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Analysis and Evaluation of Medical Prescription Practices in Taiz City– A Cross-Sectional Study

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ABSTRACT

Introduction: Using medications wisely means giving the right medicine, in the right amount, and at the right price. According to the World Health Organization (WHO), this means that patients should get the medicines they need based on their health, in doses that suit them, for as long as necessary, and at the lowest cost for themselves and their community.
Objective: The aim of the study is to evaluate and analyze prescriptions from different areas in Taiz city according to WHO prescribing indicators, detect medication errors, and detect drug interactions.
Method: This study was a cross-sectional design study conducted from March to June 2022 in different areas in Taiz City. The prescriptions included in the study were from qualified doctors in different specialties. The prescription was analyzed according to WHO parameters and pattern indicators. From each prescription, data regarding the total number of drugs, generics, antibiotics, parenteral drugs, and essential drugs were extracted. A total of 350 medical prescriptions were included in this study.
Results: All the drugs that were collected in the prescriptions were 1610 drug kinds. found out that the average number of drugs per prescription was 4.61. In addition, the percentage of drugs prescribed by generic name was 8.3%. Furthermore, the percentage of antibiotics was 13.3%. Furthermore, the percentage of injection as the route of administration was 12.3%. And the percentage of drugs prescribed from the essential drug list was 69.4%. Furthermore, the number of drug-drug interactions detected was 108; the use of the drug was missed with 100 medicines; dosage frequency was missed with 166 medicines; the date of prescription was missed with 83 prescriptions; the age of the patient was missed with 162 prescriptions; unclear writing was in 70 prescriptions; the name of the patient was missed in 6 prescriptions; and the diagnosis was missed in 117 prescriptions.
Conclusion: The number of drug-drug interactions detected was 108; the dose of the drug was missed with 100 medicines; the dosage frequency was missed with 166 medicines; the date of prescription was missed with 83 prescriptions; the age of the patient was missed with 162 prescriptions; unclear writing was in 70 prescriptions; the name of the patient was missed in 6 prescriptions; and the diagnosis was missed in 117 prescriptions.

Keywords: Medical Prescriptions, Interpretation, medication errors, drug interactions, Taiz

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INTRODUCTION

The appropriate taking of drugs requires the administration of the medications to the patient in the suitable doses at the minimum cost and for the correct duration (1). Many populations worldwide experience issues as a result of the irrational use of medications, which should be managed. In 1985, the World Health Organization (WHO) held an international conference in Nairobi, Kenya, where they developed guidelines (2). Essential drugs are a set of medications that meet the healthcare needs of a community. They should always be available in appropriate dosage forms and sufficient quantities (3). This concept was developed to improve public health and maximize the positive impact of medications, particularly in developing countries (4, 5).

Globally, studies indicate that 50% of patients do not take their medications correctly. Additionally, more than half of all drugs are sold, prescribed, or dispensed improperly, and nearly one-third of the world's population has limited access to essential medicines (6).

Irrational prescribing is a significant global health issue. Research has shown that poor prescribing practices lead to unsafe treatments, worsening of illnesses, and patient harm. Moreover, they contribute to higher healthcare costs due to prolonged therapy (2).

A medication error refers to any avoidable incident that could result in improper use of medications or cause harm to a patient. Such errors can happen at any stage of the treatment process, starting from selecting the medication to administering it. Numerous studies have shown that medication errors have negatively impacted patient health, with a significant portion of these mistakes occurring during the prescription-writing phase (7).

The other medication errors may be in dosage or medication name, illegible writing, wrong time, unauthorized drugs, improper dose, selection of the wrong drug, wrong formulation, wrong label, and drug-drug interactions. Drug-drug interactions in medical prescriptions are among the most common errors that may be found and can result in altering the effect of a drug on the body when it is taken concurrently with another medication. This phenomenon, known as a drug-drug interaction, may slow down, reduce, or enhance the absorption of one or both drugs. As a result, the therapeutic effect of either medication can be diminished or amplified, potentially leading to unwanted side effects. Drug-drug interactions can involve antagonism, where two or more medications produce opposing effects within the body. In such cases, one drug may inhibit or lessen the effectiveness of another. This type of interaction is referred to as drug antagonism; examples are morphine + naloxone and paracetamol + N-acetylcysteine (8).

