

**PATTERN OF DRUG PRESCRIBING IN RESPIRATORY INTENSIVE CARE UNIT OF A TERTIARY CARE TEACHING HOSPITAL: A CROSS-SECTIONAL STUDY**Anusree E. P.<sup>1</sup>, Bhagya Thankom Kurian<sup>2</sup> and Joga Sasidhar\*<sup>1</sup>Principal Investigator, Pharm D, Department of Pharmacy Practice, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka, India – 571422.<sup>2</sup>Co- Investigator, Pharm D, Department of Pharmacy Practice, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka, India – 571422.

\*Assistant Professor, Department of Pharmacy Practice, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka, India – 571422.

**\*Corresponding Author: Dr. Joga Sasidhar**

Assistant Professor, Department of Pharmacy Practice, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka, India – 571422.

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**ABSTRACT**

**Background:** Over the past few decades, no branch of medicine has made more progress than Respiratory intensive care. This study is done to describe the prescription pattern in RICU, which is important in explaining the extent and profile of drug use, quality of drugs, usage of drugs from the essential medicines list, etc. There are several problems which are associated with drug prescription patterns that are quite common worldwide. Errors in drug prescription are considered a key threatening factor that affects patient safety. Adverse drug reactions are one of the main causes of injury and death, it is estimated that they cause 100,000 deaths annually in the United States.

**Objectives:** To describe the drug prescribing pattern in patients admitted to the respiratory intensive care unit. To describe the rationality of these prescriptions using the WHO core drug prescribing indicators. **Methods and Methodology:** It was a Cross-sectional study. The study period was about 6 months and the relevant data were collected from inpatient records. **Result:** A total of 120 prescriptions were collected from the Respiratory Intensive Care Unit and analyzed. Males were more (65.8%) compared to females (34.2%). The majority of patients belonged to the age group of 60 and above. The most common respiratory condition found in the study population was Acute exacerbation of COPD + IHD + Others (24.2%). A total of 1065 drugs were prescribed in 120 cases among which Antibiotics were most commonly prescribed (23.5%). Azithromycin was the most commonly prescribed. **Conclusion:** The prescription pattern was analyzed according to the WHO (World Health Organization) core indicators and most of them followed the WHO core prescription pattern. It is the responsibility of the clinical pharmacist to perform a vital role in the detection and prevention of potential prescription errors.

**KEYWORDS:** RICU, Prescription Pattern.**INTRODUCTION**

Drug prescribing pattern is a tool for assessing the prescribing, dispensing, and distribution of medicines. These can promote the appropriate use of monitored drugs and the reduction of abuse or misuse of monitored drugs.<sup>[1]</sup> Prescription pattern monitoring study has been defined by World Health Organization (WHO) as “the marketing, distribution, prescription and use of drugs in a society with special emphasis on the resulting medical and social and economic consequences”.

The Respiratory Intensive Care Unit (RICU) is an area that provides closed monitoring and intensive treatment for patients with acute or exacerbated respiratory failure caused by primarily respiratory disease.<sup>[2]</sup>

In RICU, the cases which are admitted were classified according to causes due to primary respiratory disease

and secondary respiratory disease. The high percentage of admission in cases with primary respiratory causes were acute exacerbation of chronic obstructive pulmonary disease, asthma, respiratory failure patients, and severe pneumonia.<sup>[2]</sup>

**MATERIALS AND METHOD****Study Design:** Cross-sectional study**Study place:** This study was carried out at the Respiratory Intensive Care Unit, MIMS, Mandya**Study period:** 6 months (4 months of data collection and 2 months of analysis and write-up).**Sample size:** 120**Sample method:** Convenience sampling**Inclusion Criteria:** All patients admitted to the respiratory intensive care unit.**Exclusion Criteria:** Pregnant women, Covid patients, and patients less than 18 years of age.

**Method of Data Collection:** Data regarding the details of the patient was noted from the case sheet, and assessments were done based on the WHO core drug prescribing indicators.

**Analysis:** Data were entered in an MS Excel worksheet and descriptive statistical analysis has been carried out in the present study. For the analysis of the results, a Simple percentage calculation was used to conclude our study.

## RESULT AND DISCUSSION

The study was conducted in the Respiratory Intensive Care Unit of MIMS, Mandya for a period of 6 months. A

