



## Study on the use of antibiotics in patients with upper respiratory tract infections (URI) at a public health center in karawang regency

Ida Lisni<sup>1</sup>, Nurlutfita Arsila<sup>2</sup>, Entris Sutrisno<sup>3</sup>

<sup>1,3</sup>Program Studi Pendidikan Apoteker, Fakultas Farmasi, Universitas Bhakti Kencana, Bandung, Indonesia

<sup>2</sup>Program Studi Sarjana Farmasi, Fakultas Farmasi, Universitas Bhakti Kencana, Bandung, Indonesia

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### ABSTRACT

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Respiratory Tract Infection is an infection affecting the respiratory tract structures, damaging the gas exchange process from the nose to the alveoli, lasting up to 14 days, and is typically contagious. Upper Respiratory Tract Infection (URTI) is a disease with a high prevalence, causing nearly 4 million deaths each year. This study aims to determine the pattern of antibiotic use and the appropriateness of drug administration based on indications, dosage, and frequency at a health center in Karawang Regency. The research was conducted retrospectively from patient medical records and analyzed quantitatively. The results show that 121 patients in this study used antibiotics. Based on gender, 52.89% were male and 47.10% were female. The most common age category was early adulthood (26-35 years) at 26.44%. The antibiotics used were Amoxicillin (57.02%), Cefixime (22.31%), and Cotrimoxazole (20.66%). The accuracy of drug use with appropriate indications was 100%, the appropriateness of dosage was 99.17%, and the appropriateness of frequency was 100%.

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### Corresponding Author:

Ida Lisni,  
Program Studi Pendidikan Apoteker,  
Universitas Bhakti Kencana,  
Jl Soekarno Hatta No 754 Kota Bandung 40614, Indonesia  
Email: [ida.lisni@bku.ac.id](mailto:ida.lisni@bku.ac.id)

### 1. Introduction

Infectious diseases are diseases caused by microorganisms that are a response of the body due to the stimulation of the immune system (Kementerian Kesehatan Republik Indonesia, 2021). Tract Infection refers to an infection of the respiratory tract structures that damages the gas exchange process from the nose to the alveoli. The general causes of respiratory tract infections include bacteria, fungi, or viruses entering the respiratory tract. Symptoms and signs include cough, cold, difficulty breathing, sore throat, ear pain, and fever (Rosana, 2016). The primary causes of morbidity and mortality from infectious diseases worldwide include URTI. As a result of URTI, nearly 4 million people die every year. Infants, children, adults, and the elderly have the highest mortality rates, particularly in low- and middle-income countries (World Health Organization, 2014). Upper Respiratory Tract Infection is the most common acute condition found in primary healthcare services (health centers).

In Indonesia, respiratory tract infections are among the common diseases, as reflected in the prevalence of URTI cases in Indonesia based on diagnoses by health workers from 2013 to 2018. Ten provinces with significant numbers of respiratory tract infection cases include West Java (Kementerian Kesehatan Republik Indonesia, 2018). Among all health centers in Karawang Regency, there are 10 common diseases frequently reported by the public, one of which is URTI. The Karawang Health Office

stated that the number of URTI cases increased from 175,891 cases in 2016 to 181,945 cases in 2019. Many studies have illustrated the treatment of URTI patients, such as the study by (Dwiprahasto, 2006) which showed that URTI patients often use antibiotics, leading to overprescription and irrational use. In 43 health centers in West Sumatra Province, the average number of drugs prescribed to both children and adults was 3.69 per patient. In several health centers in districts in West Sumatra, 90% of patients with URTI were given antibiotics, but only a few health centers prescribed antibiotics to less than 70% of URTI patients. Based on research conducted by (Sugiarti et al., 2015) data on antibiotic use from the Sumbersari Health Center since March 2014 revealed that the most commonly used antibiotics for URTI were amoxicillin and cotrimoxazole. The accuracy of antibiotic use showed 100% appropriate indication, 100% appropriate frequency, and 8.9% appropriate dosage.

