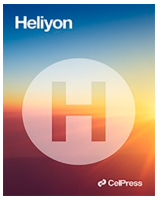
Heliyon 9 (2023) e21884

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon



Evaluation of prescribing patterns using WHO core drug use indicators in a pediatric hospital of Kabul Afghanistan: A prospective cross-sectional study

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ARTICLE INFO

Keywords:
Rational drug use
Pediatrics
WHO core drug use indicators
Irrational drug use

ABSTRACT

Background: The global issue of irrational drug use, particularly concerning pediatric patients, is a significant concern. Notably, there has been a lack of studies assessing rational drug prescribing for pediatric patients within Afghanistan's healthcare system. This investigation aimed to address this gap by examining drug prescribing patterns at the Indira Gandhi Pediatric Health Institute (IPHI) in Kabul, Afghanistan.

Methods: A prospective cross-sectional analysis was conducted to evaluate the prevailing drug prescribing practices at the outpatient department of IPHI in Kabul, Afghanistan. A systematic random sampling method was employed to select 600 outpatient prescriptions from the institute, following the World Health Organization (WHO) guidelines for investigating drug utilization in healthcare facilities.

Results: The average age of patients was 4 years, and the average number of drugs per prescription was 2.9. Notably, 84% of prescriptions included one or more antibiotics, surpassing the WHO standard of <30%. Furthermore, 67% of the prescribed drugs were listed on Afghanistan's national essential drugs list (EDL), falling below the standard value of 100%. Only 35.1% of the prescribed drugs were in generic form, also lower than the recommended 100%. Moreover, 5.7% of all prescriptions included injections, the ideal value is <20%. The most frequently prescribed drug groups were anti-microbials (25.7%), followed by non-steroidal anti-inflammatory drugs (NSAIDs), (21.4%), gastrointestinal drugs (17.3%), and vitamins (7.8%).

Conclusion: The study's findings indicate that, on average, a higher number of drugs were prescribed per patient visit at IPHI compared to recommended standards. Additionally, there was a lower utilization of generic drugs and drugs from Afghanistan's national essential drugs list (EDL), with an over-prescription of antibiotics.

1. Background

The rational utilization of medications refers to using drugs that suit a patient's medical needs, in the correct amounts, for the appropriate duration, and at the lowest possible cost [1]. In contrast, irrational drug use involves using medications inappropriately, such as excessive drug use (polypharmacy), employing antibiotics for non-bacterial illnesses, opting for injections when oral drugs are suitable, prescribing drugs that deviate from established treatment guidelines, or self-medicating [2]. This irrational use of drugs can

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https://doi.org/10.1016/j.heliyon.2023.e21884
Received 16 April 2023; Received in revised form 28 September 2023; Accepted 31 October 2023
Available online 2 November 2023

occur worldwide but is particularly prevalent in developing nations like Afghanistan.

Afghanistan, situated in southern and central Asia, has 42.3% of its population under the age of 14 [3]. Since children are highly susceptible to various diseases, including communicable diseases, and their mortality rate is significant, their healthcare demands special attention [4]. In today's world, over 50% of drug prescriptions, dispensing, or sales are done improperly, with half of the patients failing to take medications correctly. Such irrational prescribing can result in unsafe and ineffective treatment, exacerbation or prolongation of illnesses, harm to patients, and increased treatment costs. Various factors contribute to these irrational prescribing practices, including patient expectations, poor role models, particularly for new healthcare professionals, and marketing by pharmaceutical companies [5]. Consequently, modifying current prescribing practices is challenging due to multiple influencing factors.

Evaluating drug utilization practices based on WHO guidelines is increasingly crucial to encourage rational drug use in developing nations [6,7]. Before implementing any measures to promote rational prescribing, it is essential to understand and quantify the existing drug utilization patterns. Several scientific methods are available to achieve this objective. One well-established method is to assess prescriptions using WHO drug use indicators, recognized globally as a standard for identifying prescribing issues and applied in more than 30 developing nations [8]. However, no prior study has examined prescribing patterns in pediatric patients in Afghanistan using WHO core drug use indicators. Therefore, this study aims to assess current prescribing practices at IPHI by employing these WHO drug use indicators.

