



## Short communication

# Antibiotic prescribing in pediatric health care services

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**Received:** 12-06-2022, **Revised:** 23-07-2022, **Accepted:** 28-07-2022, **Published:** 30-09-2022

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## HOW TO CITE THIS

Elfowiris & Majed (2022) Antibiotic prescribing in pediatric health care service.  
*Mediterr J Pharm Pharm Sci.* 2 (3): 12 - 16. <https://doi.org/10.5281/zenodo.7115130>

**Keywords:** Antibiotic, Libya, pediatric, polypharmacy, prescribing pattern

**Abstract:** Although, antibiotics play a fundamental role in control of infectious diseases still the injudicious prescription of antibacterial agents and antibiotic resistance are a global problem. This study aims to assess prescribing pattern of antibiotics and to provide a baseline data about behaviors of physicians prescribing antibiotics during pediatric consultations. In this study, a total of 316 pediatric patients of both genders were receiving different antimicrobial therapy were evaluated during 2021 in pediatric health care services in Bayda, Libya. Data revealed that the average of drugs prescribed was 4.10 per patient while the average of antimicrobials was 2.30 per prescription. Most of the antibiotics were prescribed for the respiratory tract infections (34.0%) and followed by the urinary tract infections (29.0%). Cephalosporins and penicillins were the most common antibiotics prescribed in this study. In conclusion, these findings show the presence of polypharmacy and inappropriate prescribing pattern. To improve and minimize the unnecessary prescribing of antimicrobial agents, a continuous training program for physicians, as well as engaged pharmacists in health care services are needed.

## Introduction

Antibiotics are an essential group of medicine used in the treatment of infectious diseases [1]. The unavoidable result of the irrational use of antimicrobials leading to the development of antimicrobial-resistant pathogens which results in a decrease of antimicrobial effectiveness and an increase in demand for searching of new medicines [2]. The resistance of microbes to antimicrobials agents is considered a serious threat to global health. An estimated of 700 000 people died due

to an antimicrobial resistance during 2015, with the majority of these deaths occurring in low- and middle-income countries [3]. The selection of antimicrobial agents requires an appropriate clinical diagnosis and a full understanding of microbiological and pharmacological factors [4]. The loss of antimicrobials effectiveness will have significant consequences on health systems, particularly with vulnerable patients [5]. One of these vulnerable patients are children, who receive a significant amount of the antibiotics prescribed

each year [6]. About 50.0% of the antibiotic prescription given by practitioner are unnecessary [7]. Antibiotic misuse particularly among children is considered one of the most important healthcare issues, and the prevalence may vary from region to region in the world with different development in antimicrobial resistance level [8]. The rapid development of antimicrobial resistance is primarily caused by common misuse of antibiotics which accelerates the natural process of genetic selection, leading to an increase of resistant to antibiotic treatments [9]. A huge data that ensure the antibiotic misuse is correlated with increasing bacterial resistance. The inappropriate use of antibiotics has been well-documented in developed and developing countries [10]. The common utilization of antibiotics consider one of the main reasons of antibiotic resistant. Although most of the children infection is caused by viral. However, more than 30% of antibiotics were prescribed to children who were suffering from viral infection or non-infectious diseases [11]. Moreover, the irrational prescribing of antibiotic may lead to develop of allergy that are affecting different systems include respiratory tract that leads to sneezing, congestion, rhinorrhea, wheezing and laryngeal edema. Gastrointestinal symptoms include nausea, vomiting, abdominal pain and diarrhea. Skin symptoms include urticaria, angioedema, flushing or pruritus. Tachycardia and hypotension as cardiovascular symptoms [12]. One of the main reasons of antibiotic resistance is the misuse of antibiotics by self-prescription, incomplete therapies, missing doses and re-use of remnant antibiotics [13]. Therefore, this study was aimed to evaluate antibiotic prescribing in children and to provide a baseline data about behaviors of physicians prescribing antibiotics during pediatric consultations in Bayda, Libya.