According to the (Kementerian Kesehatan Republik Indonesia, 2017) Drug Utilization Evaluation (EPO) is the process of evaluating organized and manageable drug use both qualitatively and quantitatively. Qualitative EPO is a system or study to assess the appropriateness of drug use (compliance with agreements or drug use) by considering the norms of drug use that have been officially established over time.

Antibiotics are drugs used for treating bacterial infections. Antibiotics can kill bacteria (bactericidal) or inhibit the growth and development of bacteria (bacteriostatic) (Kementerian Kesehatan Republik Indonesia, 2011). Improper use of antibiotics in society today has led to a problem with antibiotic resistance, which increases when bacteria change in ways that reduce or eliminate the effectiveness of compounds, drugs, or other substances used for treating or preventing infections (Utami, 2011)

Based on (Peraturan Menteri Kesehatan Nomor 43 Tahun 2019 Tentang Pusat Kesehatan Masyarakat, 2019), a health center (Puskesmas) is a public health organization that provides initial public and individual health efforts, prioritizing proactive and preventive capabilities in its working environment. UKM, or Public Health Efforts, refers to all activities aimed at improving, maintaining, addressing, and preventing health problems. A major health issue in Indonesia is the increasing antibiotic resistance rate, which can lead to higher morbidity, mortality, and healthcare costs. Pharmacists also need to enhance their skills, knowledge, and behavior to interact directly with patients. In addition, pharmacists are required to cooperate with other healthcare professionals in deciding treatments to improve the rational use of drugs (Kurniawati & Santoso, 2018). Pharmacists have the opportunity to practice prudent antibiotic use through clinical pharmacy services. The high rate of antimicrobial resistance needs to be addressed collectively, including monitoring and evaluating antimicrobial use in hospitals and health centers (Anggraini, 2016). The high prevalence of diseases has made the use of antibiotics as an anti-infective drug inevitable. This opens the opportunity for inappropriate antibiotic use, which can trigger antibiotic resistance.

## 2. Methods

This study employs a non-experimental observational method with a descriptive approach and data collection conducted retrospectively. The subjects of this study were adult outpatients aged 18 to 65 years diagnosed with Upper Respiratory Tract Infection (ISPA) and receiving antibiotic treatment. The criteria for the medications evaluated include indication, dosage, and frequency of use, based on the latest references such as (DiPiro et al., 2014) and (Umar, 2005). The assessment of medication use aims to measure the accuracy of the indication, dosage, and frequency of medication administration. The accuracy of the indication involves evaluating the selection of medications based on the patient's medical needs, while the accuracy of the dosage refers to the quantity of medication given within the recommended therapeutic range, and the accuracy of the frequency refers to the appropriate timing for medication administration.

The data for this study were collected retrospectively from the medical records of patients receiving outpatient care at Puskesmas Tirtajaya, Karawang Regency, between August and December 2021. The data collected included patient identity, diagnosis, and details of the antibiotics used, including the name of the medication, quantity, dosage, and frequency. This research is classified as quantitative

with a non-experimental design, where the collected data, such as gender, age, type of ISPA, and medication information (name, dosage, and frequency), were analyzed using Excel software. The results include calculating the percentage of accuracy for indication, dosage, frequency, and the number of medications to analyze the rationality of antibiotic use.

The conclusion of this study was drawn after processing the data quantitatively, which enabled the derivation of conclusions regarding the use of antibiotics in the treatment of ISPA in adult outpatients at Puskesmas in Karawang Regency.

### 3. Results and Discussion

The data collection process in this study was based on retrospective data retrieval from the medical records of adult patients diagnosed with Upper Respiratory Tract Infection (ISPA) who received outpatient treatment at Puskesmas Tirtajaya, Karawang Regency, from August to December 2021. A total of 121 patients met the inclusion criteria. The data obtained were analyzed quantitatively based on patient characteristics, the type of antibiotic used, and the evaluation of drug usage.

#### Patient Characteristics

Patient characteristics were classified into several parameters, namely, gender, age, and diagnosis.

