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Survey on Antibiotics Use in the Outpatient Treatment of Upper Respiratory Tract Infections

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ABSTRACT

Aim: (1) Survey on the current situation of antibiotic prescription (2) Assess the safety–reasonability of antibiotic prescription.

Subject and Method: A retrospective descriptive study on 300 outpatient prescriptions at Vo Truong Toan University Hospital in 2023 with the diagnosis of upper respiratory tract infection. Several factors associated with unknown antibiotics were analyzed by the logistic regression model.

Result: Cephalosporin antibiotics account for the highest proportion (42.8%), followed by fluoroquinolones (32.8%). Recorded prescriptions with interactions were 113 prescriptions (37.7%). In the total number of prescriptions (n=113), antibiotic interactions occurred according to: the level of drug interactions to Medscape includes close monitoring (75.8%). Next is the mild level (19.4%) and the severe level is (4.8%). The level of drug interactions according to Drugs.com includes the low level (61.8%). Next is the medium level (37.5%) and the dangerous level (0.7%). The most frequent interaction pairs are ciprofloxacin plus methylprednisolone (64/300 prescriptions), levofloxacin plus methylprednisolone (8/300 prescriptions) and ciprofloxacin plus tramadol (9/300 prescriptions).

Conclusion: The most commonly used antibiotic is cephalosporin, which has many pairs of drug interactions that require close monitoring from treating physicians and clinical pharmacists.

KEYWORDS: Upper respiratory tract infections, antibiotics, interaction.

ARTICLE DETAILS

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1. INTRODUCTION

More patients visit clinics and emergency departments each year for upper respiratory tract infections than for any other infectious disease. There are more than 25 million office visits each year for acute upper respiratory infections. Otitis media, rhinosinusitis and pharyngitis are the three most common upper respiratory tract infections [1]. Clinically, the treatment of upper respiratory infections is rarely accurately diagnosed and based only on clinical symptoms, it is difficult to distinguish whether the disease is caused by bacterial, viral or other microbial infections, including: Most upper respiratory infections are caused by viruses. In addition, drug interactions also cause many disadvantages in treating this disease if clinicians and pharmacists do not clearly understand the common interaction pairs that occur when treating this disease. In order to improve the quality of treatment and use antibiotics safely and appropriately in patients I conduct research with the following specific goals:

(1) Survey on the current status of antibiotic use in outpatient treatment of upper respiratory infections

(2) Analyze drug interactions in prescriptions Antibiotic medicine at Hospital

2. RESEARCH SUBJECTS AND METHODS

Research subjects : Prescriptions for all outpatients.

Sampling criteria: Prescription with a diagnosis of ARI; prescription containing antibiotics.

Exclusion criteria: prescription for topical antibiotics (ear drops, nose drops); The prescription contains traditional medicine and antiviral medicine.

Research time and location: at Vo Truong Toan University Hospital, Viet Nam during the period from January 2023 to December 2023.

Research Methods

Study design: Retrospective descriptive study

Sample size: 300 prescriptions.

Research content: From the prescriptions in the selected sample, record and evaluate relevant information:

Characteristics of patients in the study sample: Gender, age, ARI, comorbid chronic diseases.

Characteristics of treatment drugs in the study sample: Antibiotics, duration of antibiotic use, supporting drugs.

Assessing antibiotic interactions in research samples: Evaluation standards using 2 tools Medscape and Drugs.com.

Degree of drug interaction of these drugs lookup tool *

Tools	Level	Evaluate
Medscape	Serious	*If the interacting pair has both lookup tools present at the same time, it is recorded as 2/2 lookup tools; If the interaction pair is present in the same search engine, record the highest level of interaction in that search engine; If the interaction pair is not present in any of the lookup tools, do not record that interaction pair.*
	Significant	
	Minor	
Drugs.com	Minor	
	Moderate	
	Major	

Data processing and analysis method: Data were entered and analyzed using SPSS 26.0 software. The relationship is statistically significant when $P < 0.05$.

Medical ethics: The study was conducted after passing the medical ethics council of Vo Truong Toan University.

3. RESEARCH RESULTS

3.1. Characteristics of patients in the study sample

Age and gender:

Table 1. Gender distribution by age group in the study sample

Variable	Male	Female
	n (%)	n (%)
< 18 years old	23 (51.1)	22 (48.9)
18 – 24 years old	13 (59.1)	9 (40.9)
25 – 44 years old	37 (23.7)	76 (67.3)
45 – 59 years old	36 (47.4)	40 (52.6)
≥ 60 years old	24 (54.5)	20 (45.5)
Total	**133**	**44.3**

Comment: The median age in the study sample is 40 years (Q1: 27; Q3: 53). The most common age group among adults with the disease is from 25 to 44 years (37.7%). The proportion of women is 55.7%, while men account for 44.3%. This difference is statistically significant ($P<0.05$).