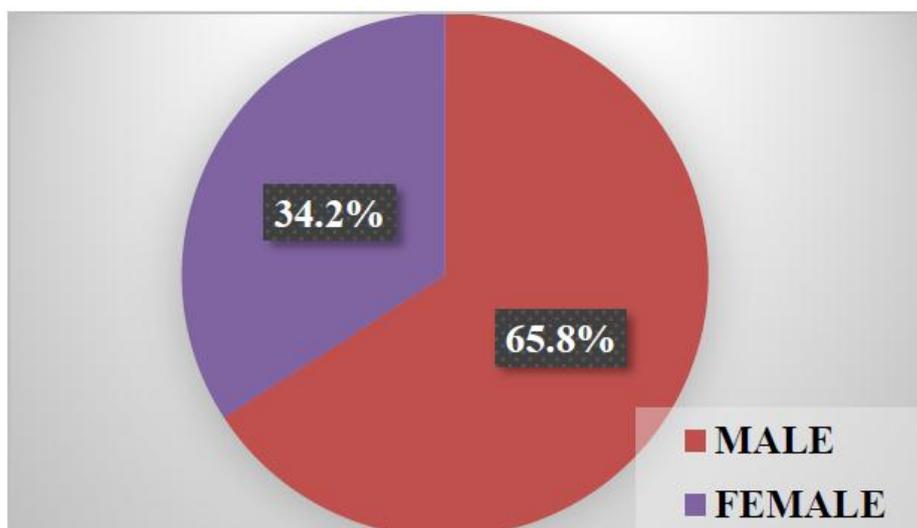
total of 120 patients were admitted to RICU during the study period and they were enrolled according to the study criteria.

### Distribution of patients based on gender

Among the 120 patient data which was collected during the study period, 79(65.8%) were males and 41(34.2%) were females. From this, we can understand that males are more prone to respiratory illness.

**Table 1: Distribution of patients based on gender.**

Gender	Number of Patients	Percentage
Male	79	65.8%
Female	41	34.2%
Total	120	100%



**Figure 1: Distribution of patients based on gender Distribution of patients based on Age group.**

Among the 120 patients involved in the study, the patients were divided into 5 groups based on their age. In that 46 (58.2%) male and 28 (68.3%), female patients were found between 60 and above years, followed by 16 (20.3%) male and 9 (21.2%) female patients found

between 50-59 years, and so on. From table 2, it is clear that the maximum number of patients was found in the age group of 60 and above years, and the minimum number of patients was found in the age group of 18-29 years.

**Table 2: Distribution of patients based on age group.**

Age	Male		Female	
	Number	Percentage	Number	Percentage
18-29	1	1.3%	0	0%
30-39	10	12.7%	1	2.4%
40-49	6	7.6%	3	7.3%
50-59	16	20.2%	9	22.0%
60 and Above	46	58.2%	28	68.3%

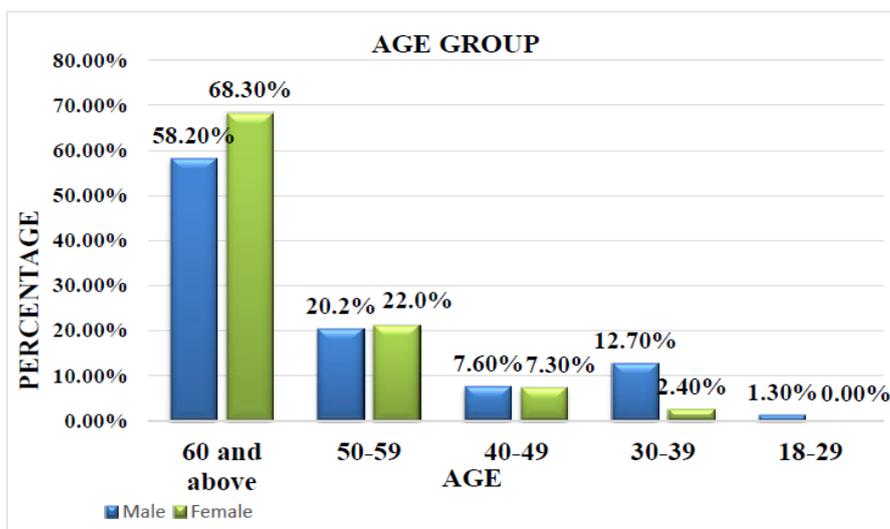


Figure 2: Distribution of patients based on Age Group.

**Distribution of patients based on disease condition**

During the study period, different types of respiratory disease along with comorbid conditions were observed among those 120 patients. Out of 120 patients, 29

(24.2%) were with Acute exacerbation of COPD + IHD + Others (HTN, T2DM, AFI), followed by 20 (16.6%) were with B/L Pneumonia + Type 2 DM+ Others(Acute pulmonary edema, ACSNSTEMI, HTN, AFI), and so on.

Table 3: Distribution of patients based on disease condition.

