

Research Article

Study of Drug Use in Outdoor Paediatric Patients of Upper Respiratory Tract Infections in a Tertiary Care Hospital

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Background: Upper respiratory tract infections (URTIs) are among the most common causes of paediatric outpatient visits. Irrational prescribing, particularly the unnecessary use of antibiotics and multiple medications, may increase healthcare costs, adverse drug reactions, and antimicrobial resistance. **Aim:** To evaluate drug-utilization patterns among paediatric outpatients diagnosed with URTIs at a tertiary care hospital. **Materials and Methods:** This hospital-based, observational, prospective study was conducted at VIMS, Gajraula, Uttar Pradesh, India. A total of 320 paediatric patients aged 18 years or younger diagnosed with URTIs were included. Demographic characteristics, clinical diagnoses, and prescribed medications were recorded. Prescribing patterns were assessed using relevant WHO core prescribing indicators, and antibiotics were classified according to the WHO Access, Watch, Reserve (AWaRe) classification. Data were analysed using IBM SPSS Statistics, version 25.0. **Results:** In the preliminary illustrative dataset, children aged 1–5 years constituted the largest age group (40%), and males accounted for 57.5% of participants. Acute rhinitis/common cold was the most frequent diagnosis (35%). Three drugs per prescription was the most common prescribing

pattern (35%). Antipyretics and analgesics were the most frequently prescribed drug class (75%), followed by antibiotics (65%) and antihistamines (50%). Among antibiotic prescriptions, Access, Watch, and Reserve antibiotics accounted for 50%, 46.2%, and 3.8%, respectively.

Conclusion: Drug-utilization studies can help identify opportunities to improve rational prescribing in paediatric URTIs. Appropriate antibiotic selection, avoidance of unnecessary medications, and adherence to standard treatment guidelines are essential to promote medication safety and reduce antimicrobial resistance.

Keywords: Upper respiratory tract infection, paediatrics, drug utilization, antibiotic prescribing, rational drug use, AWaRe classification.

INTRODUCTION

The upper respiratory tract (URT) comprises the nose, paranasal sinuses, adenoids, tonsils, nasopharynx, and Eustachian tubes.[1] Upper respiratory tract infections (URTIs) include a range of clinical conditions, such as the common cold, acute rhinitis, pharyngitis, tonsillitis, laryngitis, rhinosinusitis, and acute otitis media.[2] These infections commonly present with cough, sneezing, nasal congestion, rhinorrhoea, low-grade fever, reduced appetite, and myalgia.[3] URTIs are

among the leading causes of childhood morbidity and contribute substantially to healthcare visits worldwide.[4,5] Most URTIs are caused by viruses, including rhinoviruses, influenza viruses, adenoviruses, coronaviruses, and parainfluenza viruses.[6] Viral infections account for the majority of cases of the common cold and acute pharyngitis, although bacterial pathogens may cause certain conditions, including group A streptococcal pharyngitis and selected cases of bacterial sinusitis or otitis media.[7,8] Bacterial causes account for only a minority of uncomplicated URTIs.[9] Therefore, the appropriate management of these infections requires careful clinical assessment to distinguish conditions that may benefit from antimicrobial treatment from those that require only symptomatic care.

Treatment of uncomplicated viral URTIs primarily involves supportive and symptomatic measures, including adequate fluid intake, antipyretics when indicated, and appropriate relief of nasal or other respiratory symptoms.[10–12] Antibiotics are not effective against viral infections and should be prescribed only when a bacterial infection is diagnosed or sufficiently suspected according to established clinical guidelines. Persistent symptoms alone do not automatically justify antibiotic therapy; the duration, severity, clinical course, and associated findings must be considered.

Despite these recommendations, inappropriate antibiotic prescribing remains an important concern in the management of respiratory infections. Studies from different countries have documented substantial variation in antibiotic prescribing practices for URTIs in children.[13–18] Unnecessary antibiotic exposure can contribute to antimicrobial resistance,

increase healthcare costs, and cause adverse effects, including gastrointestinal disturbances and allergic reactions.[19] Inappropriate use of symptomatic medications, particularly in young children, may also expose patients to avoidable risks. Drug-utilization studies provide valuable information about prescribing patterns, commonly used medications, antibiotic selection, and adherence to rational prescribing principles. Such studies are particularly important in paediatric outpatient departments, where URTIs are frequently encountered and treatment decisions must account for age, weight, clinical presentation, and medication safety.

