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PRESCRIBING ANTIBIOTICS USING WHO PRESCRIBING INDICATORS AMONG OUTPATIENTS IN HEALTH SERVICES IN KABUL, AFGHANISTAN: A CROSS-SECTIONAL STUDY, 2024

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Abstract:

Background: Antibiotics are essential for treating bacterial infections and are among the most commonly prescribed drugs worldwide. However, their inappropriate use has led to a global increase in antimicrobial resistance (AMR), particularly in low- and middle-income countries. The World Health Organization (WHO) has developed prescribing indicators to monitor and promote rational medicine use. In Afghanistan, data on antibiotic prescription patterns, especially in outpatient settings, remain limited and fragmented, raising concerns about high prescription rates and non-adherence to standard protocols. A systematic evaluation using WHO indicators is crucial for informing healthcare practices and combating AMR.
Aim and Methods: A cross-sectional study was conducted from June 23 to December 22, 2024, among patients admitted to public and private hospitals in Kabul, Afghanistan. Of the 623 medical prescriptions reviewed, 306 contained at least one antibiotic. Data were collected using a data abstraction format based on World Health Organization (WHO) prescription indicators. Data analysis was performed using SPSS version 25.0. This study aims to investigate the rate of antibiotic prescription in health centers in Kabul and compare it with the WHO indicators for antibiotic prescription.
Results: A total of 306 prescriptions containing antibiotics were identified from the 623 medical prescriptions reviewed. The majority of the patients were aged between 21 and 40 years, and most had attained only primary education. 66.3% of the patients were residents of provinces outside Kabul, and 75.5% were admitted to public hospitals. Overall, 49.1% of prescriptions included at least one oral and/or injectable antibiotic. Among those who received antibiotics, 62.1% were prescribed only one type. The most commonly prescribed antibiotics are ceftriaxone, metronidazole, and amoxicillin. Most antibiotics (63.3%) were prescribed according to their generic names. Culture and sensitivity testing were not performed in any of the cases.
Conclusion: More than half of the patients received at least one antibiotic, and all antibiotics were prescribed according to the National Essential Medicines List. However, all prescriptions were made empirically, without the support of culture and sensitivity testing. These findings indicate that the current antibiotic prescription practices deviate from the WHO standards and highlight non-compliance with the recommended guidelines. This study highlights the urgent need for the implementation of an Antimicrobial Stewardship Program (ASP) in hospitals, which could facilitate evidence-

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based prescribing, promote the use of culture and sensitivity tests, and support the development of institutional antibiotic guidelines.