Disease Condition	Number of Patients	Percentage
Acute Exacerbation of COPD + IHD + Others	29	24.2%
Bilateral Pneumonia + T2DM + Others	20	16.6%
Acute Bronchial Asthma + COPD +HTN + Others	15	12.5%
Left Lower Lobe Pneumonia + Asthma +Acute Bronchitis + Others	14	11.7%
Right Lower Lobe Pneumonia + COPD + Others	12	10%
Acute Exacerbation of COPD + Corpulmonale + Others	11	9.2%
Acute Exacerbation of COPD + Old TB + Others	8	6.6%
TB + Others	6	5%
Respiratory failure + HTN + Others	5	4.2%

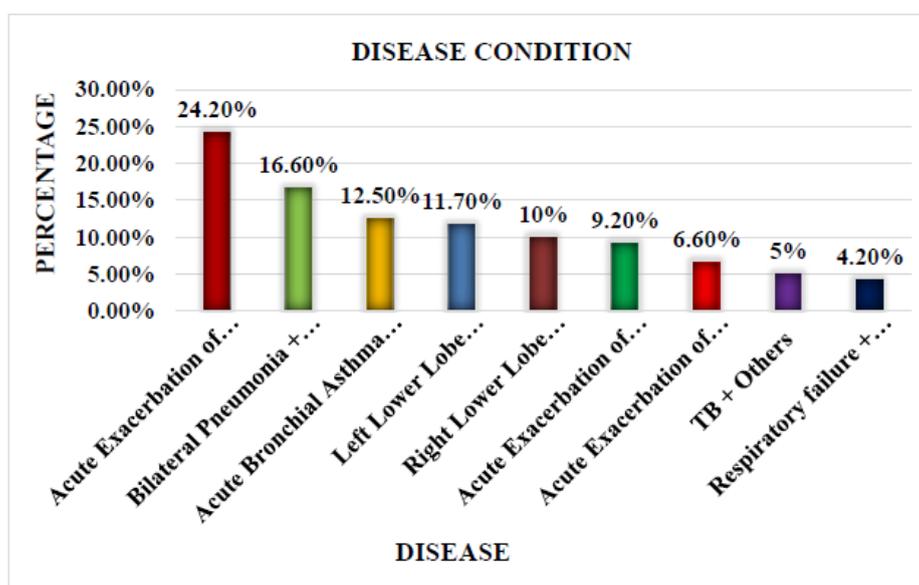


Figure 3: Distribution of patients based on disease condition.

### Drug categorization according to the class and disease condition

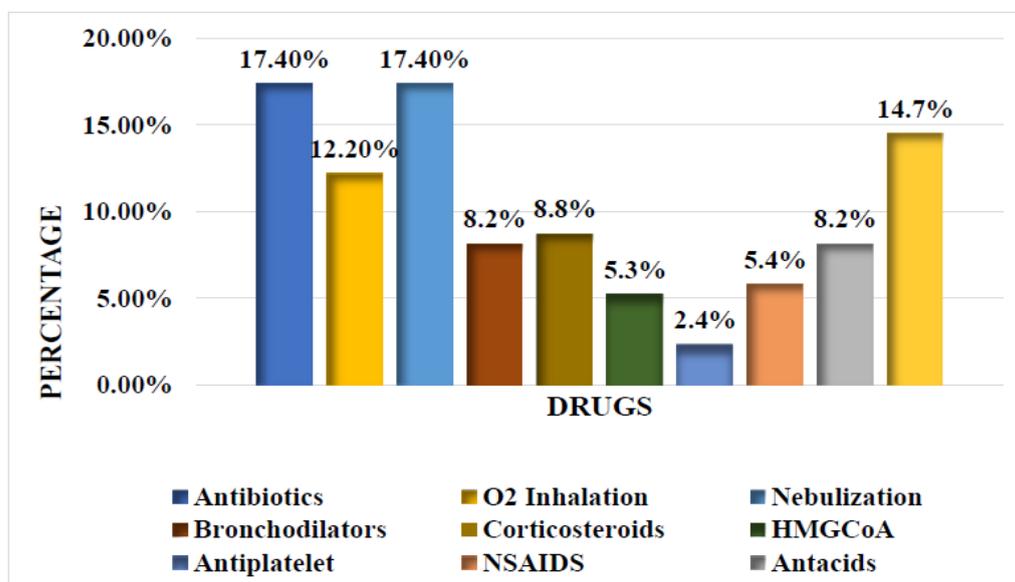
#### 1. Prescription pattern of drugs in Acute exacerbation of COPD +IHD + Others

Of the total of 120 patients in the study, 29 (24.2%) were admitted to the RICU with complaints of Acute exacerbation of COPD + IHD + others (HTN, T2DM,

AFI). Among these 29 prescriptions, a total of 172 drugs were prescribed. Antibiotics and nebulization were the most commonly prescribed at 17.4% and 17.4% respectively. According to the prescription pattern, among antibiotics Ceftriaxone was mostly used, followed by Azithromycin.

