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Optimizing respiratory care: clinical pharmacist interventions in respiratory tract infection management at a tertiary teaching hospital

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Abstract

Respiratory tract infections (RTIs) are prevalent in India, affecting approximately 11.3% of the population. India leads globally in lung disease mortality, including chronic obstructive pulmonary disease and asthma, contributing significantly to disability-adjusted life years and mortality rates. The role of clinical pharmacist interventions (CPIs) in optimizing antibiotic use and managing RTIs is increasingly recognized as vital for improving patient outcomes and reducing healthcare costs. This study aimed to evaluate the effectiveness of CPIs in managing RTIs among inpatients at Vivekananda General Hospital, Hubballi, and to identify common drug-related problems (DRPs) using the Hepler-Strand classification system. A cross-sectional study was conducted over 6 months, including 200 inpatients diagnosed with RTIs. Data was collected through patient profiles, treatment charts, and medical case sheets. The study employed descriptive and inferential statistical analyses to evaluate the impact of CPIs on antibiotic therapy and the prevalence of DRPs. The study identified drug-drug interactions as the most frequent DRP (38.30%), followed by drug duplication (31.49%) and improper drug selection (9.79%). Other issues included adverse drug reactions (4.68%), overdosage (5.53%), untreated indications (6.38%), subtherapeutic dosage (2.13%), and drug use without indication (1.70%). CPIs, including prospective audits, prescription feedback, and healthcare professional education, effectively addressed these issues, improved antibiotic appropriateness, and optimized patient outcomes. CPIs significantly enhance the management of RTIs by addressing various DRPs and optimizing antibiotic use. The study underscores the importance of incorporating pharmacists into antimicrobial stewardship programs to improve medication safety, efficacy, and overall patient care in managing RTIs. Continued emphasis on pharmacist-led interventions and adherence to best practices in antimicrobial stewardship is essential for reducing the burden of respiratory diseases in India.

Key words: RTI, chronic obstructive pulmonary disorder, asthma, clinical pharmacist intervention, antimicrobial stewardship programs.

Introduction

Respiratory tract infections (RTIs) are a common medical issue affecting 11.3% of the total Indian population. India tops the world in lung disease deaths, with 142.09 deaths per 100,000 population [1]. COPD is one of the fastest-growing respiratory diseases in India, driven by external factors like pollution and lifestyle factors like smoking [2]. India's total asthma burden is 34.3 million, accounting for 13.09% of the global asthma burden. India has 3 times higher asthma mortality and more than 2 times higher DALYs compared to the global average. Due to severe air pollution, almost 100 million people in India suffer from respiratory diseases, with 1 million dying yearly from asthma and COPD [3].

Clinical pharmacist interventions are crucial in optimizing antibiotic use and improving patient outcomes in RTIs. Pharmacist involvement in antimicrobial stewardship programs (ASPs) has been associated with reduced antibiotic consumption, shorter hospital stays, and lower healthcare costs [4]. Effective interventions include performing prospective audits and feedback on antibiotic prescriptions, educating healthcare professionals on appropriate antibiotic use, developing treatment guidelines for common RTIs, encouraging de-escalation of broad-spectrum antibiotics to narrower spectrum agents, and facilitating real-time pathogen identification to guide antibiotic selection. Studies have found that pharmacist involvement in ASPs can increase the appropriateness of antibiotic prescriptions and reduce overall antibiotic consumption in RTIs. Guidelines recommend that pharmacists should be co-leaders of ASPs, as they have an important role in promoting optimal antimicrobial use and reducing infection transmission [5]. The Hepler-Strand classification system is a widely used approach by pharmacists to identify drug-related problems (DRPs) and adverse drug reactions in prescriptions. It helps healthcare professionals identify and address these problems systematically, ultimately improving patient care and medication management. Interventions like therapy effectiveness, safety, and optimized use, reduce medication errors and pharmaceutical-related hazards [6].

Materials and Methods

Study design

A cross-sectional observational study was conducted from August 2023 to January 2024. A pilot study was conducted to determine the sample size. After that, the research comprised 200 patients with RTI diagnosis who were admitted to the pulmonology department at Vivekananda General Hospital Hubballi, India.

Ethical considerations

The study's purpose was conveyed to the patients and their families. All of the patients provided written informed consent. The KLE College of Pharmacy Ethical Committee gave its approval to the study. IEC Reference Number: KLECOPH/IEC/2023-24/08

Study population

Inclusion criteria: Patients of either gender above 18 years of age, diagnosed with respiratory disease, and admitted to the inpatient pulmonology department.

