

# Patterns of Antibiotic Prescription in Children: Tirana, Albania Region

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## Abstract

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**BACKGROUND:** Antibiotics (abx) constitute the most prescribed therapeutic agent in the world. There is little data regarding antibiotic consumption by young children in Albania.

**AIM:** This study aims to evaluate antibiotic prescription in children in quantitative and qualitative terms, and therefore, propose recommendations to improve overall clinical outcomes.

**METHODS:** A retrospective, cross-sectional drug utilisation study was conducted based on unreimbursed prescriptions collected in 25 pharmacies, randomly selected within the district of Tirana, during the period beginning December 2015 to January 2016. They contain at least one antibacterial therapeutic agent prescribed for children 0-15 years old, for systemic use. The data were analysed using SPSS 20.

**RESULTS:** A group of 904 prescriptions meet inclusion criteria, 54.1% patient were female, and 45.9% were male. The most exposed age group were 2-6 years old. The most common diagnosis was respiratory tract infections: bronchitis (59.2%), tonsillitis (17%) followed by bronchopneumonia (9.6%). The most prescribed antibiotic classes are Penicillins (33%), Cephalosporins (33.2%) and Macrolides (21.5%). Amoxicillin (19.4%), Azithromycin (14.7%), the combination of Amoxicillin and Clavulanic acid (13.5%) and Cefaclor (11.7%) were the most commonly prescribed. We observed short duration therapies, with a mean duration of 5.21 days and in 17.4% of cases with a duration of  $\leq 2$  days.

**CONCLUSIONS:** We observed a large use of broad-spectrum antibiotics for common respiratory tract infection in children less than 6 years old. We would recommend the creation of an electronic database of patient's record in order to monitor the quality of prescription and education of the healthcare professionals and patient of risks related to antibiotic resistance.

## Introduction

Antibiotics (abx) constitute the most prescribed therapeutic agent in the world [1]. Their use has become prolific worldwide, and the rate of prescriptions grown along with [2] [3]. Preschool children are the primary recipients of this medication. [4]. Differences in antibiotic prescription in quantitative and qualitative terms, varies greatly from region to region, country to country [5]. Overuse and misuse of antibiotics have been proven to be the primary cause of antibiotic resistance in patients [6]. It is estimated that almost 50% of antibiotics prescribed for children by primary care physicians are unnecessary [7]. In the USA, almost three-quarters of all antibiotics are

prescribed for acute respiratory infections, and 44% of children with common colds were reported to be treated with antibiotics [8] [9]. In Canada, 74% of preschool children seeking care for respiratory infections received antibiotic prescriptions [10]. Prescribing broad-spectrum antibiotics, instead of the narrow spectrum (when appropriate) is also a common type of inappropriate usage [11]. There is little data regarding antibiotic consumption by young children in Albania.

This study aims to evaluate antibiotic prescription in children in quantitative and qualitative terms and to, therefore, propose recommendations and counter-measures to improve overall clinical outcomes.

## Patients and Methods

A *retrospective, cross-sectional* drug utilisation study was conducted based on unreimbursed prescriptions collected in 25 pharmacies, randomly selected within the district of Tirana. Drugs were prescribed by physicians and dispersed by pharmacies during the period beginning December 2015 to January 2016. They contain at least one antibacterial therapeutic agent prescribed for children 0-15 years old, for systemic use. The aim of this study is: to evaluate the most prescribed antibiotics; to discover the most common diagnosis they are prescribed for and the mean duration of therapy for each diagnosis; and finally, to compare possible similar patterns of prescription dissemination with other countries. To define each drug, we referred to the Anatomical Therapeutic Chemical Classification System (ATC). According to this system, antibiotics for systemic use are defined as the *J01* main therapeutic group [12]. The data were analysed using SPSS 20.

## Results

We collected a total number of 904 prescriptions, 54.1% patient were female, and 45.9% were male. According to children age, the most exposed age group were 2-6 years old, and preschool children ( $\leq 6$  years old) represent 2/3 of total prescription.

