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Drug Utilization Profile for Upper Respiratory Tract Infections at a Primary Health Clinic in Gorontalo City Indonesia: A Retrospective Study of August–October 2025

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ABSTRACT

This study aimed to describe the utilization patterns of selected drugs prescribed for upper respiratory tract infection (URTI) cases at a primary health clinic in Gorontalo City, Indonesia, and to assess monthly variations by age group and sex during August–October 2025. A retrospective descriptive design was applied using archived inpatient and outpatient prescription records. Eligible prescriptions included URTI cases containing cefixime 100 mg, cefadroxyl 500 mg, erdosteine 300 mg, ambroxol 30 mg, or loratadine 10 mg. The findings demonstrated clear month-to-month and sex-related variation in prescribing patterns. In August, cefadroxyl 500 mg was the most utilized drug among men (total = 19; mean = 4.75 ± 1.64), whereas loratadine 10 mg was highest among women (total = 18; mean = 4.50 ± 1.80). In September, erdosteine 300 mg ranked first among men (total = 21; mean = 5.25 ± 3.11), while loratadine 10 mg remained the most utilized among women (total = 20; mean = 5.00 ± 3.35). In October, erdosteine 300 mg and loratadine 10 mg were jointly highest among men (total = 20 each; mean = 5.00 ± 2.87 and 5.00 ± 2.16, respectively), while loratadine 10 mg continued to predominate among women (total = 19; mean = 4.75 ± 2.87). Ambroxol generally showed the lowest utilization in several subgroups, and utilization patterns shifted across age categories over time. Overall, these findings indicate that drug utilization varied by sex, age group, and month, underscoring the importance of periodic prescribing review to support rational and evidence-based URTI management in primary care.

Keywords:
Upper respiratory tract infection; Drug utilization; Prescribing pattern; Primary health care; Retrospective study

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1. Introduction

Upper respiratory tract infections (URTIs) remain among the most frequent reasons for outpatient and primary care visits worldwide. Clinically, URTIs encompass a broad spectrum of conditions, including the common cold, pharyngitis, tonsillitis, and related upper airway syndromes characterized by cough, rhinorrhea, nasal congestion, sore throat, and general malaise. Although most acute URTIs are viral and self limiting, medication use in routine practice remains substantial, and antibiotics are still prescribed in many cases where clear bacterial indications are absent. This persistent gap between evidence-based recommendations and real world prescribing makes URTI management an important area for drug utilization research [1,2].

Importantly, pharmacotherapy for URTIs is not limited to antibiotics. In everyday primary care, prescribing decisions are often driven by the patient's dominant symptom burden, such as productive cough, excessive mucus, rhinorrhea, sneezing, or throat discomfort. As a result, symptom oriented medicines are frequently used alongside, or instead of, anti-infective therapy. Large primary-care data have shown that symptomatic medications including antihistamines, mucolytics, antitussives, and throat preparations are commonly prescribed for URTIs, even though the evidence base for non-antibiotic treatment across uncomplicated viral URTIs remains heterogeneous and generally focused on symptom relief rather than disease modification [3,4].

Within this therapeutic landscape, the medicines examined in the present study represent clinically relevant categories of URTI treatment in primary care. Cefixime and cefadroxil are oral cephalosporins used in selected bacterial upper respiratory infections, including pharyngitis and tonsillitis caused by susceptible organisms. From an antimicrobial stewardship perspective, this distinction is also meaningful because cefixime is classified by WHO in the Watch group, whereas cefadroxil is categorized in the Access group. In contrast, erdosteine and ambroxol are mucoactive or mucolytic agents used to reduce mucus viscosity and improve airway clearance, while loratadine is a second-generation H1-antihistamine used to relieve symptoms such as sneezing, itching, and rhinorrhea, particularly when allergic manifestations overlap with upper airway complaints. Taken together, these medicines reflect a combined prescribing approach that addresses both presumed infectious etiology and symptomatic control [4–8].

The Indonesian context further strengthens the relevance of this topic. A systematic review of antibiotic use in Indonesia reported suboptimal prescribing appropriateness overall, including in primary care, and identified substantial evidence gaps at the facility level. The same review found that cefadroxil was among the antibiotics commonly consumed in outpatient settings, highlighting the need for more granular studies of prescribing practices in everyday care. However, most discussions of rational medicine use in respiratory infections still emphasize antibiotics, whereas less attention is given to the broader profile of symptomatic medications that often dominate actual prescribing at the clinic level [9–11].

