

Auditing of Pediatric Outpatient Prescriptions in Primary Healthcare Centers

Ahmed Abdulrahman Albarraq

Pharmacy Practice Research Unit, Department of Clinical Pharmacy, College of Pharmacy, Jazan University, Jazan, SAUDI ARABIA.

ABSTRACT

Background: Prescription writing errors can significantly impact the pediatric population. **Aim:** To audit the physicians' prescription writing pattern for pediatric outpatients in primary healthcare centers in Saudi Arabia. **Objective:** Evaluating the practice of prescription writing based on the World Health Organization (WHO) recommendation, to assess medication errors and the communication gap between the prescriber, pharmacist and the patient. **Methods:** A cross-sectional study was carried out in randomly selected primary healthcare centers in Jazan. Data was recorded from 950 prescriptions available with caregivers of pediatric patients visiting the primary healthcare centers between August to December 2017. Data were evaluated as per the core prescribing indicators of WHO. **Results:** The average number of drugs per prescription were 2.30, and information about patients' age (54.3 %), weight (73.7 %), diagnosis (28.8 %), prescriber's name (6.1 %), signature (3.4 %), refill information (97.8 %), regimen of therapy (34.8 %), strength of unit dosage forms (3.2 %), dose information (5.0 %), and instructions (6.2 %) was missing. The number of prescribed generic medications were 53.6 %. Overall, 58.9 % of collected prescriptions contained antibiotics and the most dispensed classes were penicillin (72.5 %), followed by cephalosporins (12.40 %). **Conclusion:** The study affirmed the lapses of several vital components in prescriptions. Updating prescription writing according to WHO guidelines and usage of newer technologies to generate orders can minimize prescribing and dispensing errors. The outcomes of the study strongly suggests the need of pharmacists intervention in reducing prescription-related errors through the practice of pharmaceutical care.

Key words: Primary healthcare centers, Prescribing pattern, Pediatric, Outpatient, Saudi Arabia.

INTRODUCTION

Pediatric patients are sensitive to medications, and the chances of risk are very high. Irrational prescriptions make them further vulnerable to the harmful effects of drugs; therefore, the onus rests on all the healthcare professionals to create a safe medication environment for children. Physicians usually have the freedom to make decisions regarding the medication and communicating it to patients through prescriptions. Prescription writing, therefore, is a science and has a specific format to be followed. Each component of the prescription has significance, which conveys the correct information to the patients and the pharmacists for better pharmaceutical care. Rationality in prescribing, on the other hand, is the prescribing of a drug in the right way-right drug, in the right dose, at the right time for the right patient through the right route of administration. It,

therefore, requires special attention to write a prescription.

The physicians usually prescribe medicines based on diagnosis, in most cases, or some times to please his patients or to decrease patients' anxiety.¹ Many studies worldwide, including in Saudi Arabia, have reported that the patients sometimes urge physicians to prescribe particular medicines.²⁻⁴ According to the reports of the Centers for Disease Control and Prevention⁵ and Stratus and Arnold, 2005,⁶ tens of millions of antibiotic prescriptions are written each year for viral infections that are not treatable with antibiotics. A study in Riyadh, KSA, found an incidence of 7.7% errors in 1582 medicine orders, significant errors identified were in the wrong strength and frequency of administration.⁷ In another study, prescribing

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Address for

correspondence:

Dr. Ahmed A. Albarraq
Pharm.D.,

Dean and Associate Professor,
Pharmacy Practice Research
Unit, Department of Clinical
Pharmacy, College of Pharmacy,
Jazan University, Jazan,
SAUDI ARABIA.

Phone no: +966-17-3217442

Email Id: aalbarraq@jazanu.
edu.sa



www.ijopp.org

errors had been identified in the pediatric department,⁸ in which the researchers analyzed 2380 prescriptions and identified 56% of prescribing errors, and the majority of these errors (79%) were classified as potentially harmful.