## Materials and methods

The data of this retrospective study were collected between April and October 2021. The study was carried out in AL-bayda city, Libya. 316 prescriptions were collected from department of pediatrics at health care service, which prescribed to

children from birth day until 12 years old by investigators. All the prescriptions contain at least one antibiotic. The data recorded to assess the prescription pattern included demographic details, clinical diagnosis and antibiotic prescription data, antibiotic class, route of administration and duration of therapy. An ethical approval of the Institutional Ethics Committee of the Omar Al-mukhtar University was taken before starting the study and a consent was obtained before the participation of subjects in the study. All data were statistical analyzed and presented as a descriptive (frequency and percentage).

## Results

A total of 316 pediatric patients' prescriptions were engaged, who receiving different antimicrobial therapy. Of these, 172 were males (54.0%) and 144 were females (46.0%). In **Table 1**, the mean age of both genders was (4.15 years). Since the duration of therapy of the antibiotics have been prescribed, almost half of the patients (50.0%) received antibiotics for 2 - 6 days, followed by 32.0% for duration of 7 - 13 days (32.0%). A total of 1593 drugs were prescribed with an average of 4.1 drugs per patient. The average of antimicrobials prescribed was 2.3 per prescription. Most of the antibiotics were prescribed for respiratory tract infections. Azithromycin (macrolide) which represents 35.0%, n = 110, followed by Augmentin (amoxicillin with clavonic acid), penicillins 29.0%, n = 91.

**Table 1:** Demographic characteristics of Libyan pediatric patients

| Variable | Data        | n (%)       |
|----------|-------------|-------------|
| Gender   | Male        | 172 (54.0%) |
|          | Female      | 144 (46.0%) |
| Age      | 1 m - 1 yrs | 043 (14.0%) |
|          | 1 - 2 yrs   | 025 (08.0%) |
|          | 2 - 6 yrs   | 142 (45.0%) |
|          | 6 - 12 yrs  | 106 (34.0%) |

In **Table 2**, azithromycin was the most common class of antibiotic prescription for children (34.8%) followed by Augmentin (28.7%) and then by cephalosporin (23.4%). In **Table 3**, the most

common infections in pediatrics patients according to diagnosis are presented. Thus, respiratory infections are about one third of the patients representing the highest rate (34.5%). Tonsillitis and GIT infectious are representing almost the same as respiratory infectious (33.0%, 29.0%, respectively). However, CNS, surgical and skin infections are the lowest rates in these patients, about 01.0%.

**Table 2:** Distribution of antibiotic class in Libyan pediatrics

| Antibiotic class | n (%)       |
|------------------|-------------|
| Cephalosporin    | 74 (23.4%)  |
| Penicillin       | 30 (9.50%)  |
| Amoxillin        | 04 (1.30%)  |
| Augmentin        | 91 (29.0%)  |
| Azithromycin     | 110 (34.8%) |
| Erythromycin     | 04 (01.3%)  |
| Septin           | 03 (0.95%)  |

**Table 3:** Diagnosis pattern in Libyan pediatrics

| Diagnosis             | n (%)        |
|-----------------------|--------------|
| Respiratory infection | 109 (34.49%) |
| CNS infection         | 04 (01.26%)  |
| GIT infection         | 91 (29.0%)   |
| UTI infection         | 03 (0.94%)   |
| Skin infection        | 02 (0.63%)   |
| Surgical              | 04 (1.30%)   |
| Tonsillitis           | 103 (33.0%)  |

## Discussion

Pediatric populations are important targets for efforts aimed at reducing unnecessary antibiotic use. The present study has showed the problem of inappropriate prescribing of antibiotics to children in Libya. One of the parameter, we have evaluated the average number of drugs per prescription which considered an important indicator of prescription evaluation [14]. The average number of drugs was found to be 4.1 drug per patient prescription encounter in this study. This shows the presence of polypharmacy. Polypharmacy can be defined as prescribing multiple medications than that are clinically indicated or necessary [14]. The ideal WHO standard value for average drugs per encounter is 1.6 - 1.8. However, it is found that most

of prescription depend only on signs and symptoms and lack to any other laboratory findings. These are an important tools for diagnostic accuracy to support a prescription of antibiotics and to confirm the diagnosis. The inadequate diagnosis or applying a pressure on physicians to prescribe antibiotics for minor symptoms leads to an increased risk of side effects, drug interactions, progress of antimicrobial resistance and increased cost [15].