Exclusion criteria: Patients below 18 years of age, those attending the outpatient department, patients who were not conscious and oriented, patients who did not consent to participate in the study, and pregnant and lactating women were excluded.

Statistical analysis

Data were analyzed using descriptive statistics to summarize the key features and trends observed in the dataset. No inferential statistical tests were conducted. Clinical pharmacist interventions were systematically documented and stored in Excel sheets, where data collection involved calculating the sum and percentage to assess the impact and frequency of each intervention.

Results

Table 1 summarizes the clinical characteristics of the research patients. Of the 200 patients, 141(70.50%) were male and 59(29.50%) were female, suggesting a higher incidence of RTIs among the population was in males. The highest number of patients were from 55-69 years age group 70(35%) followed by 25-39 years: 42(21%), 40-54 years: 41(20.50%), 70-84 years: 26(13%), 18-24 years: 17(8.50%), and 85-99 years: 4(2%). Around 124(62%) patients were from rural areas and 76(28%) from urban. The educational background of the patients was diverse, with 82(40.50%) being uneducated and 53(26.50%) having some schooling. The most common occupation among patients was farming 54(27%), construction labor 20(10%), industry workers 22(11%), and housewives 19(9.50%). Comorbidities were prevalent among the patients, 52(26%) had hypertension, and 13(6.5%) had type 2 diabetes mellitus. The 175(87.50%) of patients belonged to the low-income category. Inflammatory biomarkers were examined, and the results revealed raised CRP and ESR values. This indicates that RTI is predominantly an inflammatory process.

Table 2 summarizes the Clinical Pharmacist Intervention in Respiratory Tract Infection Patients. The distribution of study participants was based on the Hepler and Strand

Classification (Figure 1). In the present study, we found that Drug-Drug Interactions were the major complication which is 38.30% (n=90), Adverse drug reactions were 4.68% (n=11), and Drug duplicationwas 31.49% (n=74), Overdosage was 5.53% (n=11), Untreated indication was 6.38% (n=15), Sub therapeutic dosage was 2.13% (n=5), Improper drug selection was 9.79% (n=23), and Drug without indication was 1.70% (n=4).

Discussion

This study highlights the prevalence and management of RTIs among inpatients at Vivekananda General Hospital, Hubballi, emphasizing the role of clinical pharmacist interventions (CPIs) in optimizing treatment outcomes. The findings underscore the substantial incidence of RTIs among the study population, aligning with national statistics indicating a high respiratory disease prevalence in India [7]. The burden of RTIs is compounded by the high mortality and disability-adjusted life years (DALYs) associated with conditions like asthma and COPD [8]. In this context, effective management strategies are crucial to mitigate disease progression and improve patient outcomes. CPIs are pivotal in optimizing antibiotic use and overall management of RTIs. This study employed CPIs such as prospective audits and feedback on antibiotic prescriptions, education of healthcare professionals on appropriate antibiotic use, and the development of treatment guidelines tailored to RTIs. These interventions are aligned with global recommendations that advocate for pharmacist involvement in antimicrobial stewardship programs (ASPs) to enhance the appropriateness of antibiotic therapy [9].

Clinical Pharmacist Interventions were assessed using Hepler and strand classification. Inour study, we found that drug-drug interaction was a major complication which is 38.30%along with drug duplication at 31.49%, and 9.79% with improper drug selection. Divya Gopineni et.al (2022) The clinical pharmacist intervention using the Hepler and Strand classification in respiratory tract infections (RTIs) involves identifying and addressing drug-related problems (DRPs) through a systematic approach. This method categorizes DRPs based on specific criteria, such as untreated indications, improper drug selection, suboptimal dosing, drug interactions, and drug use without indication. By utilizing the Hepler and Strand classification, clinical pharmacists can effectively assess medication-related issues, provide targeted interventions, and collaborate with healthcare providers tooptimize drug therapy, enhance patient outcomes, and promote rational drug use in managing RTIs [6].

Conclusions

The study highlights the importance of Clinical Pharmacist Interventions (CPIs) in managing Respiratory Tract Infections (RTIs) in an inpatient setting at Vivekananda General Hospital,

Hubballi. The study found that clinical pharmacists play a crucial role in optimizing antibiotic use and addressing drug-related problems (DRPs) through systematic approaches like the Hepler-Strand classification. The prevalence of RTIs in the study population aligns with national data reflecting the high burden of respiratory diseases in India. The study identified drug-drug interactions and drug duplication as the most common issues, emphasizing the complexity of managing RTIs and the need for targeted interventions to enhance medication safety and efficacy. The CPIs implemented in the study, such as prospective audits, feedback on antibiotic use, and educational initiatives, effectively addressed DRPs, improved the appropriateness of antibiotic therapy, reduced the risk of adverse drug reactions, and optimized patient outcomes. The study emphasizes the need for continued emphasis on pharmacist-led interventions and adherence to best practices in antimicrobial stewardship to advance patient care and reduce the burden of respiratory diseases.

