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PRESCRIPTION PATTERNS FOR UPPER AND LOWER RESPIRATORY TRACT INFECTIONS IN THE PEDIATRIC POPULATION: A CROSS-SECTIONAL STUDY

Pankti Solanki[1], Jitendra Vaghela[2], Darshankumar Mahyavanshi[3], Chyta Gohil[4]

[1]*Pharm D, Junior Executive, Regulatory Affairs, Meril life science, Vapi, Gujarat, India*
[2]*Associate Professor, Department of Pharmacology, NAMO Medical Education and Research Institute, Silvassa, India*
[3]*Medical Superintendent; Professor and Head, Department of Community Medicine, NAMO Medical Education and research institute, Silvassa, India*
[4]*Pharm D, Clinical and Medical Writer, Sahajanand Medical Technologies Limited, Surat, Gujarat, India*

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Corresponding Author:
Dr. Darshan Mahyavanshi,
Medical Superintendent; Professor and Head, Department of Community Medicine, NAMO Medical Education and research institute, Silvassa, India.
Email: drdarshanm@gmail.com

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ABSTRACT

Background: Drug utilization studies assess prescribing patterns and rational drug use for common pediatric infections, informing stewardship and quality-improvement efforts. The aim is to prospectively evaluate prescribing patterns for upper and lower respiratory tract infections (URTI, LRTI) among pediatric inpatients and assess rationality of drug use.

Materials and Methods: Prospective, 3-month study at a tertiary care hospital. Seventy-five patients were approached; 50 provided consent and were enrolled. Demographic and clinical data and prescription details were extracted from medical records. Descriptive analysis was performed; results are reported as percentages and means.

Results: Of 50 enrolled children, 52% were male and 48% female; 54% were aged <1 year. URTI was the most frequent diagnosis. The modal prescription counts were 7 and 8 drugs (26% of prescriptions); mean total medications per patient was 7.56. Azithromycin was the most frequently prescribed antibiotic (76%). Nebulizer therapy was the most common supportive treatment (92%). For LRTI, ceftriaxone was prescribed in 39.13% of cases; for URTI, amoxicillin–clavulanic acid was used in 85.71% of cases. Other commonly used supportive agents included antacids and ondansetron.

Conclusion: In this tertiary-care pediatric cohort, antibiotic use and overall drug counts were substantial but judged rational within the institutional context. Continued stewardship, guideline adherence, and periodic prescription audits are recommended to sustain appropriate prescribing.

Keywords: Prescribing pattern, antibiotic, supportive treatment, in- patient, paediatric.

INTRODUCTION

Pediatrics is the medical specialty concerned with the growth, development, diagnosis, treatment, and prevention of diseases in infants, children, and adolescents. In the inpatient setting, pharmacotherapy constitutes a central component of pediatric clinical management, requiring accurate diagnosis and selection of age appropriate therapeutic regimens. Children, particularly infants and young toddlers, represent a vulnerable population with distinct pharmacokinetic and pharmacodynamic considerations that increase their susceptibility to illness and adverse drug effects.[1]

Respiratory tract infections (RTIs) are among the most common reasons for pediatric consultations in primary care, urgent care, and emergency departments, and they account for a large proportion of antibiotic prescriptions. National Ambulatory Medical Care Survey analyses indicate that antibiotics are the second most frequently prescribed drug class in ambulatory pediatric practice, with the majority of these prescriptions issued for respiratory conditions. Reported antibiotic prescribing rates for

children with colds, upper respiratory tract infections (URTI), and bronchitis have been 44%, 46%, and 75%, respectively.[2]

Recurrent infections of the respiratory and gastrointestinal tracts are common in childhood and contribute substantially to morbidity and mortality; lower respiratory tract infections remain a leading cause of death in children under five years of age. Acute watery diarrhea, acute respiratory infections, and febrile viral illnesses constitute the predominant reasons for pediatric healthcare visits in many settings.[1-3]

Rational use of medicines requires that patients receive medications that are appropriate to their clinical needs, in doses that meet individual requirements for an adequate period, and at the lowest possible cost to patients and the community. Rational prescribing also implies selection of the correct formulation and route, and consideration of safety and efficacy in the pediatric population.[4] Assessment of prescription practices provides an objective measure of the rationality of pharmacotherapy and can identify areas for improvement.[5,6] Monitoring medication use is therefore an important indicator of care quality and supports standards setting and performance based evaluation in clinical practice.[7]

The present study aimed to evaluate antibiotic prescribing patterns for pediatric patients with upper and lower respiratory tract infections admitted to the tertiary care teaching hospital in Silvassa, with the objective of assessing the rationality of antibiotic use and identifying opportunities for stewardship interventions.