Keywords: WHO prescribing indicators, Antibiotic, Kabul

1. INTRODUCTION

Antibiotics are drugs used to treat infections caused by bacteria and have saved countless lives [1]. These medications selectively kill or block the formation of disease-causing microorganisms, thereby destroying or inhibiting their growth [2], [3], [4]. Over the past 50 years, antibiotics have evolved into a likely course of disease in patients with severe infections [5]. They are currently the most widely prescribed medications in hospitals worldwide [2]. Antibiotics are pivotal in combating diseases and maintaining health, especially in developing countries where infectious diseases are still a major challenge [6], [7]. In 2002, the World Health Organization (WHO) reported that more than 50% of all medicines are prescribed, dispensed, or sold inappropriately, and that 50% of patients do not take medications correctly [8]. Poor prescribing practice leads to ineffective and unsafe treatment, prolonging illness, distress, and harm to the patient at a higher cost. Irrational medicine may result in serious morbidity and mortality, as well as additional economic burden, leading to a reduction in the quality of drugs, thereby increasing wastage of resources, increased treatment costs, increased risk for adverse drug reactions, and emergence of resistance [9]. Misuse, excessive use, and inappropriate use of antibiotics result in antimicrobial resistance [10]. Studies in different countries have shown that the irrational use of antibiotics is very common. A study in Iran showed a high rate of empirical and prophylactic antibiotic use, vancomycin overuse, and third-generation cephalosporins [11]. Another study conducted in Lesotho showed that the average number of medicines prescribed per prescription was 3.8, of which antibiotics constituted 37.6% [6]. In India, the use of antibiotics has gradually increased in recent years. Between 2000 and 2010, antibiotic retail sales in India increased by 23%; between 2000 to 2015, consumption of antibiotics increased from 3.2 billion to 5.5 billion defined daily doses. In contrast, in the US, antibiotic use in children gradually declined over the past 10 years, with a prominent decline in 2010 [10]. The World Health Organization (WHO) endorses five core prescription indicators as crucial guidelines for doctors, enabling accurate and legible prescriptions [12], [13]. These indicators are pivotal in mitigating errors, enhancing patient safety, and facilitating efficient drug administration. The five core prescription indicators were 1) Average number of drugs prescribed per encounter, regardless of whether the patient received the drugs (Optimal level is ≤3). 2) Percentage of drugs prescribed by generic name (Optimal level is 100%). 3) Percentage of patients prescribed antibiotics (Optimal level is ≤30%). 4) Percentage of patient encounters with an injection prescribed (Optimal level ≤10%). 5) Percentage of drugs prescribed by the essential drug list (EDL). or the facility’s formulary (Optimal level is 100%) [14]. Over-consumption of antibiotics is a realistic threat in aid-supported settings, such as Afghanistan, and may be linked to the observed high prevalence of antibiotic resistance. Nevertheless, an assessment of antibiotic utilization and prescription practices has not been reported in outpatient facilities in Afghanistan [15]. Previous assessments have highlighted high antibiotic prescription rates and poor adherence to standard protocols; however, systematic evaluation using WHO indicators is limited. Moreover, existing data are fragmented and often not comparable, owing to inconsistent methodologies [16], [17], [18]. This study aimed to evaluate antibiotic prescription patterns among outpatients in selected health facilities in Kabul during 2024 using WHO prescribing indicators. By analyzing current trends and measuring them against established benchmarks, this study seeks to inform healthcare policies, support antimicrobial stewardship, and contribute to efforts aimed at reducing AMR in Afghanistan.

2. METHODS

This study was conducted in both public and private hospitals and health services in Kabul, Afghanistan. These hospitals/health services are among the major healthcare facilities in the country, serving a wide range of patients from both Kabul City and the surrounding provinces. Public hospitals are government-funded and provide low-cost services, whereas private hospitals operate independently and offer care at a higher cost, often to urban and referred patients. These hospitals also function as training centers for medical and health science students from various other institutions. The wards included in the study were internal medicine, surgery, pediatrics, and ENT (ear and nose throat). This study was conducted across these departments in the selected hospitals. Specialists, general practitioners, clinical pharmacists, nurses, and other healthcare professionals worked in these wards and contributed to patient care and medication management.

2.1 Study Design and Period

A hospital-based cross-sectional and descriptive study design was used, conducted from June 23 to December 22, 2024.

2.2 Source and Study of Population

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All outpatients who received care in the selected public and private hospitals in Kabul were considered the source population. The study population consisted of outpatients who visited these health facilities during the study period and who met the inclusion criteria. All outpatients who received medical prescriptions at selected public and private hospitals during the study period were included. Patients on programmed antibiotics for long-term therapy, such as those receiving antituberculosis drugs and/or antiretroviral therapy, and all patients who received medications, were excluded from the study. The dependent variable of this study was the antibiotic prescription pattern, assessed using World Health Organization (WHO) prescribing indicators. These indicators included the percentage of encounters with an antibiotic prescribed, the average number of antibiotics per prescription, the percentage of antibiotics prescribed by generic name, and the percentage of antibiotics prescribed from the national essential medicine list (EML). The independent variables were as follows:

- Socio-demographic factors: age, gender, residence, marital status
- Health service–related factors: type of hospital (public or private), season of prescription (summer or fall).
- Prescription-related factors: number of days antibiotics were prescribed, type of antibiotics, and whether antibiotics were written by generic or commercial (brand) name.