Also, drug-drug interactions may result in synergism, where the combined effect of two or more medications exceeds the sum of their individual effects. This synergistic interaction can lead to enhanced therapeutic outcomes or, in some cases, increased risk of adverse effects. Example: (Aspirin + Caffeine) and (Aspirin + Warfarin) (8).

To prevent drug-drug interactions in medical prescriptions, we need the cooperation of all people, from the patient himself to the healthcare provider or pharmacist. For the patient, you should make sure all your health care providers know all the medications that you are taking, including prescription and over-the-counter drugs. In addition, ask your health care provider or pharmacist if you can take certain medications with other medications. Also use drug interaction checkers. Furthermore, read the label of all over-the-counter and prescription drugs you take. Finally, use one pharmacy for all prescriptions. For the health care providers, they must know what you are prescribed. In addition, write the prescription with a clear formulary. Furthermore, you must have full information about drug-drug interactions, double-check the prescription, dispense the prescription by one pharmacist, ask the patient about their dietary system and lifestyle, and describe how to use medicine. Inform the patient about interactions (9).

Patients need to be closely monitored following drug administration to assess the effectiveness of the treatment. If the therapy proves successful and the disease is resolved, the medication should be discontinued. However, if the treatment is effective but requires continuation, it should be maintained as appropriate. But if the disease is not cured completely and there are no serious side effects, continue the treatment; if the treatment is effective but the disease is not cured completely and there are serious side effects, stop the treatment (9).

Finally, if the disease remains unresolved, it is essential to review and verify each step of the treatment process: Was the diagnosis accurate? Were the therapeutic goals appropriate? Were the chosen medications suitable for the patient? Were the drugs prescribed properly? Did the patient receive clear instructions on how to use the medication? Was the treatment's effectiveness adequately monitored? (9-11).

Evaluating prescription patterns using the World Health Organization (WHO) prescribing indicators in developing countries plays a crucial role in promoting rational drug use. These indicators consist of the following parameters:

1. The average number of medications prescribed per patient visit, with an ideal range between 1.6 and 1.8.
2. The proportion of prescriptions written using generic drug names, where the optimal target is 100%.
3. The percentage of patient visits that result in an antibiotic prescription is ideally maintained between 20% and 26.8%.
4. The proportion of encounters in which an injection is administered, with an optimal range of 13.4% to 24.1%.
5. The percentage of prescribed medications that are listed on the Essential Drugs List (EDL), for which the ideal goal is 100%. (12).

METHODS

Study design

A cross-sectional design study was conducted. The prescription was analyzed according to WHO parameters and pattern indicators. From each prescription, data regarding the total number of drugs, generics, antibiotics, parenteral drugs, and essential drugs were extracted. A total of 350 medical prescriptions were included in this study.

Study Area and Study Duration

This study, conducted from March to June 2022 in different areas in Taiz city, possesses a heterogeneous department with different access to healthcare services.

Sample Size

About 350 prescriptions were collected from different areas in Taiz city, and seven specialties (cardiovascular, UTI, bones and joints, gynecology, endocrinology, ENT, and internal GIT) were represented. From each specialty, 50 prescriptions were collected**.**

Data Analysis

Microsoft Word was utilized for documentation and report writing, while Microsoft Excel was employed for data tabulation and generating graphical representations.

To identify brand names and assess potential drug-drug interactions, the online Medscape Drug Interaction Checker (13) and the British National Formulary (BNF) (14) were referenced.

Basic statistical analyses, including the calculation of means and percentages, were also performed using Microsoft Excel.

The percentage of drugs prescribed from the essential drugs list (EDL) was calculated by dividing the number of drugs prescribed which are listed on the essential drugs list by the total number of drugs prescribed and multiplied by 100**.**

RESULTS

350 prescriptions with 1610 drugs were conducted in this study. The prescriptions were evaluated using the WHO indicators as shown in table (1). The average number of drugs per prescription was 4.61. The majority (69.4%) of the drugs in the prescriptions were prescribed from the essential drugs list. The use of antibiotics and injections was 13.3% and 12.3%, respectively. Only 8.3% of drugs were prescribed by generic name.