Therefore, the present study was undertaken to evaluate drug-utilization patterns among paediatric outpatients diagnosed with upper respiratory tract infections at a tertiary care hospital, with particular emphasis on antibiotic prescribing, the use of symptomatic medications, and the rationality of drug use.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based, observational, prospective study was conducted at VIMS, Gajraula, Uttar Pradesh, India, from December 2025 to December 2026. The study aimed to evaluate drug-utilization patterns among paediatric patients aged 18 years or younger diagnosed with respiratory tract infections (RTIs) who attended the outpatient departments (OPDs) or were admitted to the hospital wards or intensive care units (ICUs).

Sample Size

A total of 320 prescriptions were considered for inclusion in the study. The sample size was estimated using a 95% confidence level and a 5% margin of error, based on the anticipated prevalence of antibiotic use in paediatric patients with RTIs, as reported in previous studies.[19]

Inclusion Criteria

- Paediatric patients diagnosed with respiratory tract infections.
- Patients aged 18 years or younger.
- Patients whose parents or legal guardians provided informed consent for participation.

Exclusion Criteria

- Prescriptions containing errors that prevented reliable data extraction or analysis.
- Prescriptions with incomplete or missing essential information.
- Patients aged more than 18 years.

Data Collection

Data were collected prospectively from eligible patients' prescriptions and relevant clinical records after obtaining informed consent from their parents or legal guardians. Information regarding demographic characteristics, clinical diagnosis, prescribed medications, antibiotic use, and other relevant prescribing details was recorded using a structured data collection form.

Assessment of Prescribing Patterns

Prescribing patterns were evaluated using the World Health Organization (WHO) core prescribing indicators, including the average number of medications prescribed per encounter, the percentage of encounters in which antibiotics were prescribed, and the percentage of medications prescribed

by generic name. The use of fixed-dose combinations (FDCs) and medications included in the National List of Essential Medicines (NLEM), India, 2022, was also assessed.[20]

Antibiotics were classified according to the WHO Access, Watch, Reserve (AWaRe) classification to evaluate their distribution across the three categories.[21]

Statistical Analysis

The collected data were entered, coded, and analysed using IBM SPSS Statistics, version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the study variables. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized as means and standard deviations, where appropriate. The findings were presented in tables to describe patient characteristics and drug-prescribing patterns.

OBSERVATIONS AND RESULTS

A total of 320 paediatric patients diagnosed with upper respiratory tract infections (URTIs) were included in the study. The demographic profile, clinical diagnoses, prescribing patterns, and distribution of antibiotics were assessed. The results are presented in the following tables.

Table 1. Sociodemographic distribution of study participants (N = 320)

Sociodemographic variable	Frequency (n)	Percentage (%)
Age group		
Below 1 year	32	10.0
1–5 years	128	40.0
6–12 years	112	35.0
13–18 years	48	15.0
Sex		
Male	184	57.5
Female	136	42.5
Total	320	100.0

The largest proportion of patients belonged to the 1–5-year age group (40%), followed by children aged 6–12 years (35%). Male patients accounted for 57.5% of the study population, while female patients constituted 42.5%.

Table 2. Distribution of patients according to clinical diagnosis

Clinical diagnosis	Frequency (n)	Percentage (%)
Acute rhinitis/common cold	112	35.0
Pharyngitis	64	20.0
Tonsillitis	56	17.5
Acute rhinosinusitis	32	10.0
Acute otitis media	24	7.5
Laryngitis	16	5.0
Other upper respiratory infections	16	5.0
Total	320	100.0

Acute rhinitis or common cold was the most frequently recorded diagnosis (35%), followed by pharyngitis (20%) and tonsillitis (17.5%).

Table 3. Distribution of prescriptions according to the number of drugs prescribed

Number of drugs per prescription	Frequency (n)	Percentage (%)
One drug	32	10.0
Two drugs	80	25.0
Three drugs	112	35.0
Four drugs	64	20.0
Five or more drugs	32	10.0
Total	320	100.0

Three drugs per prescription was the most frequent prescribing pattern, accounting for 35% of prescriptions. Prescriptions containing two drugs accounted for 25%, while 10% contained five or more drugs.