**Table 4: Prescription pattern of drugs in Acute Exacerbation of COPD + IHD + Others.**

Class of Drug	Name of drug	Number of drugs per prescription	Total number of drugs per prescription	Percentage
Antibiotics	Azithromycin	8	30	17.4%
	Cefoperazone-sulbactam	4		
	Ceftriaxone	18		
O2 Inhalation	O2 supplement	21	21	12.2%
Nebulization	Duolin-budecort	24	30	17.4%
	Asthalin	3		
	Formamide-combimist	3		
Bronchodilators	Theophylline	11	14	8.2%
	Salbutamol	3		
Corticosteroids	Hydrocortisone	12	15	8.8%
	Dexamethasone	3		
HMG-CoA	Atorvastatin	9	9	5.3%
Antiplatelet	clopidogrel	4	4	2.4%
NSAIDS	Aspirin	10	10	5.4%
Antacids	Pantoprazole	14	14	8.2%
Miscellaneous	Amlodipine	6	25	14.7%
	Furosemide	4		
	Human Actrapid	4		
	Metformin+ GP	5		
	Paracetamol	6		



**Figure 4: Prescription pattern of drugs in Acute Exacerbation of COPD + IHD + Other.**

#### 2. Prescription pattern of drugs in Bilateral Pneumonia + T2DM + Others

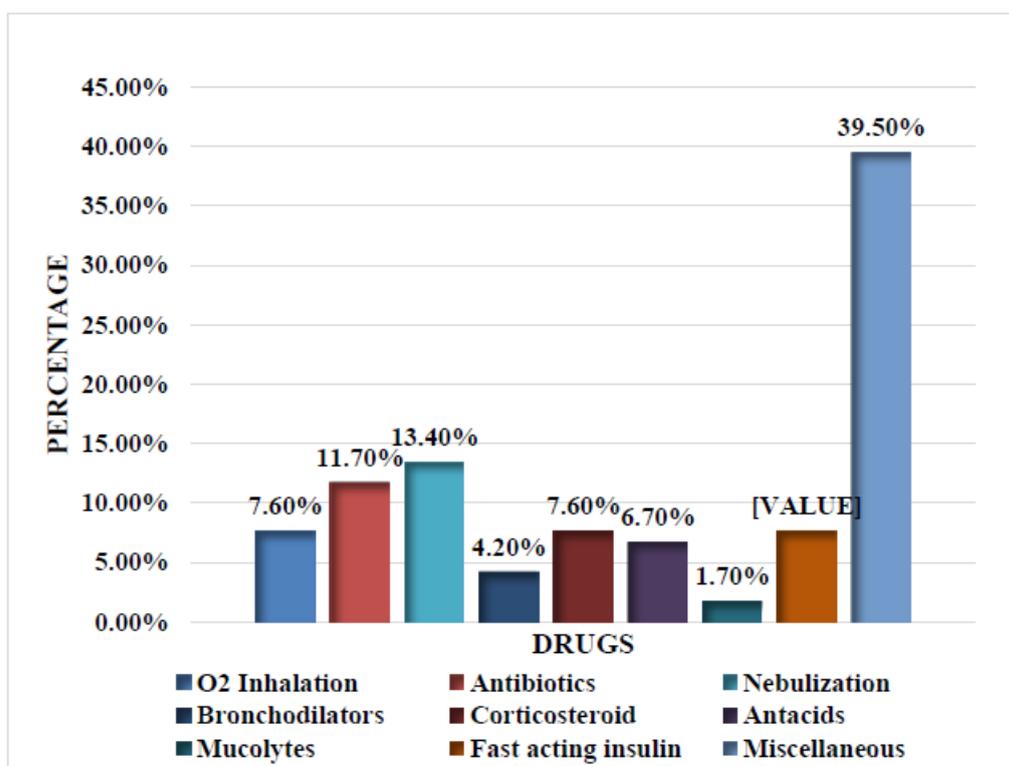
Of the total of 120 patients in the study, 20 (16.6%) were admitted to the RICU with complaints of Bilateral Pneumonia +T2DM + others (HTN, Acute pulmonary

edema, ACSNSTEMI, AFI). Among these 20 prescriptions, a total of 119 drugs were prescribed. Among these most commonly prescribed were miscellaneous drugs (39.5%), followed by Nebulization (13.4%). According to the prescription pattern, among

antibiotics Ceftriaxone was mostly used, followed by Azithromycin.

**Table 5: Prescription pattern of drugs in Bilateral Pneumonia+ T2DM+Others.**

Class of drug	Name of drug	Number of drugs per prescription	Total number of drugs per prescription	Percentage
O2 Inhalation	O2 supplement	9	9	7.6%
Antibiotics	Ceftriaxone	7	14	11.7%
	doxycycline	3		
	Azithromycin	4		
Nebulization	Duolin-budecort	14		
	Formamide-combimist	2	16	13.4%
Bronchodilators	Theophylline	5	5	4.2%
Corticosteroid	Hydrocortisone	4	9	7.6%
	Dexamethasone	5		
Antacids	Pantoprazole	8	8	6.7%
Mucolite	Syrup mucolite	2	2	1.7%