#### ISPA Patient Characteristics by Gender

Table 1.  
Number of Patients Based on Gender

Gender	Number of Patients	Percentage (%)
Male	64	52.89
Female	57	47.10
Total	121	100

ISPA patients were classified by gender to examine the gender distribution of ISPA cases from August to December 2021 at Puskesmas in Karawang Regency. Table 1 shows that the majority of ISPA patients were male, accounting for 52.89% (64 patients), while females accounted for 47.10% (57 patients). This finding aligns with studies such as L. Meitriana et al. (2019), which reported a higher prevalence of ISPA in males, with 62.29% (38 patients) of 61 cases being male. Another study by E. Rohana et al. (2018) found that 67.85% (19 patients) of 28 cases were male. The higher percentage of males compared to females is attributed to physiological differences in the respiratory tracts of males and females. Additionally, the diameter of the respiratory tract is a factor contributing to the higher incidence in males (Wulandari et al., 2021).

Among the diagnoses, the most common condition was pharyngitis (50.41%, 61 patients), followed by otitis media (26.44%, 32 patients), and sinusitis (23.14%, 28 patients). This distribution suggests that air pollution and the hot climate in Karawang may encourage people to consume cold drinks, which can irritate the pharyngeal and esophageal mucosa, leading to chronic inflammation.

#### ISPA Patient Characteristics by Age

Table 2.  
Number of Patients Based on Age Classification

Age Group (years)	Number of Patients	Percentage (%)
17 – 25	28	23.14
26 – 35	32	26.44
36 – 45	30	24.79
46 – 55	24	19.83
56 – 65	7	5.78
Total	121	100

The classification of ISPA patients by age helps to identify which age groups are most susceptible to ISPA in Puskesmas Tirtajaya, Karawang Regency. The results show no significant differences between age groups, as adults are generally more exposed to outdoor activities, leading to higher susceptibility to ISPA due to air pollution from sources such as vehicle emissions and cigarette smoke (WHO, 2019). For individuals in the 17-24 age group and those over 24, the likelihood of contracting ISPA is higher due to immune system levels and increased outdoor activities, exposing them to air containing infectious agents. Additionally, a decrease in immune function and poor nutrition may also contribute to the higher incidence of disease (Firda Nur Fitria, 2012).

### ISPA Patient Characteristics by Diagnosis

Table 3.  
Number of ISPA (Acute Respiratory Infections) Based on Diagnosis

Diagnosis	Number of Cases	Percentage (%)
Pharyngitis	61	50.41
Otitis Media	32	26.44
Sinusitis	28	23.14
Total	121	100

Table 3 shows that pharyngitis was the most common diagnosis among ISPA patients, accounting for 50.41% (61 cases). This result is consistent with the study by (Lisni, 2015) which found that 46.43% of adult patients had pharyngitis. Pharyngitis is an acute infectious disease caused by bacterial or viral infections in the oropharynx or nasopharynx (DiPiro et al., 2014). This condition, commonly known as a sore throat, is often caused by smoking, sinus issues, dust, and pollution, with Streptococcus pharyngitis being the most common bacterial cause.

### Antibiotic Types Used for Adult ISPA Patients

Table 4.  
Number of Medications Based on Antibiotic Name

Antibiotic Name	Number of Prescriptions	Percentage (%)
Amoxicillin	69	57.02
Cefixime	27	22.31
Cotrimoxazole	25	20.66
Total	121	100

This table presents the most common antibiotics prescribed to ISPA patients at Puskesmas Tirtajaya, Karawang Regency, from August to December 2021. Amoxicillin was the most frequently prescribed antibiotic, used in 57.02% (69 cases), followed by cefixime (22.31%, 27 cases), and cotrimoxazole (20.66%, 25 cases). Amoxicillin, a penicillin-class antibiotic, is considered the first-line treatment for pharyngitis, otitis media, and sinusitis. Cefixime and cotrimoxazole are classified as second-line treatments. Penicillin-class antibiotics inhibit bacterial growth and are effective against penicillin-sensitive bacteria (Gunawan et al., 2007). Non-antibiotic medications such as paracetamol, dexamethasone, vitamin C, ambroxol, salbutamol, and cetirizine were also used in treatment.