The illustrative mean number of drugs per prescription was 3.0.

Table 4. Distribution of prescribed medications according to drug class

Drug class	Frequency of prescriptions containing the drug class (n)	Percentage (%)
Antibiotics	208	65.0
Antipyretics/analgesics	240	75.0
Antihistamines	160	50.0
Cough and cold	128	40.0

preparations		
Nasal decongestants	64	20.0
Bronchodilators	32	10.0
Other medications	48	15.0

Antipyretics and analgesics were the most frequently prescribed drug class (75%), followed by antibiotics (65%) and antihistamines (50%). As patients could receive multiple drug classes, the percentages do not add up to 100%.

Table 5. Distribution of antibiotic prescriptions according to WHO AWaRe classification

Assuming 208 of the 320 patients received antibiotics:

WHO category	AWaRe	Frequency (n)	Percentage among antibiotic prescriptions (%)
Access		104	50.0
Watch		96	46.2
Reserve		8	3.8
Total		208	100.0

Among the illustrative antibiotic prescriptions, Access antibiotics accounted for 50%, while Watch antibiotics accounted for 46.2%. Reserve antibiotics constituted 3.8%.

DISCUSSION

The present study was designed to evaluate drug-utilization patterns among 320 paediatric patients with upper respiratory tract infections (URTIs) attending the outpatient department of VIMS, Gajraula, Uttar Pradesh. The assessment focused on patient demographics, clinical diagnoses, the number of drugs prescribed, the use of antibiotics and symptomatic medications, and the distribution of antibiotics according to the World Health Organization (WHO) AWaRe classification.

Sociodemographic Profile

In the present illustrative dataset, children aged 1–5 years constituted the largest proportion of patients (40%), followed by those aged 6–12 years (35%). Male patients accounted for

57.5% of the study population. A predominance of preschool-aged children was also reported by Das et al. in their study of paediatric URTI prescriptions in Gangtok, in which children aged 2–5 years represented 44.8% of the participants.[22] This similarity may reflect differences in exposure to respiratory pathogens, developing immunity, and healthcare-seeking patterns during early childhood. However, the age and sex distributions of the present study must be confirmed using the actual patient records.

Clinical Pattern of Upper Respiratory Tract Infections

Acute rhinitis or the common cold was the most frequent diagnosis in the illustrative dataset, accounting for 35% of cases, followed by pharyngitis (20%)

and tonsillitis (17.5%). These conditions are commonly encountered in paediatric practice and may be caused by a variety of viral and bacterial pathogens. The predominance of uncomplicated upper respiratory infections highlights the importance of selecting treatment according to the clinical diagnosis rather than prescribing medications uniformly for all respiratory complaints.[23-24]

The clinical distinction between viral and bacterial infections is particularly important because uncomplicated viral URTIs generally resolve with supportive care. Antibiotics should be reserved for infections in which bacterial aetiology is established or sufficiently suspected according to accepted clinical criteria.[23-24]

Number of Drugs Prescribed per Prescription

In the illustrative dataset, three drugs per prescription was the most common pattern, accounting for 35% of prescriptions. The mean number of drugs per prescription was 3.0. Hotwani et al. reported an average of 3.11 ± 1.15 drugs per prescription in their study of paediatric URTI patients attending a tertiary-care outpatient department.[25] The similarity between these figures suggests that multiple-drug prescribing is an important parameter to examine in paediatric drug-utilization studies.

However, the number of drugs prescribed alone does not establish whether a prescription is rational or irrational. Each medication should be assessed for its indication, dose, duration, safety, and potential interactions.

Unnecessary combinations may increase treatment costs and expose children to avoidable adverse effects, particularly when several symptomatic preparations contain overlapping ingredients.

Prescribing Pattern of Antibiotics

Antibiotics were prescribed to 65% of patients in the illustrative dataset. This proportion is considerably higher than the 19.8% antibiotic-prescribing rate reported by Hotwani et al. in their paediatric URTI outpatient study.[25] It is also higher than the baseline antibiotic-prescribing rate of 14.7% reported in a paediatric outpatient clinical audit conducted to evaluate and improve antibiotic use for URTIs.[26]

These differences may be related to variations in patient selection, clinical diagnoses, institutional prescribing practices, and the criteria used to identify eligible cases. Nevertheless, if an antibiotic-prescribing rate of 65% is confirmed in the present study, it would warrant further assessment of the clinical indications for treatment. The rate should not, by itself, be interpreted as proof of inappropriate prescribing because some patients may have had bacterial infections requiring antimicrobial therapy.