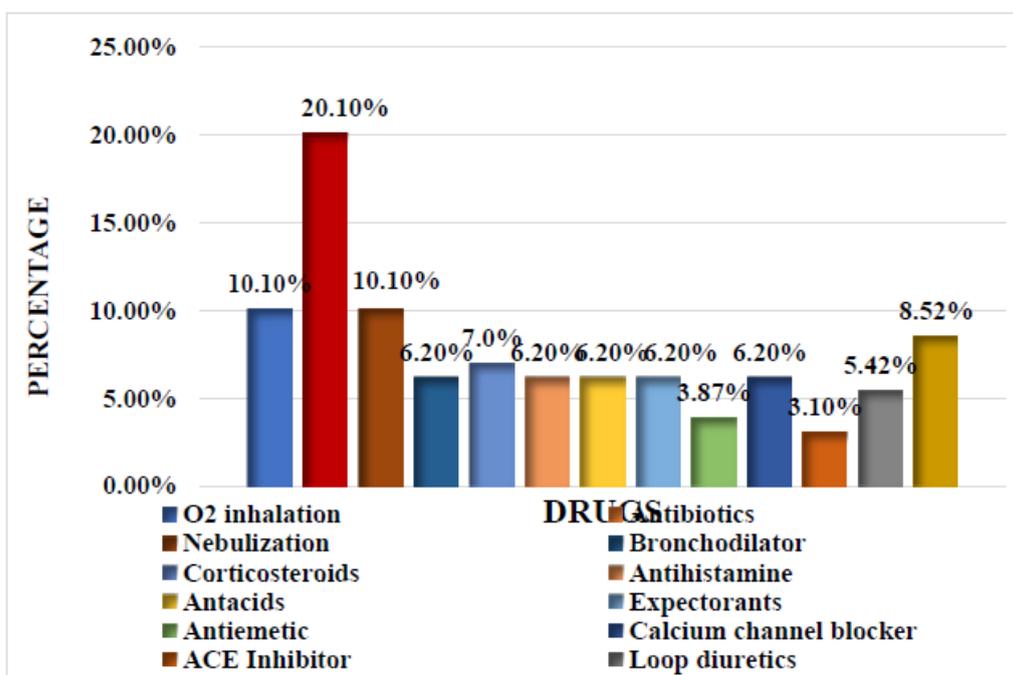
**Figure 5: Prescription pattern of drugs in bilateral pneumonia + T2DM + Others.**

### 3. Prescription pattern of drugs in acute bronchial asthma + COPD + HTN + Others

Of the total of 120 patients in the study, 15 (12.5%) were admitted to the RICU with complaints of Acute bronchial asthma + COPD + HTN + Others (T2DM, AFI). Among these 15 prescriptions, a total of 129 drugs were prescribed. Among these most commonly prescribed drugs are Antibiotics (20.1%), followed by nebulization (10.1%). According to the prescription pattern, among antibiotics Ceftriaxone was mostly used, followed by Amoxiclav.

**Table 6: Prescription pattern of drugs in Acute Bronchial asthma + COPD + HTN+ Other.**

Class of drug	Name of drug	Number of drugs per prescription	Total number of drugs per prescription	Percentage
O2 inhalation	O2 supplement	13	13	10.1%
Antibiotics	Ceftriaxone	7	27	20.1%
	Piperacillin + Tazobactam	4		
	Doxycycline	3		
	Azithromycin	4		
	Amoxiclav	5		
	Cefotaxime	4		
Nebulization	Duolin- budesort	11	13	10.1%
Asthalin		1		
Formamide- combimist		1		
Bronchodilator	Theophylline	5	8	6.2%
Salbutamol		3		
Corticosteroids	Hydrocortisone	9	9	7.0%
Antihistamine	Avil	3	8	6.2%
Cetirizine		5		
Antacids	Pantoprazole	8	8	6.2%
Expectorants	Ambroxol	8	8	6.2%
Antiemetic	Ondansetron	5	5	3.8%
Calcium channel blocker	Amlodipine	8	8	6.2%
ACE Inhibitor	Telmisartan	4	4	3.1%
Loop diuretics	Furosemide	7	7	5.4%
Miscellaneous	Human Actrapid	3	11	8.5%
	Metformin + GP	4		
	Paracetamol	4		