Table 1: Evaluation of Prescriptions According to WHO Parameters

Parameter	Result	Standard ([10])
Average number of drug prescribed per prescription	4.61	1.6 – 1.8
The percentage of drug prescribed by generic name	8.3%	100%
The percentage of encounters where an antibiotic was prescribed	13.3%	20-26.8%
The percentage of encounters where an injection was the route of administration	12.3%	13.4-24.1%
The percentage of drugs prescribed from the essential drugs list (EDL)	69.4%	100%

Prescription errors have been recorded in table (2) as drug-drug interactions, missed doses, missed dosing frequency, missing the age of the patient, unclear writing, missing the diagnosis, and missing the name of the patient.

Table 2: The Most Common Medication Errors

Type of errors	Frequency
Drug-drug interactions in all prescriptions	108 interactions
Missed dose of the drug	In 100 medicines
Missed dosing frequency	In 166 medicines
Missed the date of the prescription	In 83 prescriptions
Missed the age of the patient	In 162 prescriptions
Unclear writing	In 70 prescriptions
Missed the name of the patient	In 6 prescriptions
Missed the diagnosis	In 117 prescriptions

A deviation from the criteria of an ideal prescription was observed in this study. For example, the absence of the patient's name was noted in 2% of the prescriptions we reviewed. This percentage is lower compared to findings from previous studies, where the omission was reported at 5.4% in Saudi Arabia (15) and 11% in India. Additionally, although documenting the patient's age is considered essential on every prescription, 46% of the prescriptions in our study lacked this information. This figure is notably higher than the rates reported in Saudi Arabia (22.7%) and India (10%) (15, 16). Furthermore, details regarding the patient's gender and weight were not recorded in current study, consistent with earlier findings from both Saudi Arabia and India (17, 18). In the current study, documentation of the diagnosis was found to be satisfactory. In contrast, previous studies conducted in Saudi Arabia and India reported a lack of this information in their prescription records (17, 18). The study shows the most dosage forms prescribed were tablets (62.67%), while douches were the least dosage form used as shown in table 3. Tablets are the most popular dosage forms worldwide, as they are easy to use and have better chemical and physical stability than other dosage forms.

Table 3: Frequency of Dosage Forms Used

Dosage form	Frequency	Percent %
Tablet	927	62.67%
Capsule	232	15.6%
Ampoule	111	7.5%
Vial	92	6.2%
Syrup	33	2.2%
Suppositories	29	1.9%
Spray	23	1.5%
Infusion	18	1.2%
Vaginal douches	14	0.9%

DISCUSSION

According to the World Health Organization (WHO) guidelines, the recommended average number of medications per prescription ranges between 1.6 and 1.8. In contrast, the current study recorded a significantly higher average of 4.61 drugs per prescription. Despite this increase, the figure remains lower than the averages reported in Nigeria (5.2) and Pakistan (7.05) and is comparable to another finding from Pakistan (4.5). On the other hand, it exceeds the averages documented in Iran (3.07), Zimbabwe (1.3), and Malawi (1.8) (19-22). Prescribing a higher number of medications per encounter contributes to polypharmacy, which can result in a greater risk of adverse drug reactions, drug-drug and drug-disease interactions, unnecessary financial burdens, and irrational medication use.

Antibiotics are commonly prescribed to manage bacterial infections. According to WHO recommendations, the percentage of prescriptions containing antibiotics should be below 30%. In our study, the proportion was found to be 13.3%, which is considerably lower and more favorable compared to rates reported in Nepal (43%) (23), India (44.8%) (24), and Bangladesh (25%) (25).

Levofloxacin and ceftriaxone. The most common infections were upper respiratory tract infection (URTI) and urinary tract infection (UTI).