As the patient deserves the “best of the best” treatment from the physicians, they select the physician who can impact, assure, and help them in restoring their lost health. Therefore, physicians’ self-confidence in practicing the profession, the ability to exercise independent judgment in the care of an individual patient, their belief, behavior, and habits that emerged from the years of professional experience makes the difference in patient’s life. During the years of clinical practice, if a physician becomes complacent with a product, he tries to accustom to it by regularly memorizing with its dosage forms, timing of administration, potential side effects, etc., which influences his or her routine practices and metamorphoses the daily repertoire of patient care, ending up in a habit of writing the same product repeatedly. This prescribing pattern of the physician is a brutal enemy of change. However, direct pharmacist intervention can bring about reductions in prescription adversaries rather than changing a habit of prescribing writings of the physicians.

Proper and periodic auditing of prescribing patterns of the physicians, therefore, is indispensable regarding minimizing irrational drug prescribing. A review of current actual prescribing trends and the occurrence of polypharmacy should be studied to promote the best prescribing practices among the physicians of primary health centers. Therefore, we aimed to audit the data on drug prescribing patterns in primary health centers in Saudi Arabia, to address a reformation of medicines prescribing guidelines and policies and to assess if there is any need for the direct intervention of the pharmacists in assisting the physicians in such issues.

EXPERIMENTAL

Study design

A descriptive, cross-sectional study with randomly selected pediatric patients aged under ten years, at 20 primary health centers of Jazan, Saudi Arabia was conducted.

Sample size

Jazan has 174 primary healthcare centers under the Ministry of Health, out of which 20 health centers were selected by systematic random sampling. Data on the

prescriptions of pediatric patients, who visited these selected centers, were collected after obtaining oral consent from them from August 2017 to December 2017. There were 950 prescriptions meant for children under ten years of age and were following our inclusion criteria.

Inclusion and exclusion criteria

The prescriptions data, which corresponds to the standard core prescribing indicators of WHO, were identified and included. Patients re-attending for an existing health problem or those attending to receive preventive services such as vaccination were excluded. The prescriptions of the children for more than ten years were also excluded.

Study instruments

We developed a well-designed data collection form that was pretested and modified accordingly. We have recorded demographic information of patients, diagnoses, and medication on each prescription that was on the data collection form. The following prescribing indicators were measured: The average number of drugs per encounter, route of administration, amount of drugs prescribed by generic name, percentage of encounters with an injectable prescribed, presence or missing primary prescription’ information such as patient’ age, gender, weight, name, etc. Also, the prescriber’s information, for example, the presence of the prescriber’s name, signature, etc. were investigated. Information on medication prescribed - the strength of unit dosage form, the regimen of the therapy, instructions, and refill information were included. The data on the type of antibiotics, formulation, and the combination of antibiotics prescribed were collected.

Data collection

Sampling procedure, data collection, and analysis were defined before starting the fieldwork to ensure reliability. We have clearly explained and trained the data collection plan to the data collectors through the established data collection process. A group of pharmacists was trained to collect data directly from the prescriptions of caregivers of pediatric patients. They were familiar with the pharmaceutical terms, thus able to record the data accurately. These data collectors practiced together in the pilot study to ensure consistency of data collection. The study received ethical approval by the Institutional Research Review Board of the College of Pharmacy, Jazan University, to collect the data from the prescriptions of pediatric outpatients. The anonymity of the patients and confidentiality of the data were maintained.

Statistical analysis:

Data were processed by using SPSS, IBM, version 22. Mean, and frequencies as percentages were used to describe variables. A chi-square analysis was used to test the association between different variables. P -value < 0.05 was considered as statistically significant.

RESULTS

In total, 950 prescriptions were analyzed; 65.8% of them belonged to male pediatric patients. The current study revealed missing vital pieces of information from the majority of the prescriptions, such as the age of the patients 516 (54.3%) and patients weight 701 (73.7%). The date and diagnosis were not mentioned in 27 (2.8%) and 274 (28.8%) prescriptions, respectively. Regarding the availability of prescribers' information - the name of prescribers (6.1%), and their signatures (3.4%) were missing from the prescriptions. Although 578 (60.8%) prescriptions were written in an official format, only 372 (39.1%) of them were printed. Among the hand-written prescriptions, 46 (4.84%) were non-legible, and 8 (0.84%) were in an unofficial format, Table 1.