Pathology of ARI:

Table 2. Distribution of ARI pathology in the study sample

Variable		n	%
Number of pathologies	1 pathology	297	99.0
	2 pathologies *	3	1.0
Types of diseases	Common cold	6	2.0
	Sore throat	184	60.7
	Tonsillitis	1	0.3
	Otitis media	19	6.3
	Acute sinusitis	93	30.7

Note: * Pharyngitis and tonsillitis; pharyngitis and sinusitis.

Comment: Among ARI diseases, the proportion of patients with sore throat is (60.7%). Next are acute sinusitis (30.7%), otitis media (6.3%), common cold (2.0%), and tonsillitis (0.3%).

3.2. Characteristics of treatment drugs in the study sample

Proportion of prescribed antibiotic groups:

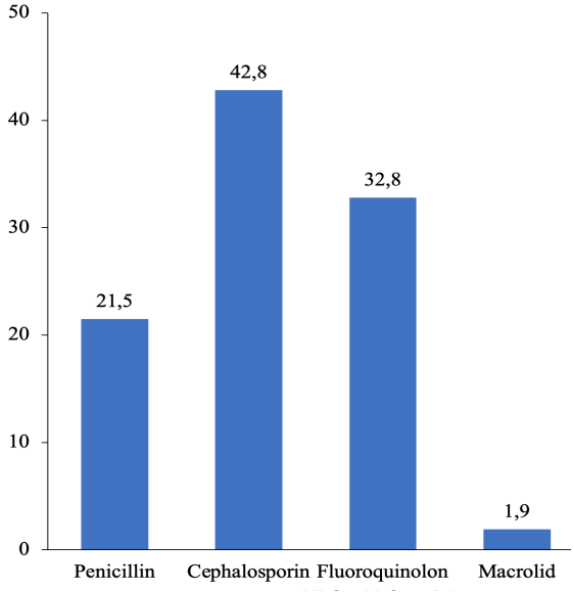

Figure 1. Treatment groups assigned to patients in the study sample

Comment: Cephalosporin antibiotics account for the highest proportion (42.8%), followed by fluoroquinolone group (32.8%).

Antibiotics are indicated in respiratory infections

Most prescriptions did not contain combinations of antibiotics (96.7%). Prescriptions with antibiotic combinations were found in 3.3% of cases. Of these, 3% were combinations of 2 antibiotics, while 0.3% involved 3-antibiotic combinations. Antibiotics indicated in the treatment of infectious diseases are shown in Table 3.

Table 3. Antibiotics indicated in the treatment of bacteremia were surveyed

Antibiotic	Common cold	Sore throat	Tonsillitis	Otitis media	Acute sinusitis
	n (%)	n (%)	n (%)	n (%)	n (%)
Penicillin	2 (33.3)	41 (22.3)	0 (0)	3 (15.8)	13 (14.0)
Cephalosporins	2 (33.3)	78 (42.4)	0 (0)	3 (15.8)	47 (50.5)
Fluoroquinolone	2 (33.3)	55 (29.9)	0 (0)	7 (36.8)	32 (34.4)
Macrolides	0 (0)	5 (2.7)	0 (0)	0 (0)	0 (0)
Lincosamide	0 (0)	-	0 (0)	2 (10.5)	-
Penicillin + Fluoroquinolone	0 (0)	2 (1,1)	0 (0)	4 (21.1)	1 (1,1)
Penicillin + Cephalosporin	0 (0)	1 (0.5)	0 (0)	0 (0)	0 (0)
Cephalosporin + Fluoroquinolone	0 (0)	1 (0.5)	0 (0)	0 (0)	0 (0)
Cephalosporin + 5-nitroimidazole + Macrolide	0 (0)	1 (0.5)	1 (100.0)	0 (0)	0 (0)

Comment: In pharyngitis, cephalosporin monotherapy accounts for 42.4%. Next is the fluoroquinolone group (29.9%), penicillin (22.3%), and macrolides (2.7%). The combination of penicillin + fluoroquinolone is 1.1%, while combinations of penicillin + cephalosporin, cephalosporin + fluoroquinolone, and cephalosporin + 5-nitroimidazole + macrolide each account for 0.5%. In otitis media, fluoroquinolone monotherapy accounts for 36.8%, followed by penicillin and cephalosporins, each with 15.8%, and lincosamide at 10.5%. The combination of penicillin + fluoroquinolone accounts for 21.1%. In acute sinusitis, cephalosporin monotherapy is the most common (50.5%), followed by fluoroquinolone (34.4%) and penicillin (14.0%). The combination of penicillin + fluoroquinolone has a 1.1% indication.