2. Methods

2.1. Study setting

Irrational drug use is a worldwide concern that can impact all patients, particularly pediatric patients. Moreover, it can potentially have adverse effects, especially in developing nations like Afghanistan.

Afghanistan, situated in South-Central Asia, is a landlocked, mountainous country with Kabul as its capital. It has a population of 40 million and falls into the low-income countries category. Healthcare services in Afghanistan are delivered through both public and private sectors. Following years of conflict, healthcare indicators in the country were extremely poor. To revitalize the healthcare system and enhance health outcomes, the Afghan Government's Ministry of Public Health introduced the Basic Package of Health Services (BPHS) as a fundamental strategy to provide standardized primary healthcare services nationwide. This was complemented by the Essential Package of Hospital Services (EPHS), offering secondary care and improved access to hospital services. Both the BPHS and EPHS, designed in 2003 and 2005, respectively, have played pivotal roles in establishing Afghanistan's healthcare system.

Since the creation of the BPHS and EPHS, there has been a notable shift in the causes of illnesses and deaths in Afghanistan. From 2002 onwards, the primary focus has been on controlling and preventing communicable diseases and reducing high mortality rates among mothers and children. Recently, the Ministry of Public Health (MoPH) launched the Integrated Package of Essential Health Services 2019 (IPEHS), which builds upon and reimagines the existing initiatives, the 2003 BPHS and the 2005 EPHS, to better align with the current epidemiological landscape, health requirements, and demands in the country [9].

The present study was conducted at the outpatient department of the IPHI, a public pediatric hospital in Kabul, Afghanistan. IPHI is a tertiary healthcare facility located in northern Kabul. It serves as a referral center for pediatric cases from primary and secondary healthcare facilities across the country and also functions as a teaching hospital for Kabul University and Kabul University of Medical Sciences.

2.2. Study design

A prospective cross-sectional investigation was carried out to elucidate the prevailing prescription practices at IPHI, focusing on outpatient prescriptions from October 18, 2016, to October 17, 2017.

2.3. Study population

The study population comprised individuals under 18 years of age who had visited the IPHI outpatient department, consulted with doctors, and received prescriptions.

Ethical approval

The study received ethical approval from the academic council of Kabul University's pharmacy faculty (reference: 181-3/9/2016).

2.4. Consent to participate

Informed consent was obtained from the IPHI administration. Verbal consent was obtained from the guardians of each patient before commencing the study. The study utilized aggregate data without patient identification. Hence, written informed consent from individual patients was not sought.

2.5. Data collection

A trained pharmacist captured outpatient prescriptions using a digital camera and returned the original prescriptions to patients. A systematic random sampling method was employed to select a sample of 600 prescriptions. Following the World Health Organization's (WHO) guidelines for investigating drug use in healthcare facilities, the collected prescriptions were analyzed.

To gather the 600 samples, a sampling frame was established based on the chronological ordering of patient prescriptions. The sampling interval was determined by dividing the total number of prescriptions by the desired sample size (2000/600 = 3.33 or 3). Consequently, samples were collected by selecting every third prescription as an initial sample [7]. All data from outpatient prescriptions were recorded in the WHO prescribing indicator form.

2.6. Data analysis

Statistical measures including frequency, average, percentage, and measures of variability such as medians, standard deviation, and interquartile range were computed using GraphPad Prism version 5.00 for Windows, GraphPad Software, San Diego California USA.

2.7. WHO drug use indicators

The study utilized the following WHO core drug use indicators.

1. Average number of drugs per encounter

Purpose: To measure the degree of polypharmacy.

Prerequisites: Combination drugs are counted as one. Guidelines are needed on how to count certain ambiguous prescribing practices (e.g. some standardized sequential therapies).