Information retrieved on details of diagnosis recorded in the pediatric prescriptions of PHCs is presented in Table 2. Most of the children were diagnosed with fever and cough due to upper respiratory tract infections (48.0%), lower respiratory tract infections (3.5%), and Gastrointestinal disorders (10.0%) of the prescriptions. The other ailments such as skin diseases (1.8%), minor accidents (2.0%), ear problems (1.5%), miscellaneous infections (1.4%), and other diagnoses (2.9%) were recorded. However, a large number of prescriptions (28.9%) did not mention any diagnosis on

the prescriptions.

The missing information about the medication prescribed and their P -values are given in Table 3. The majority of the prescription did not contain the regimen of the therapy (34.8%) and refill information (97.8%). The strength of the unit dose forms (3.2%), dose information (5.0%), and instructions (6.2%) were missing from the prescriptions; however, none of these values were found to be statistically significant. The pattern of antibiotics prescribed is presented in Table 4. We found 560 (58.9%, $P < 0.001$) prescriptions were containing antibiotics among the total of 950 prescriptions analyzed. Out of 560 such orders, 355 (37.3%) were containing single antibiotics, and 205 (21.6%) contained more than one antibiotic. Between generic and branded medicines, 300 (53.6%) generic medicines were prescribed, which was comparatively more than branded products, 129 (23.0%). Both branded and generic drugs together were written in 131 (29.4%) prescriptions. The oral route was most commonly prescribed (73.9%) than injections (3.9%). Both injection and oral administrations were recorded in 124 (22.2%) prescriptions. None of the variables studied were found to be statistically significant.

Table 3: Missing information about medications prescribed.

Missing information on medicine. $n=950$	N(%)	P-value
Strength of UDF	31(3.2)	0.272
Regimen	331(34.8)	0.577
Dose information	48(5.0)	0.969
Instructions	59(6.2)	0.945
Refill information	929(97.8)	0.141

UDF=unit dose formulation

Table 1: Information recorded from the prescriptions.

Missing information	Prescriptions from PHCs $n=950$	
	No.	(%)
Patient's age	516	54.3
Patient's weight	701	73.7
Date of prescription	27	2.8
Prescriber name	58	6.1
Prescriber signature	32	3.4
Diagnosis not recorded	274	28.8
Hand-written prescription	578	60.8
Printed prescription	372	39.1
Non-legibility	46	4.84
Non-official format	8	0.84

PHC = Primary Health Centre

Table 2: Details of the diagnosis recorded in the prescriptions from PHC.

Diagnosis recorded in the prescription	Prescriptions from PHCs $n=950$	
	Frequency	%
Fever and cough (URTI)	456	48.0
Fever and cough (LRTI)	32	3.5
GIT disorder	94	10.0
Skin disease	16	1.8
Minor Accidents	18	2.0
Ear disease	12	1.5
Miscellaneous infections	11	1.4
Other	27	2.9
Not recorded	274	28.9
Total	950	100%

URTI= Upper Respiratory Tract Infection; LRTI=Lower Respiratory tract information

The class of antibiotics prescribed were presented in Figure 1. The highest prescribed antibiotic was penicillin products, 72.5 %, and other categories of antibiotics such as cephalosporins (12.40 %), aminoglycosides (12.20 %), and macrolides were also prescribed, however, in lower frequencies. The types of formulations prescribed were given in Figure 2. The maximum prescribed formulation was syrup - 49%, followed by suspensions -16%, tablets -15%, capsules -3%, and others -15%. Injections (2%) were the least prescribed among the children.