Against this background, profiling medicine use for URTIs in a primary health clinic in Gorontalo City is both timely and methodologically important. Drug utilization studies are valuable because they allow prescribing patterns to be described systematically at the health-facility level and compared across settings and time periods. Accordingly, a retrospective assessment of cefixime 100 mg, cefadroxil 500 mg, erdosteine 300 mg, ambroxol 30 mg, and loratadine 10 mg prescribed during August–October 2025 can provide locally grounded evidence on how URTIs are managed in routine practice. Such evidence is expected to support more rational

prescribing, strengthen antimicrobial stewardship, and improve the quality of symptom oriented pharmacotherapy in primary care.

2. Methods

Study Design and Setting

This study employed a retrospective descriptive design to evaluate the drug utilization profile of upper respiratory tract infection (URTI) cases at a primary health clinic in Gorontalo City, Indonesia. The study was conducted using prescription records collected over a three-month period, from August to October 2025. Both inpatient and outpatient prescriptions were included to provide a comprehensive overview of medicine utilization patterns in routine clinical practice during the study period [12,13].

Data Source and Study Population

The study used secondary data derived from archived prescription records of patients diagnosed with URTIs and treated at the study clinic during the observation period. All eligible prescriptions issued between 1 August and 31 October 2025 were reviewed. The analysis covered prescriptions from both inpatient and outpatient services. Prescriptions were included if they corresponded to URTI management and contained the medicines of interest in this study, namely cefixime 100 mg, cefadroxil 500 mg, erdosteine 300 mg, ambroxol 30 mg, and loratadine 10 mg. Prescriptions with incomplete demographic information or unclear drug information were excluded from the analysis [12–14].

Study Variables

The variables analyzed in this study included patient sex, age group, type of service, and prescribed medicines. Sex was categorized into male and female. Age was classified into four groups: 20–30 years, 31–40 years, 41–50 years, and 51–60 years. Type of service was categorized as inpatient or outpatient. The main drug utilization variables focused on the frequency of prescribing of cefixime, cefadroxil, erdosteine, ambroxol, and loratadine in URTI cases during the study period [15,16].

Data Collection Procedure

Prescription records were identified and reviewed manually from the clinic archive for the period of August to October 2025. Relevant information was extracted using a structured data collection form. The extracted data included patient demographic characteristics, service category, and details of prescribed medicines. To ensure consistency, all prescription data were checked for completeness and screened prior to statistical processing. Records that met the study criteria were then coded and entered into the database for analysis.

3. Results

Table 1 summarizes drug utilization in August 2025 according to age group and sex. Overall, cefadroxyl 500 mg showed the highest utilization among men (total = 19; mean = 4.75 ± 1.64), whereas loratadine 10 mg was the most frequently used drug among women (total = 18; mean = 4.50 ± 1.80). Erdosteine 300 mg also demonstrated relatively high utilization in both men and women, with totals of 14 and 8, respectively. In contrast, cefixime 100 mg showed the lowest overall utilization, particularly among women (total = 4; mean = 1.00 ± 1.00). Across age groups, drug use tended to be more concentrated in the younger and middle-adult groups, while lower values were observed in several drug categories among individuals aged 41–60 years. Overall, these findings indicate sex- and age-related variation in prescribing or utilization patterns during the study period.

Table 1. Drug Utilization by Age Group and Sex in August 2025

Drug Utilization in August 2025										
Cefixime 100 mg			Erdostein 300 mg		Ambroxol 30 mg		Loratadine 10 mg		Cefadroxyl500 mg	
Age	Man	Woman	Man	Woman	Man	Woman	Man	Woman	Man	Woman
20-30	2	2	3	3	2	5	4	7	6	3
31-40	3	2	5	4	1	1	5	5	5	1
41-50	2	0	2	0	2	2	2	4	2	2
51-60	0	0	4	1	3	0	3	2	6	2
Total	**7**	**4**	**14**	**8**	**8**	**8**	**14**	**18**	**19**	**8**
Mean	**1.75**	**1**	**3.5**	**2.0**	**2.0**	**2.0**	**3.5**	**4.5**	**4.75**	**2.0**
SD±	**1.09**	**1**	**1.12**	**1.58**	**0.71**	**1.87**	**1.12**	**1.80**	**1.64**	**0.71**

