International Journal of Medical Science and Clinical Research Studies

ISSN(print): 2767-8326, ISSN(online): 2767-8342

Volume 03 Issue 05 May 2023

Page No: 1018-1021

DOI: https://doi.org/10.47191/ijmscrs/v3-i5-50, Impact Factor: 6.597

Rationality of the Antibiotics Use in Pediatric Acute Respiratory Infection Patients at Ssma Hospital in Pontianak, Indonesia

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ABSTRACT

Acute respiratory tract infections (ARI) in children have a high prevalence that can be caused by bacteria or viruses. Antibiotics are prescribed more often than recommendations in the guidelines. This study aims to evaluate the rationality of antibiotic use and the occurrence of drug interactions in pediatric patients diagnosed with ARI at one of the hospitals in Pontianak based on some parameters such as right drug, right dose, and right duration as well as the incidence of drug interactions. Data collection was carried out based on medical record data which was carried out with a total sampling technique, namely taking all data that met the inclusion criteria.This research is a descriptive cross sectional design and retrospective data collection using patient medical records. Samples were taken by total sampling method. The results obtained from 131 patients consisting of 172 visits, right drug (131), right dose (93), and right duration (77).

KEYWORDS: Acute respiratory tract infections (ARI), Pediatric, Antibiotics

ARTICLE DETAILS

Published On:
30 May 2023

Available on:
https://ijmscr.org/

INTRODUCTION

ARI include rhinitis, sinusitis, pharyngitis, epiglotitis, laryngitis, tonsillitis and otitis media. Lower respiratory tract infections include bronchitis, bronchiolitis, and pneumonia.[1] ARI are a heterogeneous and complex group of diseases that can last for 14 days due to various pathogens in which anatomic sites may extend from the pharynx to the alveoli.[2]

ARI represents 50% of all diseases in children under 5 years. Although most are limited to the upper respiratory tract, but 5% also involve the lower respiratory tract, especially pneumonia. Children aged 1-6 years can experience ARI episodes 7-9 times per year, but are usually mild. The highest consumption of antibiotics in children is one of them in ARI. Mild ARI and caused by viruses do not need to be given antibiotics because they are not useful and do not affect the duration of therapy.

On average, pediatric patients will get at least three drug items in one recipe which consists of antibiotic therapy and symptomatic therapy so that it has the potential to cause drug interactions.

This study aims to evaluate the rationality of antibiotic use and the incidence of drug interactions in pediatric patients diagnosed with ARI in an outpatient installation at a hospital in Pontianak.

MATERIALS AND METHODS

The Ethical-Clearence had arranged by Ethical Clearence Division, Medical Faculty, Tanjungpura University, numbered: 3404/UN22.9/DL/2019, and dated Mei 10th 2019. Data collection in this study was retrospective using medical records of patients from January to December 2018 that met the inclusion criteria including pediatric patients aged 0-12 years, receiving antibiotics, not diagnosed with other bacterial infections, and complete medical records. Evaluation of the rationality of the use of antibiotics in the form of right indication, right patient, right medicine, right frequency and right dosage based on the Children's Respirology Textbook of the Indonesian Pediatrician Association, as well as the correct dosage and duration based on the 2017 Indonesian Drug Information.

The inclusion criteria in this study were:

a. The patient was diagnosed with ARI.
b. Pediatric patients aged 0-12 years.
c. The patient received antibiotics and underwent outpatient treatment.
d. Complete patient medical records include medical record number, age, weight, gender, clinical symptoms, diagnostic results, results of supporting examinations and drug use data (drug name, dose, frequency, duration of administration).

The exclusion criteria in this study were: Patients with ARI children with other infectious diseases who receive antibiotics.

RESULTS AND DISCUSSION

Quantitative Data

Quantitative data including patient characteristics (gender and age), type of ARI, frequency of visits, and antibiotic use profile are presented in the table below.

Table I. Characteristics of Gender

Gender	Number
Male	71
Female	60
Total	131

It can be seen in table I, that ARI was more common in male patients. The number of ARI male patients was 71, while female was 60. In theory, in general there is no difference between ARIs in male and female.[3] However, the theory stated by Fibrila[4] suggests that there is a slight difference, namely the higher incidence in boys. The results of a similar study by Ranny et al[5] stated that male is 1.5 times more likely to suffer from ARI than female. This is because more male has outside activities than female.[5]

Table II. Frequency of patient visits

Number of visits (times)	Total (Patient)	Total visits
1	115	115
2	5	10
3	3	9
4	4	16
5	2	10
6	2	12
Total	131`	172

The highest frequency of ARI was 1 times as many as 115 samples, followed by twice as many as 10 samples, 3 times as many as 3 samples, and finally 4 times as many as 4 samples. There are also 5 and 6 times as many as 2 sample. The factors that influence this include parents' knowledge, family economy, nutritional status, and the supporting environment.[6]

Table III. Profile of antibiotic use

Antibiotics class	Antibiotics	Frequency
Bata-lactam and derivates	Amoxicillin	12
	Amoxicillin claulanic acid	49
	Cefixime	55
	Azithromycin	9
Macrolide	Erythromycin	6
		131