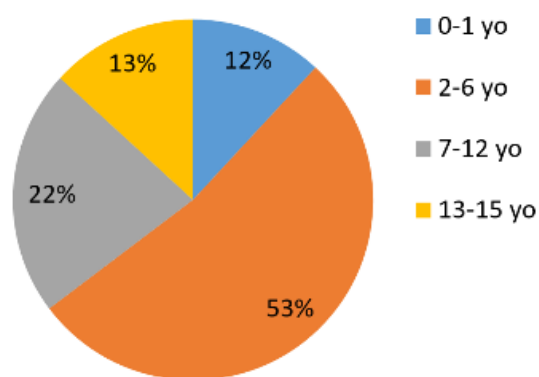


Figure 1: Prescription of antibiotics among age groups

Antibiotic therapy was given to children for 1 - 10 days, with a mean therapy duration of 5.21 days. In 17.4% of cases, antibiotic are given to children for  $\leq 2$  days. Most common diagnosis for prescribing an antibiotic was respiratory tract infections: bronchitis (59.2%), tonsillitis (17%) followed by bronchopneumonia (9.6%).

Table 1: Diagnosis for prescribing an antibiotic and mean duration of therapy

Diagnose	%	Mean Duration (days)	Std. Deviation	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
Tonsillitis	17	5.15	2.309	4.78	5.52
Bronchitis	59.2	5.22	2.291	5.02	5.41
Bronchopneumonia	9.6	5.63	1.472	5.32	5.95
Gastroenteritis	4.1	5.05	2.438	4.24	5.87
Otitis	2	5.89	1.875	4.96	6.82
Urinary tract infection	0.7	6.83	1.941	4.80	8.87
Synusitis	3.4	5.35	2.039	4.60	6.00
Dental infection	2.5	4.17	2.188	3.23	5.12
Parasitic infection	1.4	3.00	2.000	1.79	4.21

The most prescribed antibiotic classes are Penicillins (33%), Cephalosporins (33.2%) and Macrolides (21.5%) followed by Aminoglycosides with 3.3% of cases.

Table 2: Systemic antibiotics prescription

Chemical group	Drug	%
J01C Penicillins	J01CA04 Amoxicillin	19.4
	J01CR02 Amoxicillin and Clavulanic acid	13.5
J01DB First-generation cephalosporins	J01DB01 Cefalexin	5
	J01DB04 Cefazolin	3
J01DC Second-generation cephalosporins	J01DC02 Cefuroxime	2.2
	J01DC04 Cefaclor	11.7
J01DD Third-generation cephalosporins	J01DD02 Cefazidime	0.2
	J01DD04 Ceftriaxone	6.4
	J01DD08 Cefixime	4.8
J01FA Macrolides	J01FA01 Erythromycin	0.2
	J01FA09 Clarithromycin	6.5
	J01FA10 Azithromycin	14.7
J01G Aminoglycoside	J01GB03 Gentamicin	3.4
J01EE Combinations of sulfonamides and trimethoprim	J01EE01 Sulfamethoxazole and trimethoprim	5.3
J01XD Imidazole derivatives	J01XD01 Metronidazole	3.7

Amoxicillin (19.4%), Azithromycin (14.7%), the combination of Amoxicillin and Clavulanic acid (13.5%) and Cefaclor (11.7%) were the most commonly prescribed. Penicillins were the most prescribed drugs overall, while Cephalosporins were more prescribed for Bronchitis, Bronchopneumonia and Otitis. For dental infections, Penicillins remained the first pharmaceutical treatment choice. Macrolides are usually prescribed for Bronchitis and Bronchopneumonia.