MATERIALS AND METHODS

Study design and setting: A prospective observational study was conducted in the Pediatric Department of NAMO Hospital, a tertiary care teaching hospital in Silvassa, India, over a continuous three month period.

Ethical approval and consent: The study protocol was approved by the institutional ethics committee. Written informed consent was obtained from parents or legal guardians of all participants in accordance with institutional and national ethical standards.

Participants and eligibility: Consecutive pediatric in patients who received at least one antibiotic for a clinical diagnosis of upper respiratory tract infection (URTI) or lower respiratory tract infection (LRTI) during the study period were eligible. Exclusion criteria comprised neonates admitted to the NICU, patients in the PICU, and pediatric outpatients.

Sample size and sampling: A pragmatic sample size of 75 patients was determined a priori based on expected inpatient census and feasibility. Consecutive sampling of eligible patients was employed to reduce selection bias. Data collection- Data were prospectively abstracted from inpatient medical records and prescription charts using a standardized case report form. Collected variables included demographics (age, sex), clinical diagnosis (URTI/LRTI), comorbidities, length of hospital stay, and detailed prescription information: drug name, formulation, route, dose, frequency, and duration. Supportive and adjunctive therapies were also recorded. When available, microbiology results and subsequent changes to antibiotic therapy were documented to distinguish empirical from targeted treatment.

Assessment of prescribing patterns and rationality: Prescriptions were analyzed to identify the most frequently used antibiotics and supportive treatments and to quantify the total number of medications per patient. Rationality assessment evaluated indication appropriateness, age and weight appropriate dosing, choice of agent and route, duration of therapy, and concordance with institutional or national pediatric treatment guidelines.

Statistical analysis and data quality: Descriptive statistics summarized patient characteristics and prescribing patterns: categorical variables as counts and percentages; continuous variables as mean ± SD or median (IQR) as appropriate. Analyses were performed using spreadsheet software. Data abstraction was independently verified by a second investigator; discrepancies were resolved by consensus. De identified data were used for analysis to preserve patient confidentiality.

RESULTS

Study population: Seventy five inpatient prescriptions were screened; 50 patients provided consent and were included in the analysis. Of these, 26 (52%) were male and 24 (48%) were female. Age distribution- The largest age stratum was <1 year (27/50; 54%), followed by 1–4 years (16/50; 32%), 4–8 years (3/50; 6%) and 8–12 years (4/50; 8%). No patients were aged 12–16 years. Diagnostic profile- Upper respiratory tract infection (URTI) accounted for 36/50 (72%) diagnoses and lower respiratory tract infection (LRTI) for 14/50 (28%). Number of drugs per prescription- The minimum number of drugs per prescription was 5 (2% of prescriptions). The modal counts were 7 and 8 drugs (each 26% of prescriptions), followed by 9 drugs (16%) and 10 drugs (8%). The mean number of drugs per patient was 7.56. Antibiotic and supportive therapy prescribing- Azithromycin (syrup) and amoxicillin–clavulanic acid (injectable) were the most frequently prescribed antibiotics (38/50; 76% and 28/50; 56%, respectively). Other antibiotics included ceftriaxone (23/50; 46%), piperacillin (6/50; 12%), amikacin (6/50; 12%) and linezolid (1/50; 2%). Supportive treatments most commonly prescribed were antacids (50/50; 100%), ondansetron (49/50; 98%), nebulizers (46/50; 92%), paracetamol injection (41/50; 82%), cough syrups (39/50; 78%), nasal drops (20/50; 40%), multivitamins (13/50; 26%), antihistamines (12/50; 24%) and corticosteroids (10/50; 20%).

Table 1: Drugs prescribed (counts and percentages)

Drug prescribed	Count	%
Inj. Amoxycillin + clavulanic acid	28	56
Syrup Azithromycin	38	76
Inj. Ceftriaxone	23	46
Inj. Piperacillin	6	12
Inj. Linezolid	1	2
Inj. Amikacin	6	12
Inj. Paracetamol	41	82
Multivitamins	13	26
Antihistamines	12	24
Corticosteroids	10	20
Nebulizers	46	92
Nasal drops	20	40
Inj. Ondansetron	49	98
Antacids	50	100
Cough syrups	39	78

Concomitant supportive therapies with antibiotics- Supportive therapies most frequently co prescribed with antibiotics were nebulizers, ondansetron and antacids. Azithromycin had the highest number of associated nebulizer prescriptions (35), followed by amoxicillin–clavulanic acid (26) and ceftriaxone (21).