The use of antibiotics for ARI in this study can be seen in Table III. The use of antibiotics from the largest to the smallest, namely cefixime (55), amoxicillin-clavulanic acid (49), azithromycin (9), amoxicillin (12), and erythromycin (6). The first-line antibiotic for ARI is amoxicillin. The high use of cefixime antibiotics (third generation cephalosporins), amoxicillin-β-lactamase inhibitors, and azithromycin (the latest generation of macrolides) indicates that there has been a shift in treatment lines to second or even third line. These second and third-line antibiotics are less profitable in terms of price and toxicity.[1]

Table IV. The accuracy of antibiotics dosage

Antibiotic	Right dose	Under dose	Over dose
	Frequency	Frequency	Frequency
Amoxicillin	8	1	3
Amoxicillin claulanic acid	27	5	17
Cefixime	50	4	1
Azithromycin	4	5	-
Erythromycin	4	1	1
Total	93	16	22

Based on table IV, it appears that the total dosage accuracy is 93, under dose is 16, and over dose is 22. This dose inaccuracy is generally caused by the calculation of the dosage based on the child's age. In children, it is very important to determine the dosage by adjusting age and body weight.

Table V. Duration of Antibiotic Use.

Duration	Frequency
3	15
4	39
5	30
6	25
7	6
8	7
10	9
Total	131

Table V, shows the proportion of timeliness of the latest IDAI basic use is 77. The length of duration of antibiotic therapy can very much be done by the strength of the preparation received. The duration of antibiotic administration in this study was 3-12 days, with an average duration of 4-7 days. So far, there are no controlled studies regarding the optimal duration of antibitoic therapy for ARI. A randomized controlled trial study conducted by Harvey et al, states that short-term therapy of 5-7 days produces the same results with a duration of 10-14 days.[7] The prescription

pattern used in this study also shows that high doses of antibiotics are preferable but are still in the therapy range of short duration, compared to low doses but of longer duration. This is because the long duration increases colonization, pressure selection, and transfer of resistant strains.[8] The administration of low doses of penicillin for a long duration causes disruption of the gut microbiota, increases cytkoin expression in the frontal cortex, modifies the integrity of the blood-brain barrier, and modifies behavior.[9]

The results of research on ARIs rationality may vary depending on the characteristics of the subject, the method of analysis, and the treatment guidelines used. There were some cases that the drug was not appropriate according to hospital standards because the use of cefixime was not a drug of choice. Third generation cephalosporin antibiotics can have the same effect, but the risk of resistance is greater and more expensive. Treatment failure found persistent Streptococcus after completion of therapy. This occurs in 5-20% of the population, and more in the population with oral medication. The cause can be due to inadequate compliance, reinfection, the presence of normal flora that produces β-lactamase.[10]

Dose inaccuracy is generally due to the calculation of the dosage based on the child's age. In children, it is very important to determine the dosage by adjusting age and body weight. In particular, the inaccuracy of the dosage on antibiotic use is due to the practice of using antibiotics as a means of diagnosis because clinically the patient shows symptoms of infection while the results of the investigations do not support or vice versa. Several aspects are needed to realize this, for example the availability of an adequate microbiological laboratory, communication of various parties involved, support for financing policies and procurement of antibiotics that support the implementation of antibiotic use wisely in hospitals. First-line antibiotic resistance, namely amoxicillin, is already widespread in the community, however, cross-resistance can be lowered in one class of antibiotics.[11] The inappropriate use of antibiotics in terms of this dosage must be suppressed, especially in the new macrolide, azithromycin, which has many advantages. Inappropriate dosing results in patient recovery, increases the risk of drug side effects, increased medical costs, and bacterial resistance to antibiotics.

The duration of antibiotic therapy is greatly influenced by the strength of the dosage received by the patient. The duration of antibiotic administration in this study was 3-12 days, with an average duration of 4-7 days. So far, there are no controlled studies regarding the optimal duration of antibiotic therapy for treating ARI. A random control trial conducted by Harvey et al, stated that short-term therapy of 5-7 days produced the same outcome with a duration of 10-14 days.[12] The prescription pattern used in this study also shows that high doses of antibiotics are preferred but are still within the range. therapy of short duration, compared to lower doses but of longer duration. This is because the long duration increases colonization, pressure selection, and transfer of resistant strains.[13] Administration of low doses of penicillin for a long duration causes disruption of the gut microbiota, increases cytkoin expression in the frontal cortex, modifies the integrity of the blood-brain barrier, and modifies behavior.[14] Therapy of high doses and of short duration is preferred because first is the reduced impact on commensal flora, secondly reduces the chance of developing resistance, thirdly reduces the cost of treatment, at least theoretically increases adherence, and fewer side effects.

CONCLUSION

Based on the results of evaluating Rationality of the Antibiotics Use in Pediatric ARI Patients in Children's Poly and Ear Nose Throat Poly at One Hospital in Pontianak Citythe results can be concluded with the following accuracy The results obtained from 131 patients consisting of 172 visits, namely, right drug (131), right dose (93), and right duration (77).

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