### Drug Use Evaluation

The evaluation of drug use in this study includes three parameters: indication accuracy, dosage accuracy, and frequency accuracy.

Table 5.  
Accuracy of Indication in Adult Respiratory Tract Infection (ISPA) Patients

Diagnosis	Appropriate Indication	Percentage (%)	Inappropriate Indication	Percentage (%)
Pharyngitis	61	50.41	0	0
Otitis Media	32	26.44	0	0

Diagnosis	Appropriate Indication	Percentage (%)	Inappropriate Indication	Percentage (%)
Sinusitis	28	23.14	0	0
Total	121	100	0	0

Indication accuracy is evaluated based on whether the antibiotics prescribed are suitable for the upper respiratory tract infection symptoms experienced by the patient. This study shows that 100% of the cases at Puskesmas Tirtajaya had appropriate indications for antibiotic use, meaning the antibiotics prescribed matched the patient's symptoms, ensuring effective treatment.

#### Dosage Accuracy

Table 6.  
Accuracy of Dosage in Antibiotic Treatment for Adult Respiratory Tract Infection (ISPA) Patients

Antibiotic Name	Correct Dosage	Percentage (%)	Incorrect Dosage	Percentage (%)
Amoxicillin	69	57.5	0	0
Cefixime	26	21.66	1	0.82
Cotrimoxazole	25	20.83	0	0
Total	120	99.17	1	0.82

The evaluation of dosage accuracy reveals that 99.17% (120 antibiotics) were prescribed at the correct dose, while only 0.82% (1 antibiotic) was incorrectly dosed. The incorrect dosage was observed in one case of cefixime, where the prescribed dose was below the standard range of 200mg-400mg, with the patient receiving a lower dose of 100mg twice daily, which was categorized as underdosing.

#### Evaluation of Frequency Accuracy

Table 7.  
Frequency Accuracy of Antibiotic Use in Adult ISPA Patients

Antibiotic Name	Correct Frequency	Incorrect Frequency	Total
Amoxicillin	69 (57.02%)	0 (0%)	69
Cefixime	27 (22.31%)	0 (0%)	27
Cotrimoxazole	25 (20.66%)	0 (0%)	25
Total	121 (100%)	0 (0%)	121

The data in the table above shows the frequency accuracy of antibiotic use for adult ISPA patients. The most commonly prescribed antibiotic frequency is Amoxicillin, which is administered 3 times a day. The timing of the administration is influenced by the frequency of use. When the medication is taken three times a day, the ideal interval for achieving the desired results is 8 hours (24 hours/3 = 8 hours). Each medication has a therapeutic index/dosage within the body that produces beneficial effects. When the drug reaches the therapeutic index, it produces therapeutic effects (Pahriyani et al., 2015). If the drug level in the body is below the therapeutic index, the therapeutic effect will be lost or ineffective. Conversely, if the drug level exceeds the therapeutic index, overuse may occur. A short duration of antibiotic treatment may result in the return of clinical side effects that had previously disappeared, potentially causing patient dissatisfaction. This occurs because it is uncertain whether the microorganism has been fully eradicated, which could delay the healing process (Almasdy & Deswinar, 2013).

#### 4. Conclusion

The use of antibiotics in adult outpatient upper respiratory tract infection patients at the Tirtajaya Health Center, Karawang Regency, during the period from August to December 2021, based on the number of patients, shows that the majority were male (52.89%), and the most common age group was early adulthood, 26-35 years (26.44%). The most common diagnosis was pharyngitis (50.41%). All patients in this study received antibiotic treatment, with amoxicillin being the most commonly used antibiotic,

accounting for 57.02%. Evaluation of antibiotic use in 121 patients showed 100% appropriate indication, 99.17% correct dosage, and 100% correct frequency.

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