Calculation: Average, calculated by dividing the total number of different drug products prescribed, by the number of encounters surveyed. It is not relevant whether the patient actually received the drugs.

2. Percentage of drugs prescribed by generic name

Purpose: To measure the tendency to prescribe by generic name.

Prerequisites: Investigators must be able to observe the actual names used in the prescription rather than only having access to the names of the products dispensed, since these may be different; a list must be available of specific product names to be counted as generic drugs.

Calculation: Percentage, calculated by dividing the number of drugs prescribed by generic name by the total number of drugs prescribed, multiplied by 100.

3. Percentage of encounters with an antibiotic prescribed
4. Percentage of encounters with an injection prescribed

Purpose: To measure the overall level of use of two important, but commonly overused and costly forms of drug therapy.

Prerequisites: A list must be available of all the drug products which are to be counted as antibiotics; investigators must be instructed about which immunizations are not to be counted as \injections. It is mentionable that in the present study, the authors considered the WHO guideline (*How to investigate drug use in selected health facilities?*) regarding the inclusion and exclusion of drugs to be considered antibiotics.

Calculation: Percentages, calculated by dividing the number of patient encounters during which an antibiotic or an injection is prescribed, by the total number of encounters surveyed, multiplied by 100.

5. Percentage of drugs prescribed from essential drugs list or formulary

Purpose: To measure the degree to which practices conform to a national drug policy, as indicated by prescribing from the national essential drugs list or formulary for the type of facility surveyed.

Prerequisites: Copies of a published national essential drugs list or local institutional formulary to which data on prescribed drugs can be compared; procedures are needed for determining whether or not brand name products are equivalent to ones appearing in generic form on the drug list or formulary.

Calculation: Percentage, calculated by dividing the number of products prescribed which are listed on the essential drugs list or local formulary (or which are equivalent to drugs on the list) by the total number of products prescribed, multiplied by 100 [10].

3. Results

3.1. Population characteristics

In this study, we examined a sample of 600 outpatient prescriptions obtained from IPHI spanning from October 2016 to October 2017. On average, the patients were approximately 4 years old (SD = 3.97). However, it's important to note that the age of 29.2% of the patients was not specified in the prescriptions. Consequently, the average patient age was determined based on the 422 prescriptions that did include this information. Among the 600 outpatient cases, 55.1% were male (refer to Table 1).

4. WHO drug use indicators

A total of 1746 medications were found within the 600 patient prescriptions. The average number of drugs prescribed per patient was 2.9. Antibiotics were prescribed for 84% (n = 504) of all patients. Furthermore, 67.2% (n = 1174) of all medications were recommended from Afghanistan's national Essential Drugs List (EDL). Additionally, 35.1% (n = 613) of the total medications prescribed in our study were in generic names. Injections accounted for 5.7% (n = 34) of the prescriptions (see Table 2).

In the present study, the most frequently prescribed medications encompassed antibiotics (25%), NSAIDs (21.4%), gastrointestinal drugs (17.3%), and vitamins (7.8%) (see Table 3).

5. Discussion

Evaluating prescription patterns provides valuable insights into healthcare quality and the practices of healthcare providers. The average number of medications per prescription serves as a critical parameter, indicating prescribing habits and opportunities for educational interventions. Our study revealed an average of 2.9 drugs per patient prescription, exceeding the WHO standard of 1.6–1.8. Some studies have reported optimal or near-optimal averages (1.8–2) [7,10], but our findings align with the values observed in studies elsewhere (2.4–4.1) [2,11,12]. Polypharmacy, or the use of multiple medications, can lead to drug interactions, increased risk of adverse effects, medication errors, and higher healthcare expenses. In low-income countries like Afghanistan, the increased healthcare costs associated with prescribing more drugs per patient encounter pose challenges [13]. However, it's worth noting that being a tertiary pediatric hospital, the higher number of drugs prescribed per prescription may reflect the complexity of patients' medical conditions.

