

Across-Sectional Observational Study on Drug Utilization and Prescribing Patterns of Antibiotics in Lower Respiratory Tract Infections in Tertiary Care Teaching Hospital

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Abstract

Background: Lower respiratory tract infections (LRTIs) affect the airways and lungs, including conditions such as bronchitis, bronchiolitis, and pneumonia. These infections are a leading cause of mortality from infectious diseases worldwide, often caused by bacterial and viral pathogens. Despite their prevalence, antibiotic prescribing trends in LRTIs remain underexplored, particularly in Indian healthcare settings. **Objectives:** This study investigates the patterns of antibiotic prescription for LRTIs, including bronchitis, in a tertiary care teaching hospital, with a focus on mono- and poly-antibiotic therapies. **Methods:** A cross-sectional observational study was conducted at Sri Venkateswara Institute of Medical Science, Tirupathi, India. Data were collected from 72 participants, including demographic information, clinical history, and self-medication practices. Statistical analysis was performed using the Statistical Package for Social Sciences software. The study focused on prescription patterns, gender distribution, and the types of antibiotics prescribed. **Results:** A greater proportion of males than females were found to suffer from LRTIs. Out of the total prescriptions analyzed, 57% were for mono-antibiotic therapy, while 7% involved poly-antibiotic therapy. LRTI diagnoses, including non-specific LRTI, pneumonia, tuberculosis, and pleural effusion, accounted for 76.28% of the cases, with 23.6% of the cases attributed to bronchitis. Augmentin and doxycycline were the two most frequently prescribed antibiotics. A comparison of the prescribed daily dose and defined daily dose of antibiotics was performed. **Conclusions:** The study highlights the predominant use of mono-antibiotic therapy over poly-antibiotic therapy in treating LRTIs. The findings underscore the need for better antibiotic stewardship to manage the rising number of LRTI patients. Further efforts are required to optimize treatment strategies and reduce the risk of antibiotic resistance.

Key words: Chronic obstructive pulmonary disease, defined daily dose, lower respiratory tract infection, pleural effusion, prescribed daily dose

INTRODUCTION

Airway and lung infections are classified as lower respiratory tract infections (LRTIs). This encompasses pneumonia, bronchiolitis, and bronchitis.^[1,2] Infections in the lower respiratory tract are typically more dangerous than those in the upper respiratory tract. Of all the infectious diseases, LRTIs are the leading cause of mortality.^[3] LRTIs are the second largest cause of disability-adjusted life years, accounting for 2.74 million deaths and

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103 million DALYS globally, according to systematic research done in 2015.^[4] General practitioners are typically in charge of them at first. Children and the elderly are more susceptible to infectious infections because of their weakened immune systems. An organ's physiological state and developmental stage are directly impacted by age.^[5,6] For LRTI s, antibiotics are used as treatment. Antibiotic prescribing is causing the community more and more concern since shifts in antibiotic resistance patterns pose a danger to the drug's ability to be effectively treated.^[7] Patients with LRTI s are said to receive 69.8% of antibiotics prescribed.^[8] Nowadays, more drugs than ever before are available on the market. Patients use many sources of healthcare, are more informed, and have higher expectations for their medical care. For outpatients with LRTIs, it might be difficult to rule out the diagnosis of community-acquired pneumonia. Self-limiting illnesses frequently result in increased antibiotic resistance, as does the illogical prescribing of antibiotics. Antibiotic misuse poses a serious risk to the health care system and can have unfavorable side effects as well as increase the expense and duration of hospital stays.^[9] Infectious respiratory disorders include colds, bronchitis, bronchiolitis, tuberculosis (TB), and pneumonia, whereas non-infectious respiratory illnesses include Chronic obstructive pulmonary disease, asthma, occupational lung diseases, and pulmonary cancers.

MATERIALS AND METHODS

In the tertiary care teaching hospital of Sri Venkateshwara Institute of Medical Sciences, located in Tirupati, Andhra Pradesh, India, the study is carried out in the Department of Medicine.

This study used a minimum sample size of 72 participants. Patient demographics and prescription data were gathered to compile information on general medicine, including inpatient and outpatient. Patient demographics, including age, gender, diagnosis, weight, prescription history, co-occurring conditions, and amount of drugs taken, will be documented. October 2022–April 2023 is the 6 months. The following parameters were taken into consideration when conducting the study.

Criteria for inclusion

Patients must be older than eighteen and must have a diagnosis of LRTI. Individuals prescribed antibiotics and individuals with a smoking habit.

Exclusion criteria

Patients age <18 years, critically ill, accident cases on patients with altered consciousness, patients diagnosed with pulmonary malignancies and occupational lung diseases, and pregnant women. Following the IEC's regulatory permission,

we were able to view the prescription patterns for antibiotics; every patient with LRTI had taken antibiotics.

Statistical analysis

Before being uploaded to Microsoft Excel and data, patient treatment and research parameters will first be input in a pre-designed performance. Mean plus or minus deviation will be used to represent continuous variables, while count and percentage will be used to represent category table variables. Pie charts and histograms are used to demonstrate how the data are computed as frequency percentages. With the statistical package of social sciences 26.0 V version, statistical analysis will be performed.

