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ASSESSMENT OF PRESCRIPTION ERRORS AND PRESCRIBING INDICATORS IN SHEIKH KHALIFA BIN ZAYYED MEDICAL COMPLEX, QUETTA, PAKISTAN

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Abstract

The safe use of prescribed drugs is important for a patient's quality of life. A large no of inappropriate prescriptions will be harmful to patient life and health. The study of the medication use for prescription indicators and prescription errors is important to increase rational drug use. The main reason for conducting this study was to evaluate rational drug use based on WHO/INRUD-core drug use indicators and prescription errors in Sheikh Khalifa Bin Zayyed Medical Complex Quetta, Pakistan. A hospital-based retrospective cross-sectional, quantitative study was conducted from July to November 2022. A total of 300 out-patient prescriptions retained at the hospital pharmacy from April to June 2022 were collected using a random sampling technique in July from the hospital's records and were evaluated. A total of 878 drugs were prescribed in 282 different prescriptions. The average number of drugs per encounter was 3.1, percentage of the medicine prescribed by the generic name was only 0.11%. The ratio of encounters with an antibiotic was 63.47% and with the injections, it was 1.06%. The percentage of drugs from the essential list was 100%. With respect to prescription errors related to the patient the name, age, weight, gender, and diagnosis were mentioned in 97.87%, 50.35%, 0%, 52.83%, and 2.48% of prescriptions respectively. On account of errors related to the prescriber the prescriber's name, signature, name of the department, directions to use medicines, refilling details, follow-up schedule, drug duplication, and legibility of handwriting were found to be 72.69%, 84.04%, 71.63%, 57.09%, 0%, 0%, 2.83%, and 76.95% respectively. The assessment of commission errors revealed that the dose of the drug, frequency, dosage form, quantity to supply and duration of therapy were mentioned in 32.97%, 78.01%, 95.03%, 34.39%, and 5.67% of the prescriptions. The evaluation of drug-drug interactions reported that 17.02% of prescriptions had interactions and major interactions accounted for 46.15% of the total interactions. Our study depicts that most of the prescribers are not acquainted with WHO guidelines for prescription writing or did not follow the guidelines which could have a serious impact on health and the economy. This study can help in designing policies that will promote the safe and effective use of drugs in the hospital.

Keywords: Healthcare quality, Medication safety, Prescription errors, Prescribing indicators, Rational drug use

INTRODUCTION

Since the publication of the report To Err is Human, medical errors have been of major concern worldwide (1). Medicines play a pivotal role in the health care delivery system. Appropriate use of medicines is critical to ensure the provision of better medical care to patients (2).

The World Health Organization (WHO) has developed and validated several indicators to provide an appropriate means to access a country's drug use patterns and to measure the efficacy of interventions. The indicators are highly standardized and are recommended for inclusion in studies for drug use (3).

Prescription errors are significant sources of irrational use of medicines (2). A prescription error is a failure in the prescription writing process that results in a wrong instruction about one or more of the normal features of a prescription (4). There are certain factors which influence rational prescribing, such as patients, health care professionals, working environment, drug supply system (including industrial impacts), legal regulations, information and misinformation about medicines and profit intentions in selling more medicines.



In general, self-medication, polypharmacy, inappropriate use of antibiotics, overuse of injectable medication and the prescribing of medicines without following clinical practice guidelines are common causes of inappropriate use of medicines. Invalid prescribing is unsafe and may lead to ineffective treatment, prolongation of disease, distress to the patient and increased costs of medication. Prescription errors may occur due to a lack of communication with patients, transcription errors, or ignoring the clinical condition of the patient when writing the prescription (2).

Irrational use of medicines is in a state of perplexity worldwide. The World Health Organization (WHO) estimates that more than half of all medicines are prescribed, dispensed, or sold inappropriately. The overuse, underuse, or misuse of medicines results in waste of scarce resources and widespread health hazards (5). The fundamental step to limiting the irrational use of medicines is to quantify the extent to which this is occurring. It is particularly important with antibiotics as resistance continues to climb and the armamentarium of new antibiotics coming to market is not on the increase (2).