DISCUSSION

Our study evaluated the prescriptions written for pediatric outpatients aged under ten, at 20 randomly selected primary healthcare centers in Jazan for five months. We found many anomalies in many of the prescriptions studied, which require attention to avoid further complications in children. WHO insists on continuous Drug Utilization Evaluation (DUE) to ensure the appropriate use of medicines at an individual patient level.⁹ Studies focusing at the primary level, therefore, are required to obtain baseline data on the prescribing pattern to identify lacunae and to improve prescribing. It is essential to follow standards of medical treatment at all levels of the healthcare centers, especially at the PHCs. Hence, our study was vital as we analyzed the

prescription writing habits of the physicians for pediatric patients at primary health centers to identify the role of “direct intervention” of the pharmacists in minimizing prescription-related adversaries.

Infants and children are sensitive members of the society, who are especially vulnerable to the detrimental effects of drugs due to differences in pharmacodynamic and pharmacokinetic characteristics compared to adults. Prevention of errors at the prescribing stage is one of the essential steps to reduce medication errors. Our study revealed that the mean number of prescribed medicines per prescription was 2.30. This finding was marginally less than a survey reported on adults,¹⁰⁻¹⁵ and higher than another study by Bilal AI *et al.* 2016.¹⁶

We observed the majority of prescriptions, 54.3 %, and 73.7 % , were devoid of patient’s age and body weight, respectively. It could be a severe mistake for pediatric patients as these prescriptions might convey wrong or conceal the correct information about the identity of the patient to the dispensing pharmacists. Our findings are in contrast with a previous study in Saudi Arabia by Neyez *et al.*, 2011,¹⁷ which reported 89.3 % of the prescriptions recorded patient age in public health center in Riyadh; prescriptions from primary healthcare centers in Qassim region showing age and weight.¹⁸

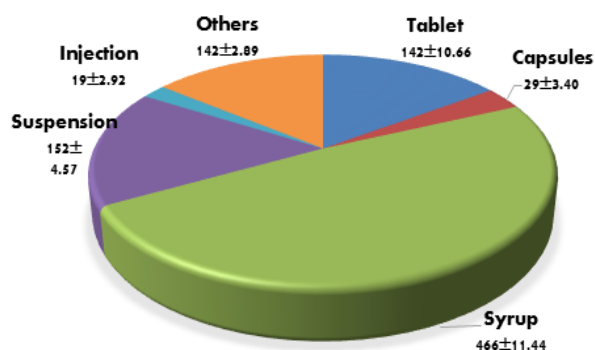


Figure 1: Distribution of types of formulations prescribed (n=950, Mean±SD).

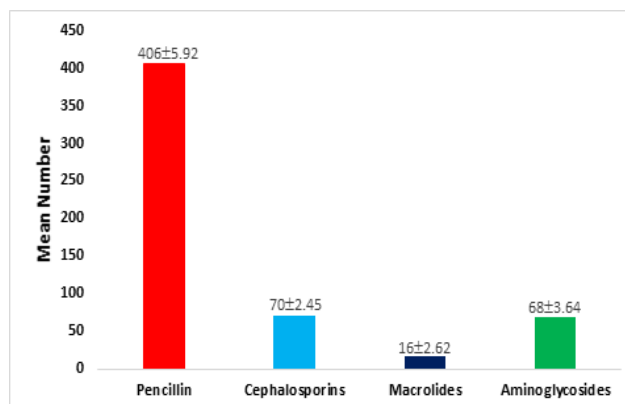


Figure 2: Distribution of class of antibiotics prescribed (n=560, Mean±SD).