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Table 1. Clinical characteristics of patients with respiratory tract infections.

Sl.no	Categories	Number of subjects N (%)
1.	Gender	
	Male	141 (70.50)
	Female	59 (29.50)
2.	Age in years	
	18-24	17 (8.50)
	25-39	42 (21)
	40-54	41 (20.50)
	55-69	70 (35)
	70-84	26 (13)
	85-99	4 (2)
3.	Residence	
	Urban	76 (38)
	Rural	124 (62)
4.	Qualification	
	Degree	23 (11.50)
	Diploma	3 (1.50)
	Intermediate	23 (11.50)
	Schooling	53 (26.50)
	Twelfth	17 (8.50)
	Uneducated	82 (40.50)
5.	Occupation	
	Farmer	54 (27)
	Construction Labour	20 (10)
	Industry worker	22 (11)
	Housewife	19 (9.50)
	Others occupations	85 (42)
6.	Comorbidities	
	Present	120 (60)
	Absent	80 (40)
7.	Income	
	Above poverty line	25 (12.50)
	Below poverty line	125 (87.50)
8.	Employment Status	
	Poorly employed	129 (64.50)
	Unemployed	37 (18.50)
	Well employed	34 (17)
9.	Social habits	
	Smokers	58 (29)
	Non-Smokers	142 (71)
	Alcoholic	56 (28)
	Non-Alcoholic	144 (72)
10.	Diagnosis	
	Lower respiratory tract infection	181 (90.50)
	Upper respiratory tract infection	19 (9.50)

Table 2. Clinical pharmacist intervention in patients with respiratory tract infection.

CATEGORY OF DRPS	N	PERCENTAGE (%)
Drug interactions	90	38.30%
Adverse drug reactions	11	4.68%
Drug duplication	74	31.49%
Overdosage	13	5.53%
Untreated indication	15	6.38%
Improper drug selection	23	9.79%
Sub-therapeutic dosage	5	2.13%
Drug without indication	4	1.70%
Total	235	100.00%

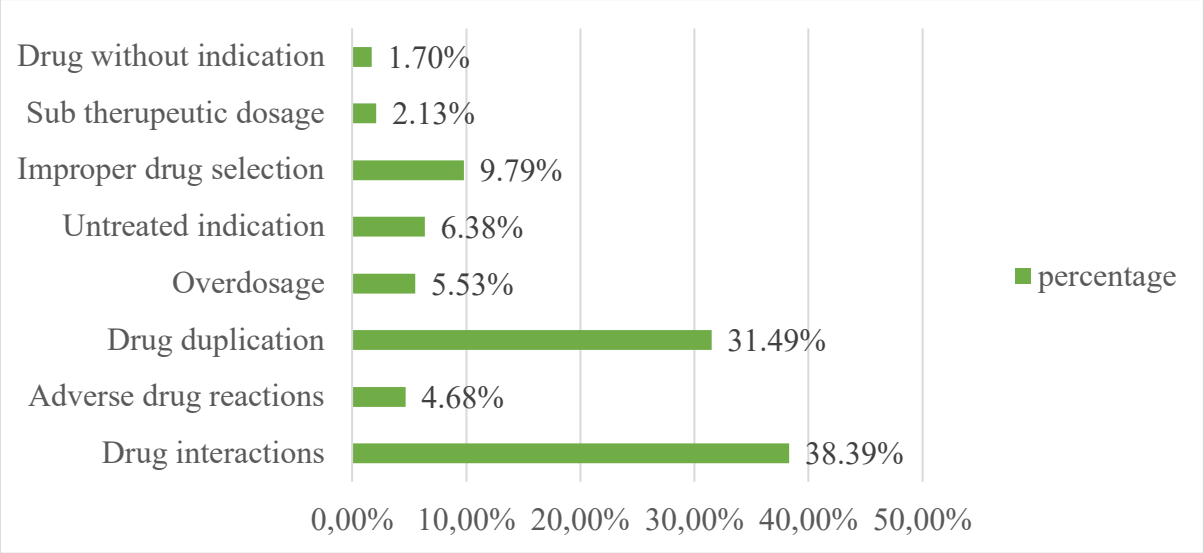

Figure 1. Clinical pharmacist intervention using Hepler and Strand classification.