In present study, the injectable dosage form prescription was found to be about 35.0% that higher than the WHO recommended range which is 13.4 - 24.1%. An unnecessary use of injectable form may lead to provoke the blood related diseases, increase risk of complications and increased expenses [16]. This study has showed a higher rate of antibiotic use in the age group of 2 - 6 year (45.0%). This may reflect the higher susceptibility of infections of this age group which could be related to nutritional problem and suggests that this age group should be a health care importance. Respiratory tract infections prevalence rate was the highest one among illness classification, this might be refer to the time of study conducted, since most of prescriptions collected during the spring time. Antibiotic prescribing rates for upper respiratory infections is alarmingly. Mainly, the symptoms of respiratory illnesses that carry patients to seek medical care are included cough, congestion, fever, chills, nasal discharge and sputum production, most of which are self-limiting and viral in origin [6]. Prescribing rates of antibiotics for respiratory infections in children still high and largely unnecessary. Reducing unnecessary use is a priority to reduce incorrect antibiotic use in primary health care [17].

Urinary tract infections represented about 30.0%, the second common indication for antibiotic use which is compatible with many studies [18]. While it is important to promptly treat urinary tract infections with antibiotics to prevent complications such aseptic shock and renal scarring in children [19]. It is also careful to use antibiotics wisely to decrease adverse effects and antibiotic resistance. Poor hygienity of children could be the cause behind high prevalence of urinary tract infections [20].

Both cephalosporins and penicillins were the most antibiotics prescribed in this study. The high prescription rate of these antibiotics may due to its broad spectrum of activity and clinical effectiveness. Another observed is that only 09.0% of physicians were used generic name of drugs. Physicians have adapted to use brand names of drugs in prescriptions. However, WHO and local authority recommend the prescribing of drugs by generic name, generic prescribing is more accurate and less errors and support the transparency between health care providers and patients. Moreover, they are cheaper than the branded drugs. The use of branded names may due to high promotional actions of pharmaceutical companies and absent of strict regulation from local authorities. However, this study was undertaken in a single part of east country

and short period of time that was not long enough to predict the pattern of antibiotics use over the year.

**Conclusion:** This study has shed the light on the prescribing pattern of antibiotics, the results shows deviation from WHO criteria, which recommended that the use of antimicrobial agents be closely monitored. There is an urgent need to find institutional policies and guidelines for improving antimicrobial use among hospitals in Libya. Moreover, there is a clear need for continuous education and training programs for physicians and pharmacists about rational prescribing of antimicrobial therapy. Thus, it is recommend to participating clinical pharmacists at all hospital wards to improve prescribing pattern.

**Acknowledgments:** The authors would like to thank all the involved participants in Pediatric Department at health care service and especially Dr. Anessa Elmasri for participating in collection of prescriptions.

**Data availability statement:** The raw data that support the findings of this article are available from the corresponding author upon reasonable request.

**Author contributions:** EAO & MNSS have conceived, designed, performed the analysis of data and drafting and revised the final version of the manuscript. MNEE has collected the data. Both authors have approved the final version of the manuscript and agreed to be accountable for its contents.

**Conflict of interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Ethical issues:** Including plagiarism, informed consent, data fabrication or falsification and double publication or submission have completely been observed by authors.

**Author declarations:** The authors confirm that all relevant ethical guidelines have been followed and any necessary IRB and/or ethics committee approvals have been obtained.

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