Table 4: Patterns of drug prescribed

Prescriber	Presence of antibiotics n=950		Route of antibiotic prescribed n=560			No. of antibiotic prescribed n=950			Name of the antibiotics prescribed n=560		
	Yes N(%)	No N(%)	Inj N(%)	Oral N(%)	Combined N(%)	one N(%)	>one N(%)	Nil N(%)	Generic 100% N(%)	Branded 100% N(%)	Combined N(%)
Physician at PHC	560 (58.9)	390 (41.1)	22 (3.9)	414 (73.9)	124 (22.2)	355 (37.3)	205 (21.6)	390 (41.1)	300 (53.6)	129 (23.0)	131 (29.4)
P-value	0.001		0.121			0.985			0.459		

Similarly, we observed the prescriber's information missing, such as name (6.1 %) and signature (3.4 %) on the prescriptions. These items are the essential components, which are required for the genuineness and authenticity of the prescriptions. Our findings were less compared to the study conducted by Saulat *et al.* 2019,¹⁹ where they have recorded 5 % of the prescriptions without signatures. Also, 5.84 % of hand-written prescriptions were non-legible, which might be another risk factor for dispensing wrong medications by the pharmacists.

As Jazan is located in the Southwestern coastal area of Saudi Arabia, the region experiences dust storms frequently. High humidity and dust in the air can cause respiratory discomfort or infections. This trend was evident in the diagnosis made by the physicians at PHCs, where 48 % of the children were suffering from fever and upper respiratory tract infections, and 3.5 % had a fever with lower respiratory infections. However, 28.9 % of the prescriptions contained no diagnosis; probably, children were with unidentified infections or intentional or unintentional errors committed by the prescribers. The omission of this piece of information might mislead the pharmacist to dispense the wrong medications. Treatment regimen, 34.8 %, and refill information, 97.8 % were not found in a majority of the prescriptions analyzed. Lack of such data in prescriptions might confuse the caregivers of pediatric patients as they might convey incomplete or wrong indications or might encourage them to misuse, Figure 3. Though the frequency of occurrence was less, our study identified some severe errors such as lack of strength of the unit dose forms, 3.2 %, dose information, 5.0 %; and instructions, 6.2 %. However, our findings had lower frequencies than the study reported by Neyaz *et al.*, 2011¹⁷, 82.7 % for the strength of the drug, and Saulet *et al.*, 2019¹⁹, 73.2 % for the strength of the drug and 19.4 % for dose information.

Our study revealed that antibiotics were present in 58.9 % of the prescriptions, which was more than the results from United Arab Emirates (21.4 %);²⁰ Iran (51 %);²¹ India (49 %);²² and less than Ethiopia (82.5 %);¹⁶ Sierra Leone (74.8 %),¹² etc. Prescribing generic medicines decreases the cost of medication. We found 23 % antibiotics prescribed were branded, which was higher than that reported in Saudi Arabia (16.2%) (Edalo, 2015),¹¹ but lower than other previous studies conducted in primary health care centers which ranged from 41 % to 48 %²³ and in Nigeria (68.9 %).¹³ Our study showed less percentage of injections (3.9 %) compared to the report of Awad and Himad, 2006 in Sudan (10.5 %),²⁴ Kasabi *et al.*, 2015 in India (61 %)²², Dong *et al.*, 2011 in China (22.93 %),²⁵ and Cole *et al.*, 2015, in Sierra Leone (21.1 %).¹²

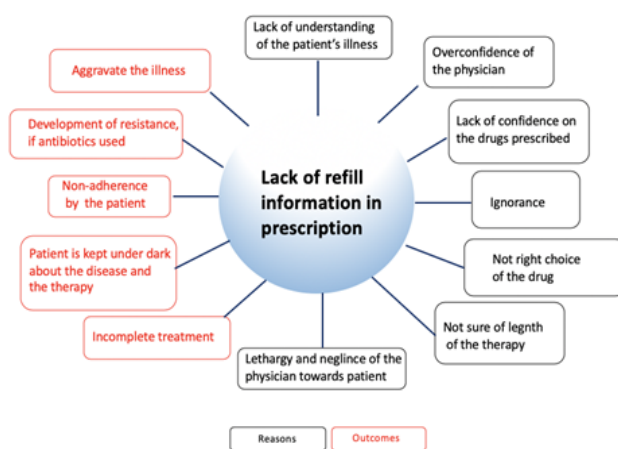


Figure 3: Reasons and outcomes of lack of refill information in the pediatric prescription.