RESULTS

The research aimed to evaluate the role of antibiotic polytherapy against antibiotic monotherapy in the treatment of patients with LRTIs. The study comprised 72 patients from the medicine department. Of these, LRTIs affected 55 (76.38%) of the subjects, while bronchitis affected 17 (23.6%) [Table 1]. Ten (58.8%) male individuals and seven (41.1%) female subjects made up the bronchitis group, whereas 35 (63.63%) male participants and seven (41.1%) female participants made up the LRTI group. According to demographic factors, there were more males than females infected in this study [Table 1], with diagnoses of LRTI (non-specific LRTI, pneumonia, TB, and pleural effusion) accounting for 76.38% of cases and bronchitis accounting for 23.6% of cases. The bulk of bronchitis patients were 45–80 years old, whereas LRTI patients were in the 23–72 age range, according to a full case analysis. The percentage of prescriptions for just one antibiotic (57%) decreased when all prescriptions were carefully examined. 7% of prescriptions included poly-antibiotic treatment. It was also observed that most instances of bronchitis received mono-antibiotic medication, whereas LRTI cases received poly-antibiotic therapy [Table 2]. Data on drug use were represented as

Table 1: Gender-wise distribution

| Illness | Cases (%) | Male (%) | Female (%) |
|------------|------------|------------|------------|
| LRTI | 55 (76.38) | 35 (63.63) | 20 (36.3) |
| Bronchitis | 17 (23.6) | 10 (58.82) | 7 (41.176) |

LRTI: Lower respiratory tract infections

Table 2: Co-morbid condition in our study protocol for LRTI and Bronchitis

| Illness | DM | HTN | COPD | ASTHMA | TB | CKD |
|------------|----|-----|------|--------|----|-----|
| LRTI | 11 | 8 | 10 | 10 | 2 | 2 |
| Bronchitis | 4 | 2 | 1 | 1 | 0 | 0 |

LRTI: Lower respiratory tract infections, DM: Diabetes mellitus, HTN: Hypertension, COPD: Chronic obstructive pulmonary disease, TB: Tuberculosis, and CKD: Chronic kidney disease

Table 3: Distribution of individual antibiotics

| Drug | LRTI Pts (%) | Bronchitis Pts (%) |
|-----------------------------|--------------|--------------------|
| Penicillin | | |
| Amoxicillin | 3 (5.4) | 0 |
| Augmentin | 19 (34.5) | 3 (17.6) |
| Piperacillin+tazobactam | 2 (3.6) | 0 |
| Amoxicillin+clavulanic acid | 4 (7.2) | 6 (35.2) |
| Cephalosporin | | |
| Ceftriaxone | 7 (12.7) | 0 |
| Cefpodomine | 2 (3.6) | 0 |
| Macrolide | | |
| Azithromycin | 9 (16.3) | 4 (23.5) |
| Vancomycin | 2 (3.6) | 0 |
| Tetracycline | | |
| Doxycycline | 14 (25.4) | 1 (5.8) |
| Fluoroquinolones | | |
| Ciprofloxacin | 0 | 1 (5.8) |
| Meropenem | 1 (1.8181) | 0 |

LRTI: Lower respiratory tract infections

defined daily doses (DDD)/1000 people per day. Doxycycline came in second with a value of 60.944 DDD/1000 inhabitants/per day, behind augmentin, which had the highest value of 63.6574 DDD/1000 inhabitants/per day, suggesting that augmentin was the medicine of choice as penicillin [Table 3].

DISCUSSION

The primary goal of a physician treating LRTIs is to treat the patient as effectively and precisely as possible. Accurate diagnosis and appropriate antibiotic prescription are crucial to achieving optimal patient outcomes. This study highlights the trends in antibiotic use for LRTI within the medicine department, providing valuable insights into current prescribing practices.^[10]

Antibiotic stewardship is an essential component of healthcare, aimed at optimizing the treatment of infections while reducing the adverse effects associated with antibiotic misuse, such as resistance. The current study observed that monotherapy with antibiotics was recommended over polytherapy.^[11,12] This approach aligns with the principles of antibiotic stewardship, as monotherapy can reduce the risk of adverse drug reactions and the development of antibiotic resistance, which is a significant concern in clinical practice.

The study's findings indicate that the majority of medications were prescribed by brand name rather than generic name. This practice has implications for both hospital inventory management and overall healthcare costs. Prescribing medications by their generic names can improve inventory control within the hospital pharmacy, ensuring a consistent

supply of essential drugs and reducing costs.^[13,14] Moreover, the preference for brand-name prescriptions might reflect the influence of aggressive marketing tactics employed by pharmaceutical companies. This underscores the need for continuous education and awareness among healthcare providers about the benefits of generic medications, both in terms of cost-effectiveness and therapeutic efficacy.

The study also highlights the demographic factors influencing LRTI, with a higher prevalence observed in males compared to females. This gender disparity in infection rates warrants further investigation to understand the underlying causes and to develop targeted interventions.^[15,16] The age distribution of patients also varied, with bronchitis patients primarily in the 45–80 age range and LRTI patients in the 23–72 age range. These insights can inform future healthcare strategies to address the specific needs of different patient populations.

Furthermore, the data on drug use, represented as DDD/1000 inhabitants per day, provides a quantitative measure of antibiotic consumption. The high DDD values for augmentin and doxycycline suggest their prominence in treating LRTIs. These findings emphasize the importance of monitoring antibiotic usage patterns to ensure appropriate and effective treatment regimens.^[17,18]

CONCLUSION

A successful cross-sectional observational research was conducted on drug utilization and antibiotic prescribing trends in both outpatients and inpatients with LRTIs. The amount of antibiotics administered per prescription is displayed in this

study, along with an evaluation of the most often prescribed antibiotics for LRTIs. The current analysis unequivocally demonstrates that the most often prescribed mono-antibiotic forms in the medical department for the treatment of LRTIs were augmentin and doxycycline. Prescriptions with generic names must be marketed. The results of this investigation demonstrate that doctors are closely following the hospital's antibiotic prescription guidelines.

Limitations

- Relatively small sample size
- Relatively short duration follow-up.

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