In the 1990s, the World Health Organization (WHO) in collaboration with the International Network of Rational Use of Drugs (INRUD) developed a set of indicators to measure the performance of healthcare facilities related to the utilization of drugs (6). Similarly, the WHO also defined a set of indicators (omission and commission errors) to evaluate prescriptions? In Pakistan, unfortunately, law enforcement agencies have minimal or no checks on the prescriptions written by medical practitioners. Consequently, this leads to the inappropriate use of medicines and the patients are the ultimate sufferers (2). The study aimed to evaluate rational drug use based on World Health Organization –medication use indicators and prescription errors in Sheikh Khalifa Bin Zayyed Medical Complex Quetta, Pakistan. Mostly number of medications prescribed and no antibiotics were relatively higher and more than optimal values. A study was conducted as the fore to check prescription errors and prescribed indicators in the hospital practices in Quetta, Pakistan (2) but no studies were found on the assessment of prescription-related errors and indicators in Sheikh Khalifa Bin Zayyed Medical Complex Quetta.

MATERIALS AND METHODS

STUDY DESIGN AND DURATION

A hospital-based cross-sectional retrospective study design was utilized to assess prescription errors and prescribing indicators at Sheikh Khalifa Bin Zayyed Medical Complex in Quetta, Pakistan. The study was conducted from April to August 2022, and prescriptions for OPD patients were retrospectively collected from the hospital's records.

OUTCOME MEASURES

PRESCRIBING INDICATORS

The study utilized five standard prescribing indicators to assess healthcare providers' performance in ensuring the safe use of medicines, as defined by Ofori-Asenso in 2016. These indicators encompass the number of drugs per encounter (optimal range 1.6–1.8), the percentage of drugs prescribed by generic name (optimal value 100%), the ratio of encounters with antibiotics prescribed (optimal range 20.0–26.8%), the ratio of encounters with prescribed injections (optimal range 13.4–24.1%), and the percentage of drugs prescribed from the Essential Drugs List (EDL) (optimal value 100%). These optimal values were adopted from a previous study (2).

PRESCRIBING ERRORS

Prescription errors were categorized into three main types: omission errors, commission errors, and errors related to drug interactions (DIs). Omission errors encompassed issues concerning patient information, such as patient name, age, gender, weight, and diagnosis, as well as prescriber information, including the prescriber's name, address, phone number, qualification, registration, and date. Commission errors included inaccuracies related to dosage, dosage form, strength, treatment frequency, and duration. Errors associated with drug interactions were further classified as major, moderate, or minor and were assessed using the IBM Micromedex Drug Interact tool (2).

SAMPLE SIZE

Out of a total of 300 prescriptions obtained through convenient sampling, 18 were excluded from the study. The remaining 282 prescriptions were included in the evaluation. To be eligible for inclusion, prescriptions had to be written on the hospital's OPD slips. Prescriptions exclusively from the ophthalmology department were excluded due to the researcher's limited expertise in ophthalmic disorders and treatment protocols.

STUDY TOOLS

The study utilized the standard WHO/INRUD prescribing indicator form to collect data on prescribing indicators. Additionally, a pro forma, based on the established WHO prescription writing parameters, was developed and employed to record data related to prescription errors and drug interactions.

ETHICAL APPROVAL

Ethical clearance for the study was obtained from the Executive Director of Sheikh Khalifa Bin Zayed Medical Complex in Quetta.

DATA ANALYSIS

Data concerning prescribing indicators were computed and summarized on the prescribing indicator form in accordance with WHO guidelines. For the analysis of prescription errors, MS Excel Professional Plus 2016 was used, and the results were presented in terms of frequency and percentage.

RESULTS

PRESCRIBING INDICATORS

Table I displays the WHO/INRUD-core drug use indicators. A total of 878 medications were assessed retrospectively across 282 prescriptions. The study found that the average number of drugs per encounter was 3.1, and only 0.11% of the drugs were prescribed by generic name. Notably, 63.47% of encounters included antibiotics, and injections were advised in 1.06% of cases. All the prescribed medicines were from the essential drug list, accounting for 100% of the prescriptions.

Table I. The standard prescribing indicators (n=282)

Indicator	Results	Optimal level
The average number of drugs per encounter	3.11	1.6 – 1.8
% drugs prescribed by generic name	0.11 %	100%
% encounters with an antibiotic	63.47 %	20.0 – 26.8%
% encounters with an injection	1.06 %	13.4 – 24.1%
% drugs from essential drugs list	100 %	100 %

PRESCRIPTION ERRORS

OMISSION ERRORS

Table II highlights omission errors related to patient information and the prescriber. The most common omission error concerning patient information was the absence of the patient's weight, with none of the 282 prescriptions (100%) containing this information. The patient's name was mentioned in the majority of cases (97.87%). The patient's age was included in 50.35% of prescriptions, while gender and diagnosis were mentioned in 52.83% and 2.48% of prescriptions, respectively.