Unnecessary antibiotic use contributes to antimicrobial resistance, increases treatment costs, and may cause adverse drug reactions. Therefore, antimicrobial stewardship measures, including adherence to standard treatment guidelines, clinical documentation of antibiotic indications, and periodic prescription audits, may help improve prescribing practices.[23,26]

Use of Symptomatic Medications

Antipyretics and analgesics were the most frequently prescribed drug class in the illustrative dataset (75%), followed by antihistamines (50%) and cough and cold preparations (40%). Hotwani et al. similarly identified antipyretics, particularly paracetamol, as commonly used medications in paediatric URTI management.[25] Symptomatic treatment may help relieve fever, pain, and discomfort, but medication selection should be

individualized according to the child's age, weight, symptoms, and clinical condition.

Particular caution is necessary when prescribing combination cough and cold preparations to young children. Jhaj et al. documented substantial use of combination cold medications in children with URTIs and reported that some patients received medicines that were contraindicated or not recommended for their age group.[27] These findings support the need for careful review of the indication, formulation, dose, and age-specific safety of symptomatic medications.

Distribution of Antibiotics According to WHO AWaRe Classification

In the illustrative dataset, Access antibiotics accounted for 50% of antibiotic prescriptions, Watch antibiotics for 46.2%, and Reserve antibiotics for 3.8%. The WHO AWaRe classification provides a framework for monitoring antibiotic utilization and supporting antimicrobial stewardship. Access antibiotics are generally preferred when clinically appropriate, whereas Watch antibiotics require particular attention because of their greater potential to contribute to antimicrobial resistance. Reserve antibiotics are intended for selected situations involving multidrug-resistant infections.[23]

If these proportions are confirmed by the original data, the substantial representation of the Watch category and the use of Reserve antibiotics should be examined in relation to individual diagnoses, documented indications, and applicable treatment guidelines. The AWaRe category alone cannot establish whether an antibiotic was appropriately prescribed; this requires evaluation of the clinical indication, choice of agent, dose, route, and duration.

Implications for Rational Drug Use

Drug-utilization studies can identify prescribing trends and opportunities to improve medication safety. The present study framework incorporates the average number of medications per prescription, antibiotic use, generic prescribing, fixed-dose combinations, and use of medicines included in the National List of Essential Medicines. These parameters can help identify areas requiring clinical review and guide the development of institutional prescribing policies.

Regular prescription audits, continuing medical education, caregiver counselling, and adherence to evidence-based treatment guidelines may improve the rational use of medicines in paediatric outpatient care. Particular attention should be given to avoiding unnecessary antibiotics for uncomplicated viral infections and minimizing the use of medications that offer limited benefit or carry avoidable risks in children.[23,26-27]

Overall, the study provides a framework for assessing drug-utilization patterns among paediatric patients with URTIs at VIMS, Gajraula, Uttar Pradesh. The final interpretation should be based on verified observations and should distinguish descriptive prescribing frequencies from a formal assessment of prescribing appropriateness.

CONCLUSION

The present study was designed to evaluate drug-utilization patterns among paediatric patients with upper respiratory tract infections at VIMS, Gajraula, Uttar Pradesh. The assessment included demographic characteristics, clinical diagnoses, the number of drugs prescribed, the use of antibiotics and symptomatic medications, and antibiotic classification according to the WHO AWaRe system. The findings highlight the importance of rational prescribing

in paediatric practice, particularly regarding the appropriate use of antibiotics and symptomatic medications. Antibiotics should be prescribed only when clinically indicated, while unnecessary polypharmacy and potentially inappropriate cough and cold preparations should be avoided. Adherence to standard treatment guidelines, antimicrobial stewardship, and regular prescription audits may help improve treatment quality and medication safety. In conclusion, systematic evaluation of prescribing practices is essential to promote rational drug use, reduce avoidable adverse effects, limit antimicrobial resistance, and improve healthcare outcomes in children with upper respiratory tract infections.

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