

Assessment of prescription quality and incidence of drug therapy problems among patients in selected primary health facilities in Maiduguri metropolitan area, Borno State

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Abstract

Background: The quality of medicine utilization at PHCs has been a matter of concern because of lack of skilled healthcare professionals and challenges with government funding. There is little information on quality of drug utilization following the use of PHCs as the major provider of basic medical services for internally displaced persons in Borno State. This study therefore aims to assess quality of drug prescriptions and also identify drug therapy problems (DTPs).

Material and Methods: This was a cross sectional retrospective review of prescriptions obtained from the medical records of 1000 patients in five PHC. Demographic data, drugs prescribed, diagnosis and other relevant information were extracted from medical records. WHO/INRUD core prescribing indicator was used to assess prescription quality, while DTPs were identified using Beers criteria, STOPP/START, NORGEF criteria. The data was entered into Microsoft excel and cleaned before being loaded into SPSS version 21 for analysis using descriptive statistics.

Results: The most prescribed drugs included analgesics (100%), antibiotics (79.6%), antimalarials (48.6%) and antihypertensives (25.9%). DTPs were identified in more than half of all prescriptions (52.5%) and mostly involved antibiotics (38.8%), analgesics (28.5%), proton pump inhibitors (23.3%) and corticosteroids (10.4%). DTPs found included wrong drug, untreated conditions, unnecessary drug therapy and polypharmacy.

Conclusion: Drugs prescribing quality was poor and characterized by high level DTPs, irrational antibiotic use and polypharmacy. This may increase the risk of microbial resistance to commonly used antibiotics and adverse drug reactions.

Keywords: Antibiotics, Drug therapy problems, Drug prescriptions, Primary healthcare, WHO/INRUD core indicators

Introduction

The primary health care system in the country is plagued by inadequate funding, lack of basic equipment and technologies as well as absence of skilled manpower. These challenges are now compounded by massive influx of internally displaced persons (IDPs) created by the worst humanitarian crisis in the country affecting millions of people.¹ The primary healthcare (PHC) system is responsible for basic medical care of both IDPs and local residents.^{2,3} Humanitarian organizations are providing significant support for the maintenance of services at PHCs,

however coping with increasing patient inflow remains a major challenge.⁴

There have been frequent reports infectious diseases such as cholera, measles, gastroenteritis, sexually transmitted infections and non-communicable diseases.^{5,6} The increased demand for healthcare services is occurring against the background of damaged facilities, lack of qualified staff and violence related disruptions to service delivery.⁷

The incidence of DTPs at PHC level has been an issue of concern in many developing countries, although figures vary widely in literature.^{8,9} The most frequently reported DTPs include polypharmacy, unnecessary drug therapy, adverse drug reactions, untreated conditions, ineffective drug(s) and wrong drug dosages.¹⁰⁻¹² These DTPs compromise the quality of medicine utilization and have been reported to cause

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poor clinical outcomes, adverse drug reactions, increased risk of emergency hospitalization, deaths and unnecessary medical costs.^{13,14}

Drug therapy comes with some safety concerns from known pharmacological effects and unpredictable adverse effects, so the presence of DTPs is believed to significantly increase the risk of more side effects and drug interactions both of which can cause reduction in patient's quality of life. The misuse of medicines at PHCs can be linked to the use of low cadre healthcare workers many of whom have limited training, skills and expertise to prescribe drugs, manage complex diseases and effectively respond to complications. While Nigeria's national health policy allows nurses, community health workers to prescribe medicines for simple ailments, there is little oversight on prescription quality and tracking the incidence of DTPs. This study is therefore aimed at assessing prescription quality and incidence of DTPs

Materials and Methods

Study setting: The study was carried out in five major PHCs located in Maiduguri the capital city of Borno State. The selection of PHCs was based on location in densely populated areas, patient traffic at least 500 per month and availability of good medical records. The selected PHCs included Abbagaram PHC, 1000 housing estate PHC, Gwange PHC, Jidari Polo PHC and Gamboru PHC located in major residential districts of Maiduguri metropolitan area.

Study design: This was a cross sectional retrospective review of drug prescriptions obtained from medical records of patients over a six month period (May and November 2023). The study duration was chosen to align with higher patient traffic and completeness of medical records as older records appeared to have missing information.

Sample size/Sampling: The sample size was determined using the formula $n = Z^2 PQ/e^2$ where n = sample size, $Z = 1.96$ at 95% confidence interval, P = proportion of prescriptions with DTPs, $Q = 1 - P$, e = margin of error (5%). The sample size was determined to be 384; however 1000 medical records were selected by simple random sampling method at the rate of 200 per facility.