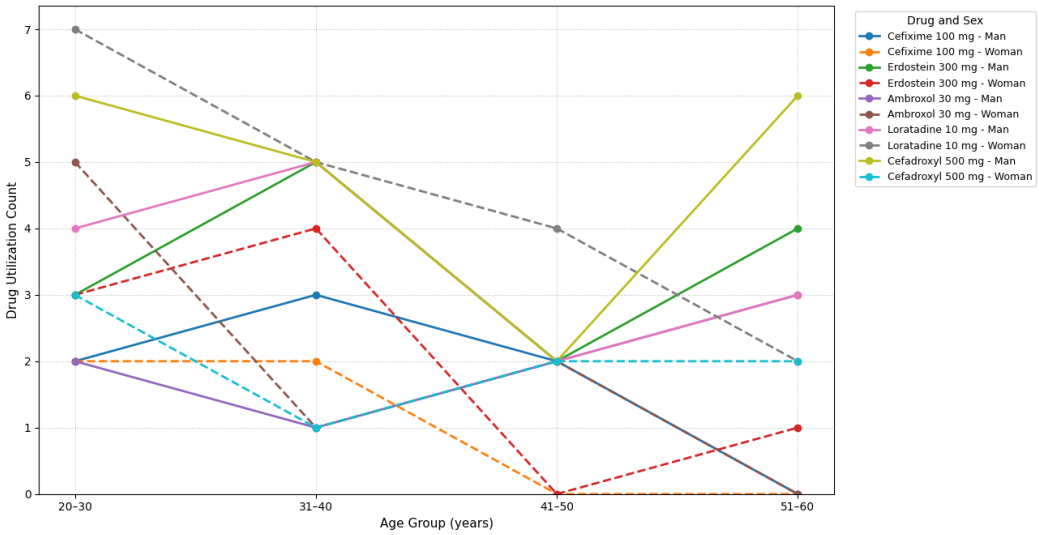

Figure 1. Drug Utilization by Age Group and Sex in August 2025

Table 2 presents drug utilization in September 2025 stratified by age group and sex. Overall, erdosteine 300 mg showed the highest utilization among men (total = 21; mean = 5.25 ± 3.11), while loratadine 10 mg was the most frequently used drug among women (total = 20; mean = 5.00 ± 3.35). Loratadine also remained highly utilized among men (total = 15; mean = 3.75 ± 2.71), indicating consistent use across both sexes. In contrast, ambroxol 30 mg demonstrated the lowest utilization, particularly among women (total = 2; mean = 0.50 ± 0.82). Across age groups, utilization tended to increase in the 51–60-year group for several drugs, especially cefixime, erdosteine, and loratadine. These findings suggest a distinct age- and sex-related variation in drug utilization patterns during September 2025.

Table 2. Drug Utilization by Age Group and Sex in September 2025

Drug Utilization in September 2025										
	Cefixime 100 mg		Erdostein 300 mg		Ambroxol 30 mg		Loratadine 10 mg		Cefadroxyl500 mg	
Age	Man	Woman	Man	Woman	Man	Woman	Man	Woman	Man	Woman
20-30	2	3	6	2	0	0	2	4	3	0
31-40	2	1	3	1	2	1	3	4	2	2
41-50	2	2	2	3	4	1	6	2	4	2
51-60	7	5	10	4	0	0	4	10	0	2
Total	**13**	**11**	**21**	**10**	**6**	**2**	**15**	**20**	**9**	**6**
Mean	**3.25**	**2.75**	**5.25**	**2.50**	**1.50**	**0.50**	**3.75**	**5.00**	**2.25**	**1.00**
SD±	**2.17**	**1.48**	**3.11**	**1.12**	**1.58**	**0.50**	**2.71**	**3.35**	**2.08**	**0.82**