2.3 Data Collection Tools and Procedure

Data were collected using a pre-tested structured questionnaire and standard antibiotic prescription indicators developed by the World Health Organization (WHO). The questionnaire was adapted from similar studies and designed to capture outpatient prescription practices. The WHO indicators used in this study were categorized into prescribing, health facility, and complementary indicators. Outpatients who visited the selected public and private hospitals in Kabul during the study period were approached, and data were collected directly using a structured questionnaire. Information gathered included sociodemographic characteristics (age, sex, residence, marital status), type of health facility (public or private), season (fall or summer), type and name (generic or commercial) of prescribed antibiotics, dosage form, route of administration, frequency and duration of antibiotic use, and the presence or absence of culture and sensitivity testing.

2.4 Data Processing and Statistical Analysis

The collected data were coded, entered, and analyzed using SPSS version 25.0. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize the data. Prescribing patterns were evaluated using WHO prescribing indicators.

3. RESULTS

3.1 Socio-Demographic Characteristics

Of the 306 patients, the majority, 49%, were between 21 and 40 years old, followed by 30% who were above 40 years of age, and 21% were below 20 years. Female patients slightly outnumbered male patients, accounting for 53% of the participants. Regarding educational level, most patients, 64.4%, had only primary education, 23.9% had secondary education, and only 11.7% had attained higher education. Additionally, two-thirds, 66.3% of the patients were residents of provinces outside Kabul, while one-third, 33.7% resided in Kabul. Table 1 shows the demographic information of all patients who participated in the study.

Table 1. Demographic information of all patients

Variables	Category	Frequency (n)	Percentage (%)
Age group	< 20 years	64	21.0
	21–40 years	150	49.0
	> 40 years	92	30.0
Gender	Female	162	53.0
	Male	144	47.0
Educational level	Primary education	197	64.4
	Secondary education	73	23.9
	Higher education	36	11.7
Residence	Province residents	203	66.3
	Kabul residents	103	33.7

3.2 Antibiotics Prescription Characteristics

Of 306 antibiotic prescriptions analyzed, 75.5% were from public hospitals and 24.5% were from private hospitals. A small majority of prescriptions, 52.8% were issued during the fall season, while 47.2% were issued during summer. The most commonly prescribed antibiotics were ceftriaxone 19.9%, metronidazole 16%, ciprofloxacin 12.4%, and amoxicillin 11.4%. Other antibiotics used included azithromycin 10.3%, clarithromycin 3.6%, cefixime 2.9%, levofloxacin 2.9%,

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and doxycycline 2.6%. Regarding the duration of therapy, 36.9% of the antibiotics were prescribed for more than seven days, 31.7% for 5–7 days, 22.9% for 2–4 days, and 8.5% for a single day. Most prescriptions were written using the generic name 63.3%, while the remaining 36.7% were written using commercial or brand names. In terms of administration route, 42.7% of the antibiotics were administered parenterally and 57.3% orally.

Table 2. Antibiotics prescription information

Variables	Category	Frequency (n)	Percentage (%)
Type of Health Service	Public services	231	75.5
	Private services	75	24.5
Season	Fall	162	52.8
	Summer	144	47.2
Antibiotics	Ceftriaxone	61	19.9
	Metronidazole	49	16.0
	Amoxicillin	35	11.4
	Ciprofloxacin	38	12.4
	Azithromycin	32	10.3
	Clarithromycin	11	3.6
	Cefixime	9	2.9
	Levofloxacin	9	2.9
	Doxycycline	8	2.6
	Others	54	17.6
Duration of Antibiotic Use	1 day	26	8.5
	2–4 days	70	22.9
	5–7 days	97	31.7
	>7 days	113	36.9
Form of Prescription	Generic name	194	63.3
	Commercial/EML name	112	36.7
Route of Administration	Parenteral	131	42.7
	Oral	175	57.3