Table 2: Concurrent supportive drugs prescribed with selected antibiotics (counts)

Supportive drug \ Antibiotic	Amox-clav	Azithromycin	Ceftriaxone	Piperacillin	Linezolid	Amikacin
Inj. Paracetamol	23	30	19	5	1	6
Multivitamins	7	8	6	3	0	2
Antihistamines	6	10	7	1	1	1
Corticosteroids	7	6	3	3	0	2
Nebulizers	26	35	21	6	1	6
Nasal drops	11	16	8	3	1	2
Inj. Ondansetron	27	37	22	5	1	6
Antacids	28	38	23	6	1	6
Cough syrups	20	28	18	6	1	6

Antibiotic use by diagnosis- Amoxicillin–clavulanic acid was prescribed predominantly for URTI (24/28; 85.7%) versus LRTI (4/28; 14.3%). Azithromycin was used mainly in URTI (31/38; 81.6%) while ceftriaxone was more frequent in LRTI (9/23; 39.1%). Piperacillin, amikacin and linezolid were used predominantly in LRTI. Supportive therapies were more commonly prescribed in URTI than LRTI (e.g., nebulizers in URTI 34/46; 73.9% vs LRTI 12/46; 26.1%). Mean number of drugs per diagnosis was 7.56.

DISCUSSION

Respiratory tract infections (RTIs) remain among the most common pediatric illnesses and a frequent indication for inpatient antibiotic therapy. In this prospective audit, 50 antibiotic containing prescriptions were evaluated from 75 screened inpatient prescriptions. The study population comprised a slightly higher proportion of male patients (26/50; 52%) than female patients (24/50; 48%), a sex distribution comparable to prior reports. Similar male predominance has been documented by Palikhe et al. and by Kolar and Hromadova et al.[8,9]

Age distribution in our cohort was skewed toward infancy: 27/50 patients (54%) were aged <1 year, 16 (32%) were 1–4 years, 3 (6%) were 4–8 years, and 4 (8%) were 8–12 years. This contrasts with some published series in which the 1–4 year age group predominated,[10] reflecting potential differences in local referral patterns, seasonal epidemiology, or admission thresholds.

Polypharmacy was notable in our sample: the minimum number of drugs per prescription was five and the modal counts were seven and eight drugs (each 26% of prescriptions), yielding a mean of 7.56 medications per patient. These values exceed mean drug counts reported in other settings (for example, 3.46 and 3.59 in studies by Ashraf et al. and Mathur et al., respectively) and suggest a higher burden of concomitant supportive therapy in our inpatient population.[1,11]

Upper respiratory tract infections (URTI) were more frequent than lower respiratory tract infections (LRTI) in our cohort (36/50 vs 14/50). This diagnostic distribution is broadly consistent with institutional audits that report URTI as a leading cause of pediatric admission alongside febrile illnesses.[10] The predominant route of antibiotic administration in our study was parenteral, a finding that aligns with other hospital based investigations reporting variable but substantial use of injectable antibiotics in pediatric inpatients.[8]

Azithromycin and amoxicillin–clavulanic acid were the most commonly prescribed antibiotics (76% and 56% of prescriptions, respectively), followed by ceftriaxone, piperacillin, amikacin and, rarely, linezolid. The high use of amoxicillin–clavulanic acid in our setting is concordant with several regional

reports that identify this combination among the most frequently employed agents for pediatric respiratory infections,[10,13] although some studies have reported lower relative use of this combination.[1] Historical data indicate that penicillins have long been dominant among pediatric antibiotic prescriptions.[12]

Supportive therapies were widely used: antacids, ondansetron, nebulization, paracetamol, cough syrups, nasal drops and multivitamins were commonly co prescribed. Nebulizer therapy and ondansetron were particularly prevalent, and azithromycin prescriptions were frequently accompanied by nebulization and other supportive measures. These patterns reflect an emphasis on symptomatic management in addition to antimicrobial therapy; however, the high frequency of adjunctive agents contributes to the overall medication burden and underscores the need to evaluate the clinical necessity of each adjunctive prescription.

The observed prescribing patterns highlight two interrelated concerns. First, the predominance of broad spectrum and combination antibiotics—particularly in URTI where viral etiologies are common—raises questions about appropriateness and potential contribution to antimicrobial resistance. Second, the extent of polypharmacy increases the risk of adverse drug events and drug–drug interactions in a vulnerable population. These findings reinforce the importance of pediatric specific prescribing guidance, pharmacokinetic/pharmacodynamic data, and stewardship interventions tailored to inpatient pediatric practice.

CONCLUSION

This study demonstrates that amoxicillin–clavulanic acid and azithromycin were the most frequently prescribed antibiotics for pediatric RTIs in our tertiary care setting, with URTI the commonest diagnosis. The high prevalence of supportive medications and the degree of polypharmacy observed indicate opportunities for targeted stewardship, guideline reinforcement, and periodic prescription audits to optimise antibiotic selection, limit unnecessary adjunctive therapies, and reduce potential harms. Future work should focus on implementing and evaluating stewardship interventions and on generating local pediatric pharmacotherapy data to inform safer, evidence based prescribing.

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