Assessment tools: Quality of prescriptions was determined using the World Health Organization and International network for rational use of drug (WHO/INRUD) core indicators¹⁵ which provided standards for number of drugs, percentage of antibiotics and percentage of injectable drugs per encounter as well as generic prescriptions and percentage of drugs prescribed from the essential drugs

list. While DTPs was assessed with the use of Beers criteria¹⁶, the screening tool of older persons prescriptions (STOPP)/ Screening tool to alert doctors to right treatment (START)¹⁷ and the Norwegian general practice criteria (NORGEPI).¹⁸

Outcome variables: The prescriptions were reviewed for incompatibilities between diagnosis and drugs identified when there is a mismatch based on national standard treatment guideline. Dosage errors were determined when dosage is outside recommended range for patient's age, body weight, frequency of dosage and duration of therapy. The potential for drug interactions was identified when two or more co-prescribed drugs may chemically react to amplify or reduce the pharmacological effect with potential for toxicity or ineffective therapy. A medical condition is regarded as untreated if no specific medication was prescribed for it and when more than one drug is prescribed to manage one clinical condition – it was considered duplicate therapy. A drug is considered to be contraindicated if there is documented evidence that it will possibly result in adverse reactions, allergy, worsen symptoms of disease(s), teratogenic in pregnancy and toxic in children. Polypharmacy was considered to have occurred when there are ≥ 4 drugs per patient encounter.

Data collection: The materials used for data collection included Medical folders, attendance records and dispensing ledgers. Patients medical records were selected using simple random sampling method and relevant demographic, drug prescription, and clinical data was extracted. The presence of drug(s) considered inappropriate by Beers criteria, STOPP/STOPP and NORGEPI criteria in light of patient variables was determined to be a DTP.

Analysis: The data was entered in to SPSS version 22 and analyzed using descriptive statistics for quality of drug prescription, polypharmacy and DTPs. The prescriptions were reviewed for DTP using the three tools, while WHO/INRUD core prescribing indicator tool was used to determine prescription quality.

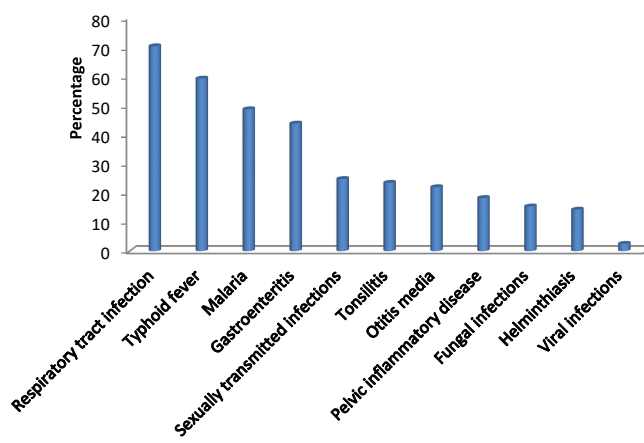
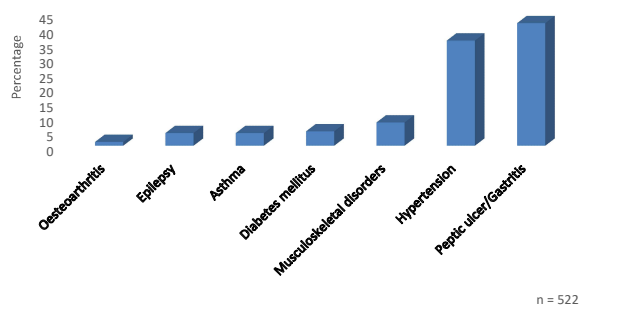
Ethical issue: The approval for this study was obtained from Borno State Ministry of Health (MOH/GEN/6679/1) and Borno State primary healthcare development agency (SPHCDA/GEN/181)

Results

Majority of patients were females (65.2%) and most of them were also (63.3%). The average duration of patient visits to these facilities was 4.7 years (**Table 1**). The results showed bacterial infections (67.6%), malaria (48.5%) and fungal infections (15.3%) were the most frequently encountered among patients.

Table 1: Demographic data

Variable	Frequency (%)
Gender	
Male	348 (34.8)
Female	652 (65.2)
Marital status	
Single	319 (31.9)
Married	633 (63.3)
Divorced	3 (0.3)
Widowed	45 (4.5)
Education	
Illiterate	690 (69)
Primary	104 (10.4)
Secondary	160 (16)
Tertiary	46 (4.6)
Age (years)	
≤ 20	253 (25.3)
21 – 30	191 (19.1)
31 – 40	181 (18.1)
41 - 50	133 (13.3)
51 – 60	96 (9.6)
61 - 70	89 (8.9)
≥ 71	57 (5.7)
Mean age	36.6 ± 18.6
Attendance at PHCs (years)	
1 – 2	59 (5.9)
3 – 4	369 (36.9)
5 – 6	498 (49.8)
≥ 7	74 (7.4)
Mean	4.7 ± 1.6 yrs.