**Figure 6: Prescription pattern in Acute Bronchial Asthma + COPD + HTN + Others.**

#### 4. Prescription pattern of drugs in Left Lower Lobe

##### Pneumonia+ Asthma+ Acute Bronchitis + Others

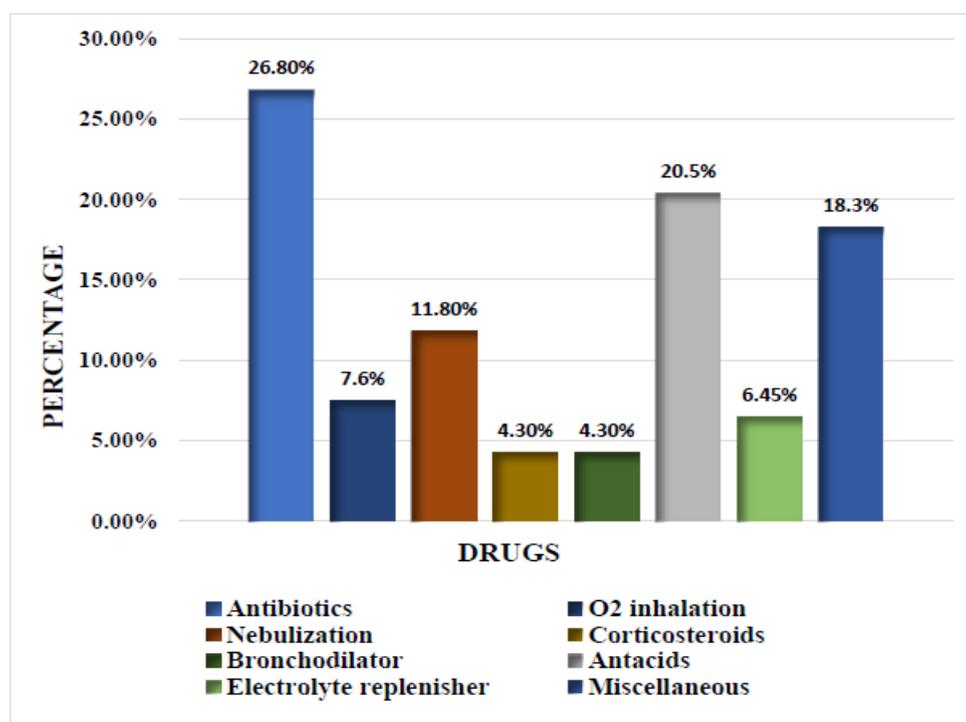
Of the total of 120 patients in the study, 14 (11.7%) were admitted to the RICU with complaints of Left lower lobe pneumonia + Asthma + acute bronchitis + others (HTN,

T2DM, Anemia, hypothyroidism). Among these 14 prescriptions, a total of 93 drugs were prescribed. In these most commonly prescribed drugs are Antibiotics (26.8%), followed by Antacids (20.5%). According to the prescription pattern, among antibiotics Ceftriaxone

was mostly used, followed by Azithromycin.

**Table 7: Prescription pattern of drugs in Left Lower Lobe Pneumonia + Asthma+ Acute Bronchitis + Others.**

Class of drugs	Name of drug	Number of drugs per prescription	Total number of drugs per prescription	Percentage
Antibiotics	Ceftriaxone	7	25	26.8%
	Azithromycin	6		
	Metronidazole	4		
	Piperacillin + Tazobactam	3		
	Cefadroxil	1		
	Cefoperazone-sulbactam	4		
O2 inhalation	O2 supplement	7	7	7.6%
Nebulization	Duolin- budesonide	9	11	11.8%
	Formamide-combimist	2		
Corticosteroids	Hydrocortisone	2	4	4.3%
	Dexamethasone	2		
Bronchodilator	Theophylline	2	4	4.3%
	Salbutamol	1		
	Pulmoclear	1		
Antacids	Ranitidine	8	19	20.5%
	Pantoprazole	9		
	Mefit gel	2		
Electrolyte replenisher	IVF Normal saline	6	6	6.4%
Miscellaneous	Metformin+ GP	2	17	18.3%
	Human Actrapid	3		
	Albendazole	2		
	FSFA	3		
	B complex	2		
	Furosemide	1		
	Amlodipine	2		
	Thyronorm	2		



**Figure 7: Prescription pattern of drugs in Left Lower Lobe Pneumonia + Asthma+ Acute Bronchitis + Others.**

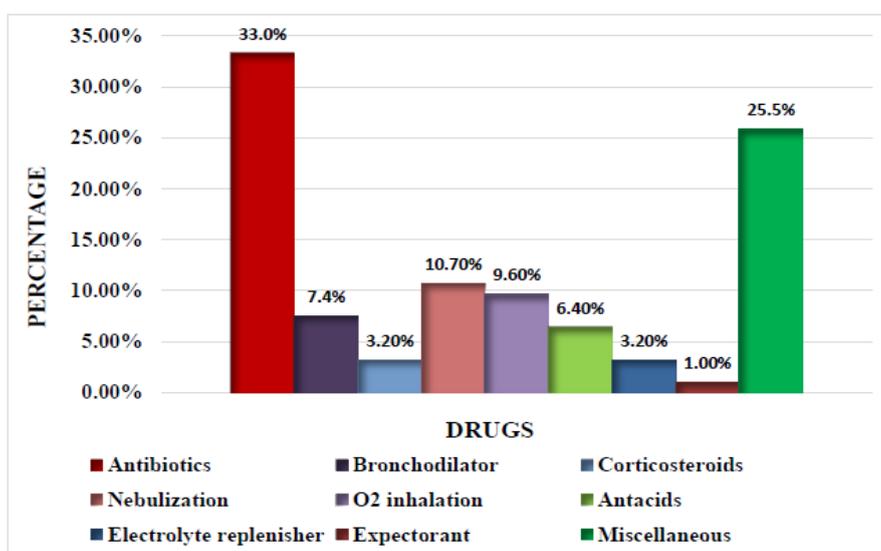
### 5. Prescription pattern of drugs in Right Lower Lobe Pneumonia + COPD + Others

Of the total of 120 patients in the study, 12 (10%) were admitted to the RICU with complaints of Right lower lobe pneumonia + COPD + others (HTN, AFI, anemia,).