Duration of antibiotic treatment:

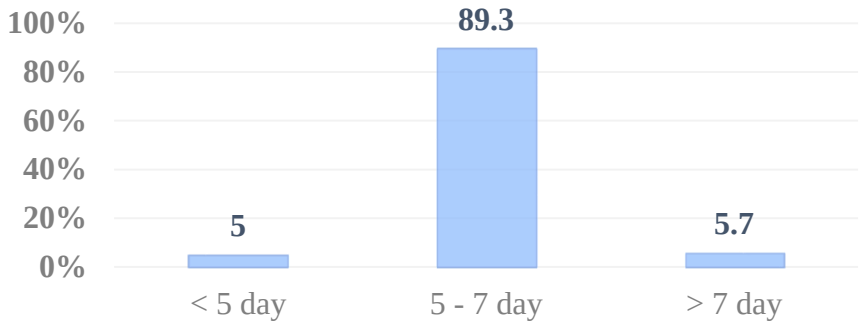

Figure 2. Time to prescribe antibiotics in the research sample

Comment: The average duration of antibiotic prescription is 6.94 ± 1.814 days (Min – Max: 1 – 14). Prescriptions lasting more than 7 days account for 5.7%, while those lasting less than 5 days account for 5.0%.

3.3. Evaluation of antibiotic interactions in research samples

Table 5. Results of antibiotic interaction assessment

	n	%
Medscape	**124**	**100**
Serious	6	4.8
Significant	94	75.8
Minor	24	19,4
Drugs.com	**136**	**100**
Minor	84	61.8
Moderate	51	37.5
Major	1	0.7

Comment: There were 113 prescriptions (37.7%) containing interacting drugs. Among these prescriptions, antibiotic interactions occurred, with the following levels according to Medscape: close monitoring (75.8%), minor interactions (19.4%), and severe interactions (4.8%). According to Drugs.com, minor interactions accounted for 61.8%, moderate interactions for 37.5%, and major interactions for 0.7%.

Table 6. Common interacting pairs

Interactive pair	n	%
Ciprofloxacin + methylprednisolone	64	21.33
Levofloxacin + methylprednisolone	8	2.67
Ciprofloxacin + tramadol	9	3

Comment: The most common interaction pairs are ciprofloxacin with methylprednisolone (64/300 prescriptions), levofloxacin with methylprednisolone (8/300 prescriptions), and ciprofloxacin with tramadol (9/300 prescriptions).

4. DISCUSSION

Research results show that beta-lactam antibiotics, fluoroquinolones, and macrolides are the most commonly prescribed antibiotic groups and are present in most prescriptions. Among these, the cephalosporin group is the most frequently prescribed (42.8%). My results are consistent with a study by Higashi T. and Fukuhara S., in which cephalosporins accounted for the highest proportion (49.0%) [3]. However, when compared to the study by Hashmi H. and colleagues, the penicillin group (54.9%) was more commonly prescribed than cephalosporins (17.0%) [2].

The beta-lactam group has a broad spectrum of activity, including Gram-positive, Gram-negative, and anaerobic bacteria, and it is also recommended as a first-line treatment in many infectious diseases. However, this group also has the highest rate of inappropriate use. Amoxicillin is often combined with clavulanate in varying ratios, making it unsuitable for substitution. In the surveyed applications, amoxicillin was combined with clavulanate at a dose of 2 tablets per time instead of the usual 1 tablet. The combination of amoxicillin/clavulanate with cefixime is considered inappropriate due to overlapping pharmacological effects within the beta-lactam group. This combination not only has limited therapeutic benefit but also increases treatment costs, toxicity, and the likelihood of resistance to available antibiotics.

The fluoroquinolone group represents a significant proportion of prescriptions (32.8%). Fluoroquinolones, though broad-spectrum and effective, are often not recommended as a first-line option due to their potential for unnecessary overuse, high costs, and associated risks, including peripheral damage. The FDA and other regulatory agencies have issued warnings about fluoroquinolones, particularly concerning their side effects related to tendons, muscles, bones, and nerves. As such, these antibiotics should be reserved for patients with no other treatment alternatives [5].

The macrolide group, including azithromycin and clarithromycin, is generally not recommended for empirical treatment because of the high resistance rates of S. pneumoniae (around 30%) [4]. This group of antibiotics may be an option for patients who are allergic to beta-lactams.s.

5. CONCLUSION

From the above research results, we conclude that the most commonly used antibiotics are cephalosporins. There are many pairs of drug interactions that require close monitoring from treating physicians and clinical pharmacists.

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