The World Health Organization (WHO) advises that all medications should be prescribed using their generic names, aiming for a rate of 100%. However, in our study, only 8.3% of prescriptions utilized generic names, which is significantly lower compared to figures from other countries such as Kenya (40%), Brazil (70.4%), and Ethiopia (98.7%). Deviation from the WHO recommendations on generic prescribing can contribute to irrational prescribing practices (26, 27). Favoring brand names over generics may result in increased treatment costs and potentially lower medication quality—issues that could be mitigated through the consistent use of generic prescriptions.

In our study, the percentage of prescribed injectable medications was 12.3%, which falls within the acceptable range set by WHO guidelines (13.4%–24.1%). This finding is comparable to a study conducted in India, which reported a similar rate of 12.27% (28). However, significant deviations have been observed in other countries, with much higher rates reported in Cambodia (57.6%) (29) and Ghana (80%) (30). It is widely recognized that the excessive and inappropriate use of injectable drugs contributes to the spread of infectious diseases, including hepatitis C and HIV/AIDS (31, 32).

CONCLUSION

The results of this study indicate deviations from rational prescribing practices within the study setting. Several prescribing indicators demonstrated a significant divergence from the standards recommended by the World Health Organization (WHO). Nevertheless, the proportion of patient encounters involving injectable prescriptions remained within the acceptable range. Despite this, most prescriptions did not fully adhere to standard

prescription writing guidelines. These results highlight areas where policymakers can intervene to enhance prescribing practices.

Conflict of Interest

The authors declare that there is no conflict of interest.

REFERENCES

[1] Kelley T. When the cost of medications keeps patients from taking them. Manag Care. 2018;27(6):12–6.
[2] Food, Medicine, and Healthcare Administration and Control Authority (FMHACA) of Ethiopia. Manual for Medicines Good Prescribing Practice. 2nd ed. Addis Ababa; 2012.
[3] Thangaraju P, Mahesh K, Venkatesan S. Information on migraine drugs in commonly available Indian drug information sources – Whether we satisfied the community needs? Indian J Pharmacol. 2022;54(3):216–20.
[4] Alanazi F, Alenazi K, Alshakrah S, Arishi I, Msaud R, Almutairi A, et al. Impact of self-medications and medications misuse on health outcomes. 2023.
[5] Kelley T. When the cost of medications keeps patients from taking them. Manag Care. 2018;27(6):12–6.
[6] World Health Organization (WHO). WHO promoting rational use of medicines: core components. WHO Policy and Perspectives on Medicine. Geneva: WHO; 2002. (Document WHO/EDM/2002.3).
[7] Sodré Alves BMC, de Andrade TNG, Cerqueira Santos S, Goes AS, Santos ADS, Lyra Júnior DP, et al. Harm prevalence due to medication errors involving high-alert medications: a systematic review. J Patient Saf. 2021;17(1).
[8] Sharif AF, Alshammari RY, Alghamdi FT, Almutairi S, Alghamdi A, Al-Nazhan AS, et al. Assessment of co-ingestion effects on poisoning patterns, drug-drug interactions, and adverse outcomes in acute toxic exposure. Toxicol Rep. 2024;13:101705.
[9] Iannone M, Tonini G, Janowska A, Dini V, Romanelli M. Definition of treatment goals in terms of clinician-reported disease severity and patient-reported outcomes in moderate-to-severe adult atopic dermatitis: a systematic review. Curr Med Res Opin. 2021;37(8):1295–301.
[10] Al-Wesabi MA, Al-Sanaani S, Al-Taybi S, Binrugaan S, Al-Raih A, Albashari A, Ebrahem HE. Drug Prescription Knowledge and Practices among Dental Students and Interns Enrolled in Selected Yemeni Universities. Yemeni Journal for Medical Sciences. 2017 Nov 11;11(1):15-23.
[11] Muthanna FM, Al-Humidi AA. Prevalence of Prescribing Macrolides and Aminoglycosides Among Dentists in Aden, Yemen. A cross-sectional Survey. Yemeni Journal for Medical Sciences. 2024 Nov 6;18(1):20-7.
[12] World Health Organization. How to investigate drug use in health facilities: selected drug use indicators. Geneva: WHO; 1993.
[13] Medscape. Drug interaction checker [Internet]. WebMD. Available from: https://www.medscape.com/druginteraction-checker
[14] Joint Formulary Committee. British National Formulary 87: March–September 2024. London: BMJ Publishing; Pharmaceutical Press; 2024.
[15] Irshaid Y, Al Homrany M, Hamdi A, Adjepon Yamoah K, Mahfouz A. Compliance with good practice in prescription writing at outpatient clinics in Saudi Arabia. East Mediterr Health J. 2005;11(6):922–8.
[16] Sheikh D, Mateti UV, Kabekkodu S, Sanal T. Assessment of medication errors and adherence to WHO prescription writing guidelines in a tertiary care hospital. Future J Pharm Sci. 2017;3(1):60–4.
[17] Alsultan MS, Khurshid F, Salamah HJ, Mayet AY, Al-Jedai AH. Hospital pharmacy practice in Saudi Arabia: prescribing and transcribing in the Riyadh region. Saudi Pharm J. 2012;20(3):203–10.
[18] Shelat PR, Kumbar SK. Analysis of out-door patients' prescriptions according to WHO prescribing indicators among private hospitals in Western India. J Clin Diagn Res. 2015;9(3):FC01.
[19] Hussain H, Shah KA, Ahmed S, Khan A, Ullah A, Aman A. Assessment of prescription pattern and prescription errors using the WHO drug use indicators in Lady Reading Hospital, Peshawar, Pakistan: a retrospective study. Khyber Med Univ J. 2017;9(4).