Our study also found that a lower percentage of drugs were prescribed using their generic names (35.1%). This figure falls short of the WHO standard (100%) but exceeds the rate observed in a similar study in India (2.6%) [14]. However, it is still lower than what was reported in studies conducted elsewhere (49.3–93.04%) [2,7,14,12,13]. Promoting the use of generic drugs is essential to reduce costs, and Afghanistan's national medicine policy encourages this practice. As in this document, it has been mentioned that "Health workers, including doctors and pharmacists, will be encouraged to explain to patients the acceptability and cost benefits of generic products. When a product has been prescribed under a brand name, the retail pharmacist will be permitted to dispense a generic equivalent of the same medicine, if it is available and the prescriber doesn't reject the distributed medicines" [15]. Nevertheless, our findings suggest that prescribers may not fully appreciate the importance of generic drugs. Additionally, pharmaceutical companies' marketing efforts may influence the preference for brand-name drugs in our country [11,16,17].

The overuse of antibiotics, as observed in our study (84%), contributes to antimicrobial resistance. Unfortunately, our figure exceeds both the WHO standard and the rates reported in similar studies worldwide [2,11,12,14,16,18], except for one study in Jordan (85%) [19]. This overprescribing can fuel antimicrobial resistance, a significant therapeutic challenge. As existing antimicrobials lose effectiveness, the development of new agents becomes necessary, which can be costlier and have more adverse effects. Addressing antimicrobial overuse is crucial, particularly in developing countries like Afghanistan [16].

Table 1
Overview of the study sample's demographic information (N = 600).

Characteristic	Frequency	
Age	Number	Percentage
Up to 28 days	4	0.6 %
<12 months	113	18.8 %
1–3 years	132	22 %
4–6 years	58	9.6 %
7–9 years	56	9.3 %
10–15 years	63	10.5 %
Age not indicated	178	29.2 %
[a]Average patient age (yrs.), (SD)[b]	4 (3.97)	
Sex		
Male	331	55.1 %
Female	258	43 %

[a] The average patient age is calculate\ed based on 422 patient prescription.
[b] SD (standard deviation).

Table 2
WHO prescribing indicators calculated based on 600 patient prescriptions at the IPHI, outpatient department, Kabul, Afghanistan.

WHO Prescribing Indicator	Total drugs/ prescription	Average/ percentage	Standard deviation	Median	Interquartile range	WHO Standard
Average number of dugs per patient prescription	1746	2.9	1	3	2	1.6–1.8
Percentage of drugs prescribed by generic name	613	35.1%	1	1	2	100%
Percentage of prescriptions with an antibiotic prescribed	504	84%	0.37	1	0	20–26.8%
Percentage of prescriptions with an injection prescribed	34	5.7%	0.4	0	0	<20%
Percentage of drugs prescribed from EDL	1174	67.2%	1	2	2	(100%)

Pharmacological classes Prescribed.

Table 3
Pharmacological classes prescribed in the prescriptions at the IPHI outpatient department.

Pharmacological Class	Frequency	Percentage
Antibiotics (Like Cefixime)	411	25.7%
NSAIDs (like Ibuprofen)	342	21.4%
Gastrointestinal medicines (Like Omeprazole)	275	17.3%
Vitamins (like Folic acid)	125	7.8%
Respiratory drugs (like Salbutamol)	119	7.5%
Anti-allergic drugs (like Pheniramine)	113	7%
Antiseptics (Like mouthwas)	38	2.4%
Antiemetics (like domperidon)	27	1.7%
Others	148	9.2%

To combat blood-borne diseases such as HIV/AIDS and HBV, global efforts have discouraged the overuse of injections [20–22]. Interestingly, our study aligns with WHO recommendations, with an acceptable prescription rate of injectable preparations (5.7%), below the 20% threshold. Some studies have reported similar findings [2,14], but others have noted higher rates of injection prescriptions (21.1–59.16%) [7,20].