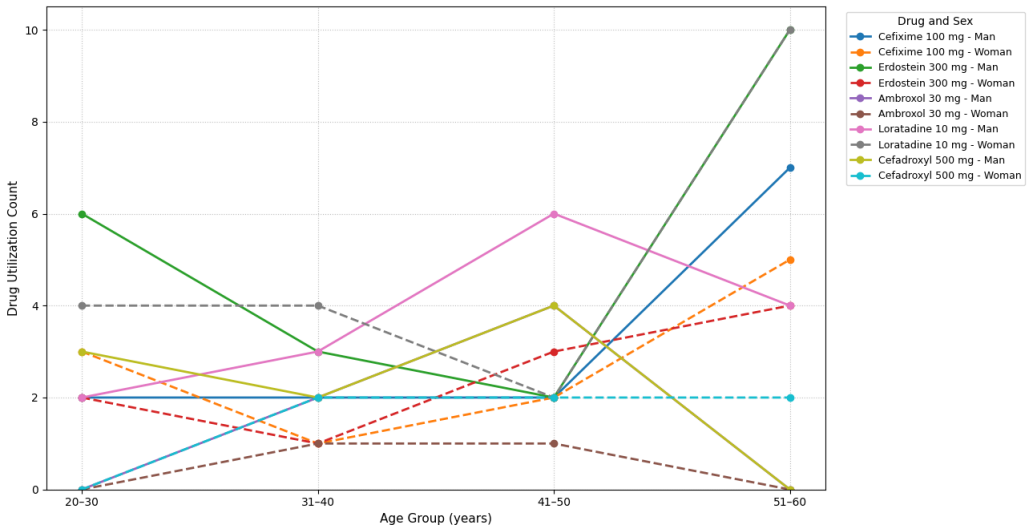

Figure 2. Drug Utilization by Age Group and Sex in September 2025

Table 3 summarizes drug utilization in October 2025 by age group and sex. Overall, erdosteine 300 mg and loratadine 10 mg showed the highest utilization among men, each with a total of 20, although erdosteine demonstrated a slightly higher variability (mean = 5.00 ± 2.87) compared with loratadine (mean = 5.00 ± 2.16). Among women, loratadine 10 mg remained the most frequently used drug (total = 19; mean = 4.75 ± 2.87), followed closely by erdosteine 300 mg (total = 18; mean = 4.50 ± 1.71). In contrast, ambroxol 30 mg showed the lowest utilization in both men and women, with totals of 6 and 4, respectively. Across age groups, higher utilization was generally observed in the 20–30 and 41–50 year groups for several drugs, particularly loratadine, cefadroxyl, and erdosteine. These findings indicate a continued age- and sex-related variation in drug utilization patterns during October 2025.

Table 3. Drug Utilization by Age Group and Sex in October 2025

Drug Utilization in October 2025										
Cefixime 100 mg			Erdostein 300 mg		Ambroxol 30 mg		Loratadine 10 mg		Cefadroxyl500 mg	
Age	Man	Woman	Man	Woman	Man	Woman	Man	Woman	Man	Woman
20-30	1	2	5	5	4	2	5	9	8	5
31-40	4	1	2	4	2	1	6	3	2	2
41-50	2	2	9	6	0	1	7	4	7	5
51-60	3	2	4	3	0	0	2	3	1	1
Total	**10**	**7**	**20**	**18**	**6**	**4**	**20**	**19**	**18**	**13**
Mean	**2.5**	**1.75**	**5.0**	**4.5**	**1.5**	**1.0**	**5.0**	**4.75**	**4.5**	**3.25**
SD±	**1.29**	**0.83**	**2.87**	**1.71**	**1.73**	**0.82**	**2.16**	**2.87**	**3.08**	**2.17**