Among these 12 prescriptions, a total of 94 drugs were prescribed. In these most commonly prescribed drugs were Antibiotics (33.0%). According to the prescription pattern, among antibiotics, Ceftriaxone and Piperacillin Tazobactam were mostly used.

**Table 8: Prescription pattern of drugs in Right Lower Lobe Pneumonia + COPD + Others.**

Class of drugs	Name of drug	Number of drugs per prescription	Total number of drugs per prescription	Percentage		
Antibiotics	Ceftriaxone	6	31	33.0%		
	Cefoperazone sulbactam	3				
	Piperacillin+Tazobactam	6				
	Cefotaxime	1				
	Cefixime	1				
	Metronidazole	2				
	Ciprofloxacin	2				
	Doxycycline	4				
	Azithromycin	6				
Bronchodilator	Theophylline	4			7	7.4%
	Levosulbutamol	1				
	Salbutamol	2				
Corticosteroids	Hydrocortisone	3	3	3.2%		
Nebulization	Asthalin	1	10	10.7%		
	Duoiln- budecort	9				
O2 inhalation	O2 supplement	9	9	9.6%		
Antacids	Ranitidine	3	6	6.4%		
	Pantoprazole	3				
Electrolyte replenisher	IVF normal saline	3	3	3.2%		
Expectorant	M brox	1	1	1.0%		
Miscellaneous	Human Actrapid	3	24	25.5%		
	Metformin + GP	4				
	FSFA	2				
	B complex	2				
	PRBC	1				
	Losartan	1				
	Mannitol	1				
	Furosemide	3				
	Amlodipine	3				
	Paracetamol	4				



**Figure 8: Prescription pattern of drugs in Right Lower Lobe Pneumonia + COPD + Others.**

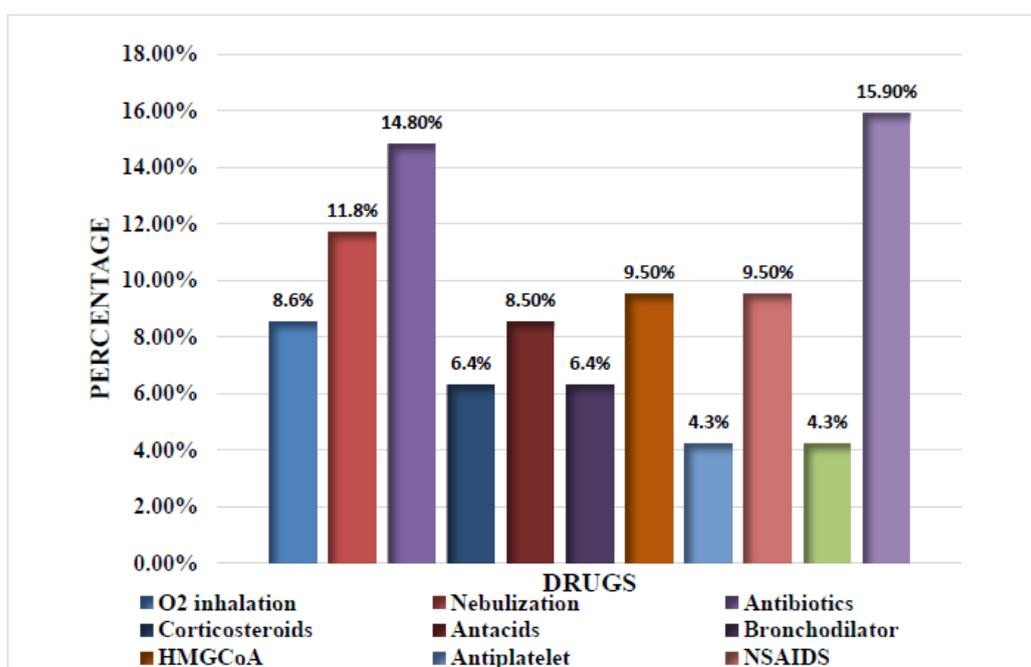
### 6. Prescription pattern of drugs in Acute Exacerbation of COPD + Corpulmonale + others

Of the total of 120 patients in the study, 11 (9.2%) were admitted to the RICU with complaints of Acute Exacerbation of COPD + Corpulmonale + others (HTN, T2DM, ACSNSTEMI). Among these 11 prescriptions, a

total of 94 drugs were prescribed. In these most commonly prescribed drugs are Miscellaneous (15.9%), followed by Antibiotics (14.8%). According to the prescription pattern, among antibiotics Ceftriaxone was mostly used, followed by Azithromycin.