**Figure 1:** Prevalence of infectious diseases (n=642)**Figure 2:** Prevalence of non-communicable diseases

Overall, more than half of patients (64.2%) were treated for communicable diseases. The most common bacterial infections were respiratory tract infections (70.7%), typhoid fever (59.1%), gastrointestinal infections (43.7%) and sexually transmitted infections (24.7%). Others included tonsillitis (23.4%), otitis media (21.9%) and pelvic inflammatory disease among females (18.2%) (**Figure 1**).

The most frequently encountered non-communicable diseases were peptic ulcer/Gastritis (41.6%), hypertension (35.7%) and musculoskeletal disorders (7.9%). While diabetes mellitus (4.9%), asthma (4.3%) and epilepsy (4.3%) were less frequently found among patients (**Figure 2**).

A total of 2350 prescriptions consisting 11045 individual drugs were reviewed and analgesics (100%), antibiotics (79.6%), antimalarials (48.6%), gastrointestinal drugs (41.8%), antihypertensives (35.7%), antifungals (15.3%) and anthelmintics (14.2%) were the most prescribed class of drugs. Anxiolytics were prescribed for 6.8% patients, while 4.9% were for diabetes mellitus (**Table 2**).

Drug therapy problems were found in more than half of all prescriptions (52.5%) of which wrong drug (86.8%), untreated conditions (21.6%), unnecessary drug

therapy (21.6%) and duplicate therapy (11.1%). The need for additional drug(s) was found among 9.4% of patients while contraindication was identified in 1.8% of prescriptions (**Figure 3**).

The drugs most implicated in DTPs were antibiotics (38.8%), analgesics (28.5%), proton pump inhibitors (23.3%) and corticosteroids (10.4%) (**Figure 4**).

The quality of prescriptions was generally poor as results were well above the standard reference values set by WHO/INRUD core indicator. The percentage of antibiotics per encounter (79.6%), injectable drugs (48.5%), number of drugs per encounter (4.6) and generic prescription (78.4%) were above recommended standard values (**Table 3**).

Discussion

The quality of drug prescriptions was generally poor and comparably similar to reports from many developing countries,¹⁹ although contrasting figures have also been published.^{20,21} Most prescription audits in Nigeria largely focused on secondary and tertiary health facilities,²² with little emphasis on PHC facilities which provide basic medical care to majority of the population. While diseases were generally comparable to other studies, greater proportion of patients were females,^{23,24} as reported in previous studies.^{25,26}

Table 2: Drugs prescribed according to pharmacological classification

Class of drug	Frequency (%)	Drugs	n (%)
Analgesics	11045 (100)	Paracetamol	4615 (41.8)
		Ibuprofen	2847 (25.8)
		Diclofenac	3189 (28.9)
		Paracetamol + Codeine	394 (3.5)
Antibiotics	8791 (79.6)	Amoxicillin	538 (6.1)
		Ampicillin/Cloxacillin	423 (4.8)
		Ciprofloxacin	1328 (15.1)
		Levofloxacin	696 (7.9)
		Amoxicillin/Clavulanic acid	2749 (31.3)
		Cefuroxime	1765 (20.1)
		Doxycycline	362 (6.4)
		Cotrimoxazole	247 (2.8)
		Metronidazole	483 (5.5)
Antimalarials	5081 (48.6)	Artemether/Lumefantrine	2724 (53.6)
		Artesunate injection	646 (12.7)
		Artesunate/Piperaquine	492 (9.7)
		Dihydroartemisinin	150 (2.9)
		Arteether injection	1069 (21.1)
Antidiabetics	541 (4.9)	Metformin	435 (80.4)
		Glibenclamide	85 (15.7)
		Glimepiride	21 (3.9)
Antihistamines	232 (2.1)	Chlorpheniramine	179 (77.2)
		Promethazine	53 (22.8)
Anthelmintics	1568 (14.2)	Praziquantel	289 (18.5)
		Albendazole	857 (54.6)
		Mebendazole	422 (26.9)
Antifungals	1689 (15.3)	Griseofulvin	394 (23.3)
		Fluconazole	1200 (71.1)
		Nystatin	95 (5.6)
Anxiolytics	751 (6.8)	Diazepam	230 (30.6)
Antiepileptics	475 (4.3)	Bromazepam	521 (69.4)
		Carbamazepine	384 (80.8)
		Phenobarbitone	91 (19.2)
Antiasthmatics	475 (4.3)	Salbutamol	132 (27.8)
Antivirals	276 (2.5)	Salbutamol inhaler	343 (72.2)
		Acyclovir	276 (100)
Cardiovascular drugs	3943 (35.7)	Amlodipine	2027 (51.5)
		Nifedipine	546 (13.8)
		Methyldopa	344 (8.7)
		Atenolol	396 (10.1)
		Amiloride/Triamterene	630 (15.9)