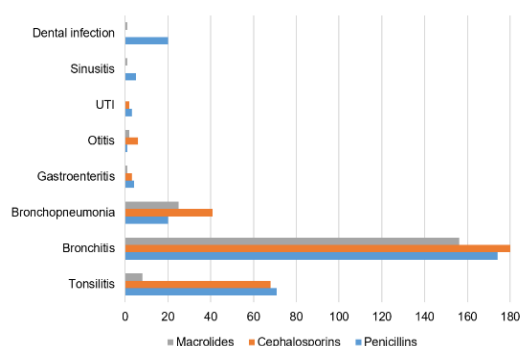


Figure 2: Prescription of Penicillins, Macrolides and Cephalosporins According to Diagnosis

Syrups were the most commonly used pharmaceutical dosage forms (53.2%), followed by injections (29.8%) and tablets/capsules (15%).

## Discussions

From 902 prescriptions, 64.4% were dispensed for children under 6 years old. In point of fact, the general worldwide trend is that preschool children are the most exposed to these drugs [4] [13]. Other studies have evidenced that antibiotics are often prescribed without likely therapeutic effects (e.g. for viral respiratory infections). This phenomenon is particularly frequent amongst children [9] [10] [14] [15] [16]. Most of the prescriptions in our study were for respiratory tract infections and bronchitis, as the most frequent diagnosis. According to the pediatric treatment recommendations of the Center for Disease Control and Prevention (CDCP) antibiotics are not helpful and should not be used for bronchitis [17]. Because the risk of antibiotic resistance and *Clostridium difficile* infection, antibiotics should not be routinely used in the treatment of acute bronchitis, especially in younger patients in whom pertussis is not suspected [18]. From this study, we discovered that broad spectrum abx are far more preferred pharmaceuticals in the Tirana region, with Penicillins being the most prescribed drug class, followed by Cephalosporines and Macrolides. Amoxicillin, Azithromycin, the combination of Amoxicillin and Clavulanic acid and Cefaclor are usually prescribed and dispersed for respiratory tract infection. The trend of using newer broad-spectrum agents in pediatric outpatients is spreading globally. In the Netherlands [13], UK [19], Italy [20], and in the US [21] [22], the use of broad-spectrum abx has increased disproportionately. The use of broad-spectrum agents for viral infections is also a serious concern regarding antibiotic resistance [23] [24]. In this study, we observed short duration therapies, with a mean duration of 5.21 days and in 17.4 % of cases with a duration of  $\leq 2$  days. This use is in contrast with general guidelines of antibiotic use where in most cases it is recommended that a therapy continues 7-10 days for diagnosis such as Tonsillitis and Pneumonia [25]. Nevertheless, according to the pharmacokinetic characteristics of some antibiotics [26], and some studies in which 5 days duration therapies, showed that these could be equally effective as therapies with a duration of more than 7 days, authors of the studies recommended to be cautious about the results [27]. We observed the widespread use of injections for outpatient children (almost 30% of all patients). Oral dosage of pharmaceutical forms is more appropriate and less traumatic for children. This study gives information about the patterns of antibiotic prescriptions in children for the mentioned region of Tirana. However, it has some limitations. First, it is limited only to unreimbursed prescriptions. However, a previous study of antibiotic consumption in Albania showed that the unreimbursed abx use is almost seven times higher than the reimbursed use [28]. Secondly, the location of the study is restricted to the region of

Tirana, and this is a random sampling study. The absence of clinical electronic health record databases for drug prescription outside the reimbursement scheme presents a major difficulty in collecting data to evaluate antibiotic prescriptions for outpatients on a national scale. This program could help to monitor pharmaceuticals like antibiotics which are frequently prescribed and dispersed outside this scheme, increase the responsibilities of appropriate antibiotic use, including warnings, and finally, to decrease costs for disease management for Albanian families.

In conclusion, this study demonstrated a large use of broad-spectrum antibiotics for common respiratory tract infection in children less than 6 years old. Guidelines recommend that for some of these infections, antibiotics can be avoided or at least delayed, as the situation is monitored. Short duration therapies were observed, raising other concerns such as antibiotic resistance. This study has a limited number of prescriptions, and it is nor conducted on a national scale. We would recommend the creation of an electronic database of patients record to monitor the quality of prescription and education of the health care professionals and patient of risks related with antibiotic resistance.

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