[20] Cheraghali A, Nikfar S, Behmanesh Y, et al. Evaluation of availability, accessibility, and prescribing pattern of medicines in the Islamic Republic of Iran. East Mediterr Health J. 2004;10(3):406–15.
[21] Amir M. Clinical pharmacy practice: an activity-based definition for pharmacy students of developing countries. Arch Pharm Pract. 2012;3(3):193.
[22] Hogerzeil HV, Bimo D, Ross-Degnan D, et al. Field tests for rational drug use in twelve developing countries. Lancet. 1993;342(8884):1408–10.
[23] Kafle K, Karkee S, Prasad R. INRUD drug use indicators in Nepal: practice patterns in health posts in four districts. INRUD News. 1992;3(1):15.
[24] Holloway KA, Henry D. WHO essential medicines policies and use in developing and transitional countries: an analysis of reported policy implementation and medicines use advances in preventive medicine 5 surveys. PLoS Med. 2014;11(9):e1001724.
[25] Guyon AB, Barman A, Ahmed J, Ahmed A, Alam M. A baseline survey on use of drugs at the primary health care level in Bangladesh. Bull World Health Organ. 1994;72(2):265.
[26] Ofori-Asenso R, Brhlikova P, Pollock AM. Prescribing indicators at primary health care centers within the WHO African region: a systematic analysis (1995–2015). BMC Public Health. 2016;16(1):724.
[27] Ibrahim M. Physicians' prescribing behavior in two tertiary health care facilities in Northwestern Nigeria: analysis of 518 prescriptions. Sahel Med J. 2004;7(4):114–8.
[28] Ashutosh K, Ipseeta R, Sandeep R. Assessment of prescription pattern of antidiabetic drugs in the outpatient department of a tertiary care hospital. Int J Clin Endocrinol Metab. 2017;3(1):001–7.
[29] Holloway KA, Henry D. WHO essential medicines policies and use in developing and transitional countries: an analysis of reported policy implementation and medicines use advances in preventive medicine 5 surveys. PLoS Med. 2014;11(9):e1001724.
[30] Bosu W, 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.
[31] Nsimba S, Gesase A, Massele A. Dangers of injections overuse in developing countries with a high HIV/AIDS prevalence: a review on HIV risk hazards, traumatic effects, and other bloodborne infections. Asian Pac J Trop Dis. 2011;1(2):158–63.
[32] Jafri W, Jafri N, Yakoob J, et al. Hepatitis B and C: prevalence and risk factors associated with seropositivity among children in Karachi, Pakistan. BMC Infect Dis. 2006;6(1):101.