4. DISCUSSION

This study assessed the pattern and completeness of antibiotic prescriptions in 306 patients in healthcare facilities. A total of 374 antibiotics were prescribed, representing 24.8% of the 1509 total drugs, with an average of 1.5 antibiotics per prescription. This figure surpasses the WHO-recommended optimal range of 0.2–0.26, indicating a propensity for overprescription in our setting. A WHO-supported study in Ethiopia reported a lower average of 0.93 antibiotics per prescription [19]. The most frequently prescribed antibiotics were ceftriaxone 19.9%, metronidazole 16%, ciprofloxacin 12.4%, and amoxicillin 11.4%. These findings partially align with those of previous studies. For example, an ASB hospital study in India identified amoxicillin as the most prescribed antibiotic, accounting for over 30% of all prescriptions [15], while studies in Ethiopia also reported high usage of ceftriaxone and metronidazole [11], [19]. The relatively high use of ceftriaxone, a "Watch" antibiotic under the WHO AWaRe classification, raises concerns about potential misuse of broad-spectrum agents, particularly given the lack of diagnostic justification in most outpatient settings [5], [11]. Parenteral antibiotics were used in 42.7% of the cases, significantly exceeding the WHO-recommended maximum of 10%. This figure is also slightly higher than Iran's national average of 41% reported in a large survey [20]. Such overuse may reflect aggressive prescribing behaviors or perceived patient preferences, both of which contribute to antimicrobial resistance and healthcare-associated risks. The completeness of the prescription information was also suboptimal. Although prescriber signatures were present in 96.3% of prescriptions, other important details, such as diagnosis, route of administration, and treatment duration, were often missing or inconsistent. In our study, 36.9% of prescriptions had durations longer than 7 days, and 8.5% were prescribed for only one day, reflecting inconsistency with established guidelines. Studies from Ethiopia and Pakistan have similarly reported poor documentation and inconsistent prescription practices, often linked to irrational

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antibiotic use [5], [11]. Only 63.3% of the antibiotics were prescribed using their generic names, which is below the WHO target of 100% and lower than the 83.1% reported in other Ethiopian studies [21]. Additionally, only 36.7% of antibiotics were from the National Essential Medicines List (EML), suggesting further deviation from rational prescribing norms. Generic prescriptions and adherence to the EML are critical for cost-effective care and supply chain efficiency, especially in low-resource settings [5], [20]. Our comparison of the public and private healthcare sectors revealed a higher frequency of antibiotic prescriptions in private facilities. Although 75.5% of all prescriptions originated from public hospitals, private hospitals accounted for a disproportionately higher rate of antibiotic use relative to their case volume. Similar patterns have been reported across South Asia and the Middle East, where private sector overprescribing has been attributed to profit incentives, patient pressure, and a lack of regulatory oversight [5], [20]. Lastly, seasonality showed a slight variation, with 52.8% of prescriptions issued in the fall and 47.2% in the summer. While modest, this difference may indicate seasonal variations in respiratory and gastrointestinal infections, which are common precursors to antibiotic use.

5. CONCLUSION

This study reveals a high rate of antibiotic prescribing among outpatients in Kabul's health facilities, with prescribing patterns that diverge significantly from WHO-recommended standards. More than half of the reviewed prescriptions contained at least one antibiotic, and broad-spectrum antibiotics, such as ceftriaxone, were frequently prescribed without supporting diagnostic evidence, such as culture and sensitivity testing. Additionally, the overuse of parenteral antibiotics, limited use of generic names, and inconsistent adherence to the National Essential Medicines List highlight ongoing issues in rational medicine use. These findings underscore the urgent need for implementing antimicrobial stewardship programs (ASPs) in Afghan hospitals, improving prescriber training, enforcing prescribing guidelines, and promoting diagnostic testing to support evidence-based antibiotic use. Addressing these challenges is critical to combating the growing threat of antimicrobial resistance in Afghanistan and ensuring the sustainable and effective use of antibiotics.

6. ETHICS DECLARATIONS

Ethics approval and consent to participate: Not applicable.
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