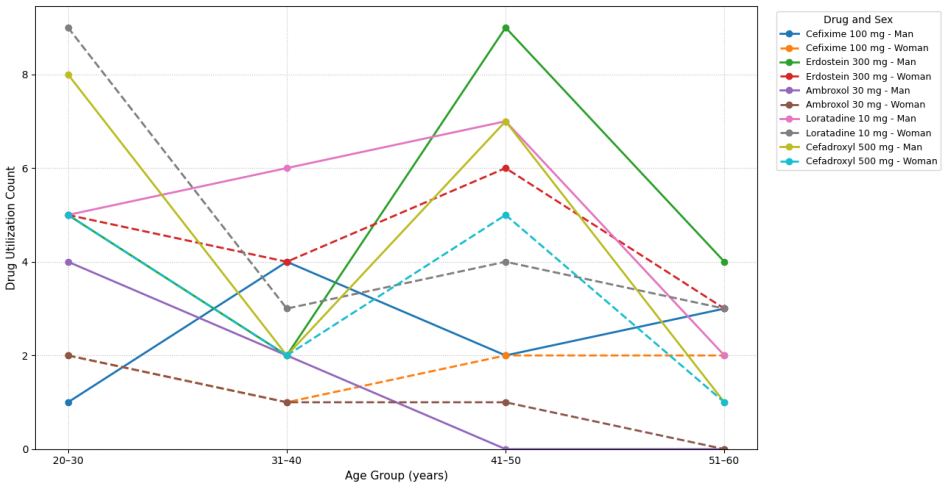

Figure 3. Drug Utilization by Age Group and Sex in October 2025

4. Discussion

The present study provides a descriptive overview of prescribing patterns for selected drugs used in URTI management at a primary health clinic in Gorontalo City over a three month period. Because the analysis was based on archived prescription records from both inpatient and outpatient services, the findings reflect routine clinical practice rather than experimental conditions. A consistent pattern across the study period was the prominent use of erdosteine, loratadine, and cefadroxyl, although the dominant drug varied by sex and month. In August, cefadroxyl was most frequently used among men, whereas loratadine predominated among women; in September, erdosteine was highest among men and loratadine among women; and in October, erdosteine and loratadine remained the most frequently utilized agents overall. This pattern suggests that symptomatic therapy and selected antibacterial treatment were central components of URTI prescribing during the observation period [15,17].

The age stratified results also indicate that drug utilization was not evenly distributed across adult age groups. In August, higher utilization tended to cluster in younger and middle-adult patients, whereas in September several drugs showed a clear rise in the 51–60-year group, particularly cefixime, erdosteine, and loratadine. In October, higher frequencies were again concentrated in the 20–30 and 41–50-year groups for several medications. These fluctuations may reflect temporal variation in clinic attendance, symptom burden, prescribing preference, or differences in case mix across age strata. Importantly, the descriptive design does not permit causal inference; however, the repeated age related shifts across months support the interpretation that prescribing for URTI was influenced by patient demographic characteristics rather than following a completely uniform distribution [18].

Sex based differences were also evident throughout the study period. Women showed consistently high utilization of loratadine, especially in August, September, and October, while men more frequently received erdosteine and, in some months, cefadroxyl. These differences may indicate variation in presenting symptoms, clinician prescribing behavior, or healthcare seeking patterns between male and female patients. At the same time, the observed standard deviation values suggest that some drugs had substantial variability across age groups, particularly erdosteine and loratadine in September and October. This variability is meaningful because it implies that utilization was concentrated in particular demographic strata rather than being evenly distributed, which may be relevant for forecasting medicine demand and improving stock management at the primary care level [19,20].

From a clinical and policy perspective, these findings highlight the importance of periodic drug utilization review in primary care, especially for URTI cases where prescribing practices should remain rational and responsive to patient needs. Since this study relied on retrospective prescription data and focused on frequencies of selected medicines, it could not assess diagnostic accuracy, symptom severity, treatment appropriateness, adherence to guidelines, or clinical outcomes. Nevertheless, the study offers a practical baseline for evaluating local prescribing trends and identifying drug categories that warrant closer stewardship attention, particularly antibiotics and commonly used symptomatic agents. Future studies should integrate diagnosis-specific clinical information, service-level comparisons, and appropriateness indicators to determine whether the observed prescribing patterns are fully aligned with evidence based URTI management [19,20].

Conclusion

In conclusion, this retrospective descriptive study demonstrates that drug utilization for URTI cases at a primary health clinic in Gorontalo City during August–October 2025 showed clear variation by sex, age group, and month of observation. Across the three-month period, erdosteine, loratadine, and cefadroxyl emerged as the most frequently utilized drugs, whereas ambroxol and, in some subgroups, cefixime showed relatively lower use. Utilization patterns were not uniformly distributed across age categories, with certain months showing higher concentrations in younger and middle-adult groups and others indicating increased use among patients aged 51–60 years. Women consistently showed higher utilization of loratadine, while men more often received erdosteine and cefadroxyl, suggesting demographic influences on prescribing patterns in routine URTI management. Overall, these findings provide an important baseline for monitoring prescribing trends and underscore the need for ongoing drug utilization review to support rational, evidence-based, and context-appropriate prescribing in primary care.

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Conflict of interest statement

The authors declared no conflict of interest

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