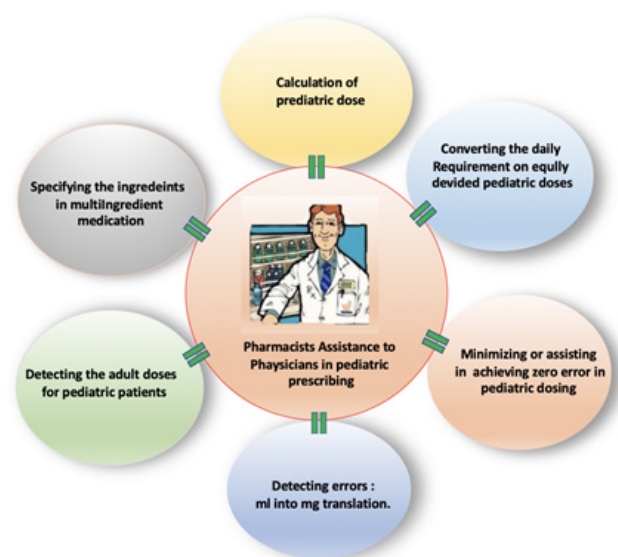


Figure 4: Pharmacists assistance to physicians in pediatric prescribing at primary health centres.

What this study adds to existing evidences?

As our study recorded several lapses in prescription writings, such as no record of diagnosis (28.9 %), no refill information (97.8 %), lack of strength of the dosage form (3.2 %), no dose information (5.0 %), and no instruction for patients about the intake of medications (4.2 %), we feel that there should be a need for “direct intervention” by the pharmacist in reducing prescription-related errors, which includes the review of patients' medication history and to make recommendations to physicians in routine healthcare practices, Figure 4.

Study limitation and future research direction:

We also recognize as a limitation that we collected information from outpatient pediatric prescriptions from twenty randomly selected PHCs, which was restricted to

a region in Saudi Arabia. We recommend similar studies in other areas and even at the national level.

CONCLUSION

The current study recorded the sub-optimum level of prescribing pattern among physicians of the primary health care centers of Jazan for pediatric outpatients as many essential components were missing from a majority of the prescriptions; however, it was most appropriate in terms of the mean number of medications per order, route of administration and antibiotic prescribing. We, therefore, recommend the implementation of WHO guidelines to improve prescribing practices. Also, we encourage the intervention of proven success, printed prescription formats, follow up to complete the prescription elements, adoption of technology-driven measures in generating prescriptions, and direct intervention by the pharmacists to ensure safe prescribing.

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CONFLICT OF INTEREST

The author has no conflict of interest.

ETHICAL APPROVAL

The study was approved by the Institution Research Review Committee (IRRC) for Clinical studies. The approval number is IRRC/606/118/1438 dated 11/08/1438 Hijri.

ABBREVIATIONS

WHO – World Health Organization; **KSA** – Kingdom of Saudi Arabia; **SPSS** – Statistical Package for Social Sciences; **DUE** – Drug Utilization Evaluation; **PHC** – Primary Health Centre; **IRRC** – Institution Research Review Committee.

SUMMARY

The patients deserve the best therapy for their illness from the physician; however, pediatric patients require even better treatment with care and attention. The World Health Organization insists on continuous drug utilization evaluation to ensure the appropriate use of medicines at the individual patient level. Hence, a study was conducted with randomly selected pediatric patients aged under ten years, at twenty primary health care centers of Jazan. Nearly 950 prescriptions were collected

and analyzed as per the specifications of the WHO for prescription writing. Many lapses have been identified in the prescriptions; some were minor, and others were major lapses. The deficiencies, those observed in high frequency, were refill information, regimen of the therapy, hand-written prescription with non-legible writing, lack of strength of the dosage form, and no information on the dose. Similarly, the types of medications and dosage forms prescribed were also audited. The audit of this study emphasizes the need for pharmacist intervention to reduce prescription-related errors.

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