Regarding errors related to the prescriber, all 282 prescriptions (100%) lacked refilling details, and follow-up schedules were also absent in each of them. The name of the prescriber was mentioned in most cases (72.69%), along with the prescriber's signature (84.04%) and the name of the department (71.63%). Directions for drug use were provided in 57.09% of prescriptions. The analysis revealed that there was no duplication of drugs in the majority of prescriptions (97.16%), and the handwriting was legible for most of them (76.95%).

Table II. Omission errors related to patient information and the prescriber

Type of errors		Frequency	Percentage%
Errors related to patients information			
Patient name	Mentioned	276	97.87
	Not mentioned	6	2.12
Age	Mentioned	142	50.35
	Not mentioned	140	49.64
Patient	Mentioned	0	0
Weight	Not mentioned	282	100
Gender	Mentioned	149	52.83
	Not mentioned	133	47.16
Diagnosis	Mentioned	7	2.48
	Not mentioned	275	97.51
Omission Errors related to prescriber			
Prescriber	Mentioned	205	72.69
Name	Not mentioned	77	27.30
Prescriber's	Mentioned	237	84.04
Signature	Not mentioned	45	15.95
Name of	Mentioned	202	71.63
Department	Not mentioned	80	28.36
Directions to use	Mentioned	161	57.09
	Not mentioned	121	42.90
Refilling details	Mentioned	0	0
	Not mentioned	282	100
Follow up schedule	Mentioned	0	0
	Not mentioned	282	100
Drug duplication	Yes	8	2.83
	No	274	97.16
Hand writing	Legible	217	76.95
	Illegible	65	23.04

COMMISSION ERRORS

Table III identifies commission errors, indicating that dose information was omitted in the majority of cases (66.66%). However, frequency and dosage form were specified in 78.01% and 95.60% of the prescriptions, respectively. The quantity to supply and the duration of therapy were missing in the majority of cases (65.60% and 94.32%, respectively).

Table III. Commission errors

Type of error		Frequency	Percentage
Dose	Mentioned	93	32.97
	Not mentioned	188	66.66
Frequency	Mentioned	220	78.01
	Not mentioned	62	21.98
Dosage form	Mentioned	268	95.03
	Not mentioned	14	4.96
Quantity to supply	Mentioned	97	34.39
	Not mentioned	185	65.60
Duration of therapy	Mentioned	16	5.67
	Not mentioned	266	94.32

ERRORS RELATED TO DRUG-DRUG INTERACTIONS

Table IV presents errors related to drug-drug interactions. Out of the 282 prescriptions, 48 (17.02%) contained 91 interactions. These interactions were classified as major (46.15%), moderate (39.56%), and minor (14.28%).

Table IV. Errors related to drug-drug interactions

Drug-drug interactions		Frequency	Percentage%
Interactions	Yes	48	17.02
	No	234	82.97
Number of interactions		91 out of 282	32.26
Type of interactions	Major	42 out of 91	46.15
	Moderate	36 out of 91	39.56
	Minor	13 out of 91	14.28



DISCUSSION

As per the World Health Organization (WHO) report, more than half of all medicines are subject to inappropriate prescribing, dispensing, or sales, particularly prevalent in healthcare settings in developing countries where mechanisms for routine medication monitoring are still in early stages of development (7). Prescription errors represent a significant challenge, impacting both general practice and hospital settings. Although they are seldom fatal, they can have a substantial impact on patient safety and healthcare quality (8). This study aimed to assess prescribing indicators and prescription errors using the WHO standard.

A total of 282 prescriptions were scrutinized to assess prescribing patterns and prescription accuracy. The findings showed that, on average, each prescription contained 3.11 prescribed drugs. This number exceeded the recommended range of 1.6 to 1.8 drugs per prescription and was higher than the average of 2.81 drugs per prescription in a teaching hospital in Central Nepal (9) and 2.4 drugs per prescription at primary healthcare centers in the Eastern Province of Saudi Arabia (10). In contrast, Indonesia reported a higher average of 3.31 (11), while India reported 5.6 drugs per prescription (12).