Corticosteroids	243 (2.2)	Prednisolone	184 (75.7)
		Hydrocortisone	59 (24.3)
Gastrointestinal drugs	4595 [41.6]	Omeprazole	1973 [42.9]
		Rabeprazole	2126 [46.3]
		Loperamide	342 [7.4]
		Hyoscine N methyl bromide	154 [3.4]

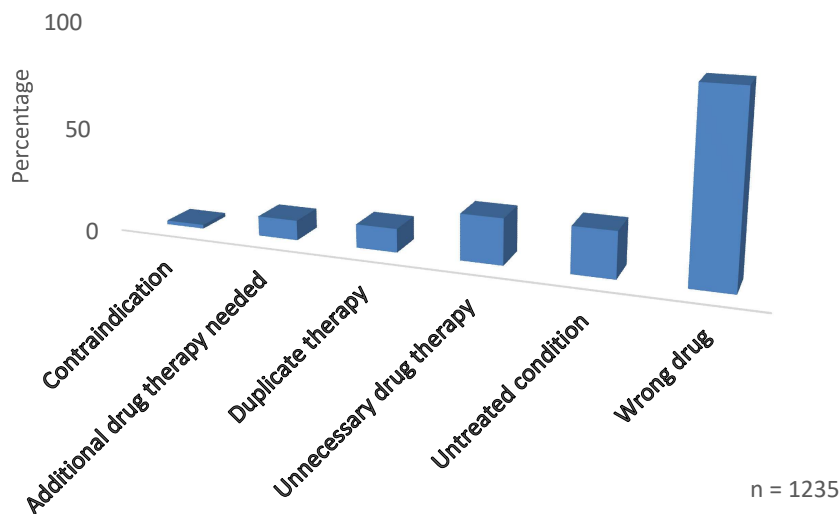


Figure 3: Frequency of drug therapy problems

Similarly bacterial infections and malaria appear to be the most encountered infectious diseases,²⁷ while peptic ulcer and hypertension were the most non-communicable diseases among patients.²³

The most prescribed drugs were analgesics and antibiotics similar to previous studies,^{28,29} contrasting rates have also been reported.^{30,31} The poor quality of prescriptions using WHO/INRUD indicators was similarly reported^{32,33} and several factors have been given for this consistent finding some of which include prescriber qualification, medicine availability, preferences and level of adherence to standard treatment guidelines.³² The deployment of low cadre health workers with limited training and inadequate oversight by physicians and pharmacists also create favourable environment for poor prescription practices.³⁴

While empirical prescription is widely practiced in most PHCs in the country, the problems associated with patient exposure to medication errors, irrational drug use and drug misadventure remains an endemic public health challenge.^{35,36} For instance, antibiotics were inappropriately prescribed for fevers associated with malaria and common cold.³⁷⁻³⁹ This observation may be partly responsible for the high antibiotic prescriptions in this study with its associated risk of resistance to commonly used antibiotics.⁴⁰ Furthermore, the clinical

competence and prescribing skills of low cadre health workers does not equip them with knowledge needed to optimize prescription quality.

The high prevalence of DTPs in this study have been previously reported,^{14,40} however mixed results have been previously reported due to differences in assessment tools, patient variables, study settings and DTP classification system.⁴² While the most common DTPs were wrong drug(s), unnecessary drug therapy and untreated conditions, individual drugs implicated vary widely between studies.^{42,43}

The number of drugs per encounter was considerably higher than WHO/INRUD standard (1.6–1.8),⁴⁴ so also it is for including injectable drugs,^{45,46} generic drug,⁴⁷ polypharmacy^{40,48} and prescription from essential drugs list.⁴⁹ The poor prescription quality coupled with the high prevalence of DTPs clearly indicates that significant challenges remain with drug utilization at PHC facilities. There is need for better training and supervision of prescribers at this level of the healthcare system if improvements are to be made to the quality of drug utilization.

Conclusion

Drug prescription quality was poor and characterized by high level of DTPs, polypharmacy and irrational antibiotic use. These significantly increase the risk of

adverse reactions, unnecessary cost of drugs and poor clinical outcomes.

Conflict Of Interest: None declared

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