Prescribing drugs from Afghanistan's national Essential Drug List (EDL) in our study was 67.2%, falling short of the WHO standard (100%) and rates reported in other studies (70.6–100%) [2,7,11,12], although one study reported a lower rate (60.4%) [13]. An EDL can promote rational drug prescribing by selecting cost-effective drugs appropriate for prevalent diseases in a country. It can also enhance medicine management by improving the quality of available drugs, making it particularly valuable in resource-constrained healthcare systems [21,22].

In terms of drug categories, the most commonly prescribed drugs in our study were antimicrobial drugs (25.7%), followed by NSAIDs (21.4%), gastrointestinal drugs (17.3%), and vitamins (7.8%). In contrast, a similar study in India found antibiotics (24.15%) to be the most commonly prescribed class, followed by nasal decongestants (18.86%), NSAIDs (16.47%), and antihistamines (12.47%) [11]. Another study in Ethiopia found antibiotics to be the most frequently prescribed class (34.98%), followed by fluids and electrolytes (25.23%), analgesics (12.02%), and corticosteroids (5.74%) [23].

5.1. Limitation

Limitations of our study include limited human and financial resources, the focus on outpatient prescriptions from a single public health facility in Kabul (limiting generalizability), and reliance on WHO core drug use indicators, which do not capture the reasons behind the prescribing practices. Future research should employ qualitative methods such as focus group discussions or in-depth interviews, to collect data on the reasons for drug prescribing [24]. to explore the rationale for drug prescriptions. Furthermore, these indicators are designed for primary care settings, potentially limiting their relevance in tertiary care settings with more complex drug usage patterns.

6. Conclusion

In conclusion, this study identified higher-than-recommended prescription rates of drugs per patient encounter at IPHI, lower usage of generic drugs, and over-prescription of antibiotics. Additionally, adherence to Afghanistan's national Essential Drug List was suboptimal. However, the rational use of injections was noted. This study, the first of its kind in Afghanistan, can serve as a foundation for future research and guide policymakers in developing interventions to promote rational drug use among pediatric patients in Afghanistan.

Ethical approval and consent to participate

Ethical approval for the present study was obtained from the academic council of the pharmacy faculty, at Kabul University (reference: 181-3/9/2016). Besides, informed consent was taken from the IPHI administration. Verbal consent from each patient's guardian was taken before starting the study. The aggregate data were used excluding patient identifying data. Therefore, written informed consent from the patient was not received.

Consent for publication

Not applicable.

Funding

No funding agency supported this research project.

Availability of data and materials

The aggregate data supporting findings contained within this study will be shared upon reasonable request submitted to the corresponding author. Identifying patient data will not be shared.

Additional information

No additional information is available for this paper.

CRediT authorship contribution statement

Ahmad Farid Habibyar: Conceptualization, Formal analysis, Investigation, Methodology, Software, Writing – original draft, Writing – review & editing. **Qand Agha Nazari:** Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing.

Declaration of AI and AI-assisted technologies in the writing process. Statement

During the preparation of this work, the author(s) used [ChatGPT] to [improve readability and language only. After using this tool, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We express our gratitude to the administration of the pharmacy faculty of Kabul University as well as the administration of IPHI for facilitating and supporting this research project. The authors also acknowledge the pharmacist who helped in the collection of outpatient prescriptions. In addition, the authors also acknowledge Mohammad Humayoon Amini and Ali Wasiq Bakthyari from Kabul University and Dr. Navneet Khurana from Lovely Professional University for Language editing issues.

Finally, I would like to thank all those who helped in any way to conduct the present study.

Abbreviations

WHO	World Health Organization
EDL	Essential Drugs List
IPHI	Indira Gandhi Pediatric Health Institute
NSAIDs	Non-steroidal Anti-inflammatory Drugs
PharmD	Pharmacy Doctor
M.Pharm-Pharmacology	Master of Pharmacy in Pharmacology
Ph.D.	Doctor of Philosophy
USA	United States of America

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