The rate of generic drug prescriptions was disappointingly low at 0.11%, falling significantly short of the WHO's recommendation that all medications be prescribed using their generic names. This value was substantially lower than the 78.9% reported in an Italian university hospital (13) and the 6.67% reported in the Southern District of Bangladesh (14).

The results regarding antibiotic usage in the hospital were disheartening. The study found that 63.47% of encounters involved antibiotics, which far exceeded the optimal range of 20.0% to 26.8%. This value was notably higher than the 31.8% observed in Goa, India (15) and 36.2% reported in Ethiopia (16). Bangladesh reported a slightly higher rate at 64% (14). Conversely, the percentage of encounters involving injections was only 1.06%, which was much lower than optimal values. Ethiopia reported 38.1% of encounters involving injections (17), while Bangladesh reported 60% (14).

The ratio of medicine advised from the Essential Drug List was found to be 100% and in compliance with the WHO standards. A study in Goa found that 99.67% of ordered drugs were on the essential drug list of India. The most significant contributing factor for this compliance is that the prescriptions analyzed in this study were collected from hospital records and reflected medications dispensed by the hospital's pharmacy. Notably, no prescriptions from Orthopedic, Ophthalmology, and Neurology departments were included in the study's data collection.

An evaluation of the prescriptions included in the study revealed that none of them met the criteria for a standard prescription. Patient information, such as name, age, weight, gender, and diagnosis, was mentioned in 97.87%, 50.35%, 0%, 53.83%, and 2.48% of the prescriptions, respectively. A similar study in Bangladesh reported that 100% of prescriptions included the patient's name and the date of prescription (14), while a previous study in Bahawalpur, Pakistan, found that 6.7% omitted the patient's name, 66% lacked the patient's age, 79.7% didn't include the patient's weight, 72% missed gender, and 37.3% lacked patient diagnoses (2).

Regarding omission errors related to the prescriber, which encompassed the absence of the prescriber's name, signature, and department, these errors occurred in 27.69%, 15.95%, and 28.36% of the prescriptions, respectively. In a study conducted in Maharashtra, India, 23.3% did not include the prescriber's name (18), while the prescriber's signature was missing in 26.5% in previous studies carried out in major cities of Punjab, Pakistan (19). None of the prescriptions in this study included information about refilling or follow-up schedules. In contrast, a study in rural Sri Lanka found that 6% of prescriptions included refilling information and 0.3% had issues with drug duplication (20). Approximately 76.95% of prescriptions in this study were legible, with 84.4% featuring clear handwriting in an Egyptian study (21).

As for commission errors, the study revealed that the dose, frequency, dosage form, quantity to supply, and duration of therapy were indicated in 32.97%, 78.01%, 95.03%, 34.39%, and 5.67% of the prescriptions, respectively. A study at Menoufiya University, Menoufia, Egypt, found that 81.6% of prescriptions included the dose (21). Another study conducted in three pediatric teaching hospitals in Khartoum reported that 98.3% of prescriptions had the dose mentioned (22). Both of these studies had higher compliance with these parameters compared to the present study. They also reported that

frequencies, duration of treatment, and directions for medication use were mentioned in 96.1%, 80.6%, and 66.6% of prescriptions.

Drug-drug interactions are particularly significant adverse events because they are predictable and, therefore, can be avoided or effectively managed. The results of this study revealed a 17.02% occurrence of drug-drug interactions, with 48.15% classified as major interactions, 39.56% as moderate interactions, and 14.28% as minor interactions. A study in a Brazilian teaching hospital reported an overall frequency of drug-drug interactions at 49.7%, with major drug interactions at 3.4% (23). A similar study in rural Sri Lanka reported that 52.5% of prescriptions had drug-drug interactions, with 7% being major interactions, 74% moderate interactions, and 19% minor interactions (20).

CONCLUSION

In conclusion, this study assessed drug prescription practices using WHO/INRUD core drug prescribing indicators and identified significant prescription errors in out-patient prescriptions. The findings indicated substantial deviations from optimal values across various prescribing indicators and highlighted a high prevalence of prescription errors, including omissions of critical patient information, prescriber details, and inadequate drug-related information. These errors can contribute to adverse drug events, emphasizing the need for improvements in prescription practices.

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