Tertiary Care District Hospital in Central Nepal[12] to mention a few. This is easier for a hospital pharmacist who can communicate with the prescribing physician in the same health facility as compared to a community pharmacist. The most commonly administered therapeutic class of drugs as discovered in this study are the analgesics especially Paracetamol. This is in line with the study in South India which also has Paracetamol as the most commonly prescribed analgesic.[13] This may be due to the prevalence of malaria and fever in this region as paracetamol serves as both a pain relief and an antipyretic agent. Following the analgesics are the antibiotics with the nitroimidazole metronidazole as the most commonly prescribed followed by the cephalosporins. This is similar to the study in Pakistan which has the cephalosporins as the most commonly prescribed antibiotics.[10] This is due to metronidazole and the third generation cephalosporins being broad-spectrum antibiotics and also metronidazole is used in the treatment of nosocomial infection and also in cases where causative agent of an infection is not yet known. Antimalarials are the third most prescribed therapeutic class of drug due to the prevalence of malaria in the region with artemether-lumefantrine being the most commonly prescribed antimalarial due to its fast onset of action. This is in line with a previous study done in Nigeria which has artemether-lumefantrine as its most commonly prescribed antimalarial drug.[14]

CONCLUSION

Based on the results obtained, the study shows low compliance with WHO prescribing indicators. Prescribing from the Essential Drug List and generic prescribing were substandard while antibiotic prescribing, injections were above the World Health Organization standard. Polypharmacy was high. This underscores the need an effective and functionalized Drugs and Therapeutic Committee in the hospital and continuous sensitization trainings for prescribers and pharmacists (dispensers) on the rational use of medicines. Copies of the treatment guideline and hospital essential list of drugs should be availed in all outpatient prescribing and dispensing units.

REFERENCES

1. Godman, B., Wettermark, B., Van Woerkom, M., Fraeyman, J., Alvarez-Madrazo, S., Berg, C., ... & Gustafsson, L. L. Multiple policies to enhance prescribing efficiency for established medicines in Europe with a particular focus on demand-side measures: findings and future implications. *Frontiers in pharmacology*, 2014;*5*:106.
2. World Health Organization. (2002). *Promoting rational use of medicines: core components* (No. WHO/EDM/2002.3). World Health Organization.
3. Desalegn, A. A. Assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia: a cross-sectional study. *BMC health services research*, 2013;*13*(1):1-6.
4. Gopalakrishnan, S., Udayshankar, P. M., & Rama, R. Standard treatment guidelines in primary healthcare practice. *Journal of family medicine and primary care*, 2014; *3*(4): 424.
5. World Health Organization. How to investigate drug use in health facilities: selected drug use indicators. 1993. Available from : http://apps.who.int/medicine docs/en/d/Js2289e. Accessed November 13, 2020
6. World Health Organization (WHO, 1985). Rational use of drugs: A review of major issues; Proceedings of the Conference of Experts; Nairobi, Kenya. 22–29 November 1985.
7. Berger, M., Murugi, J., Buch, E., IJsselmuiden, C., Moran, M., Guzman, J., ... & Kubata, B. Strengthening pharmaceutical innovation in Africa. Council on Health Research for Development (COHRED, 2016), New Partnership for Africa's Development (NEPAD) 2009. 2010 Council on Health Research for Development (COHRED) New Partnership for Africa's Development (NEPAD).
8. Ritika, R., Kondr, B., & Ghongane, B. Drug utilization research; need of the hour. *International Journal of Pharma and Bioscience*, 2013;*4*(3):170-178.
9. World Health Organization. World medicines situation report 2011. Geneva: World Health Organization (WHO, 2011).
10. Atif, M., Sarwar, M. R., Azeem, M., Umer, D., Rauf, A., Rasool, A., ... & Scahill, S. Assessment of WHO/INRUD core drug use indicators in two tertiary care hospitals of Bahawalpur, Punjab, Pakistan. *Journal of pharmaceutical policy and practice*, 2016;*9*(1):1-8.

11. Ofori-Asenso, R., Brhlikova, P., & Pollock, A. M. Prescribing indicators at primary health care centers within the WHO African region: a systematic analysis (1995–2015). *BMC public health*, 2016;*16*(1):1-14.

12. Shrestha, R., Prajapati, S. Assessment of prescription pattern and prescription error in outpatient Department at Tertiary Care District Hospital, Central Nepal. *J of Pharm Policy and Pract* 2019;12, 16.

13. Shanmugapriya S, Saravanan T, Rajee SS, Venkatrajan R, Thomas PM. Drug prescription pattern of outpatients in a tertiary care teaching hospital in Tamil Nadu. *Perspect Clin Res*. 2018; 9(3): 113-138.

14. Builders, M. I., Degge, H., Peter, J. Y., & Ogbole, E. Prescription pattern of antimalarial drugs in a teaching hospital in Nigeria. British Biomedical Bulletine 2014; 2(1): 267-276.

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