**Table 9: Prescription pattern of drugs in Acute Exacerbation of COPD + Corpulmonale + Others.**

Class of drugs	Name of drugs	Number of drugs per prescription	Total number of drugs per prescription	Percentage
O2 inhalation	O2 supplement	8	8	8.6%
Nebulization	Duolin- budesort	10	11	11.8%
	Duolin- foracort	1		
Antibiotics	Azithromycin	3	14	14.8%
	Ceftriaxone	9		
	Metronidazole	2		
Corticosteroids	Hydrocortisone	6	6	6.4%
Antacids	Mefit gel	2	8	8.5%
	Pantoprazole	6		
Bronchodilator	Theophylline	5	6	6.4%
	Salbutamol	1		
HMG-CoA	Atorvastatin	9	9	9.5%
Antiplatelet	Clopidogrel	4	4	4.3%
NSAIDS	Aspirin	9	9	9.5%
Electrolyte replenisher	IVF normal saline	4	4	4.3%
Miscellaneous	Metformin + GP	4	15	15.9%
	Human Actrapid	2		
	Furosemide	3		
	Atenolol	4		
	Spirolactone	2		



**Figure 9: Prescription pattern of drugs in Acute Exacerbation of COPD + Corpulmonale + Others.**

### 7. Prescription pattern of drugs in Acute Exacerbation of COPD + Old TB

Of the total of 120 patients in the study, 8 (6.6%) were

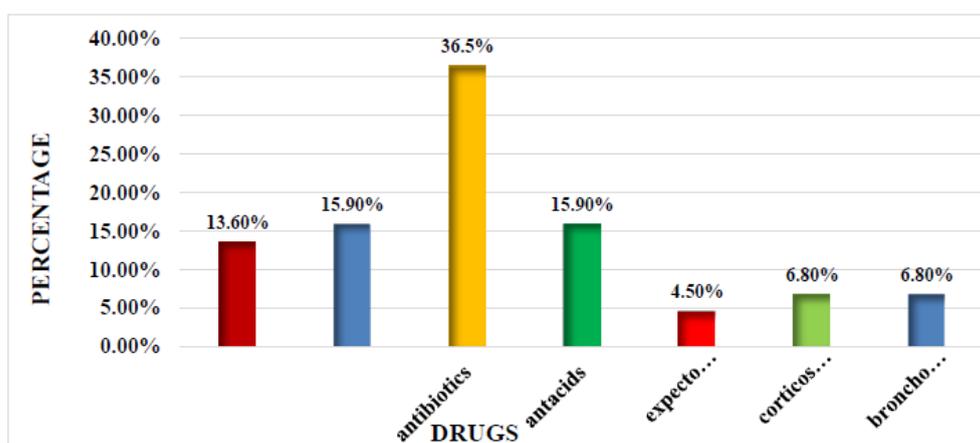
admitted to the RICU with complaints of Acute Exacerbation of COPD + Old TB. Among these 8 prescriptions, a total of 44 drugs were prescribed.

Among these most commonly prescribed drugs were Antibiotics (36.5). According to the prescription pattern,

among antibiotics Ceftriaxone was mostly used, followed by Azithromycin.

**Table 10: Prescription Pattern of drugs in Acute Exacerbation of COPD + Old TB.**

Class of drugs	Name of drugs	Number of drugs per prescription	Total number of drugs per prescription	Percentage
O2 Inhalation	O2 Supplement	6	6	13.6%
Nebulization	Duolin - budesort	6	7	15.9%
	Formamide-combimist	1		
Antibiotics	Ceftriaxone	8	16	36.5%
	Azithromycin	4		
	Doxycycline	2		
	Piperacillin + Tazobactam	2		
Antacids	Pantoprazole	6	7	15.9%
	Mefit gel	1		
Expectorant	M-brox	1	2	4.5%
	Asthalin	1		
Corticosteroids	Hydrocortisone	3	3	6.8%
Bronchodilator	Theophylline	3	3	6.8%



**Figure 10: Prescription pattern of drugs in Acute Exacerbation of COPD + Old TB.**

#### 8. Prescription pattern of drugs in Tuberculosis + meningitis + pulmonary effusion

Of the total of 120 patients in the study, 6 (5%) were admitted to the RICU with complaints of Tuberculosis + meningitis + pulmonary effusion. Among these 6

prescriptions, a total of 19 drugs were prescribed. In these most commonly prescribed drugs are Nebulization and Antibiotics (21.1%). According to the prescription pattern, among antibiotics, Ceftriaxone was mostly used. In Nebulization, the commonly used is Duolin- budesort.

**Table 11: Prescription pattern of drugs in Tuberculosis + Meningitis + Pulmonary Effusion.**

Class of drugs	Name of drugs	Number of drugs per prescription	Total number of drugs per prescription	Percentage
O2 inhalation	O2 Supplement	3	3	15.8%
Nebulization	Duolin -budesort	3	4	21.1%
	Formamide -combimist	1		
Antibiotics	Ceftriaxone	3	4	21.1%
	Cefoperazone-S	1		
Corticosteroids	Dexamethasone	2	2	10.4%
ATT		3	3	15.8%
Electrolyte replenisher	IVF normal saline	3	3	15.8%

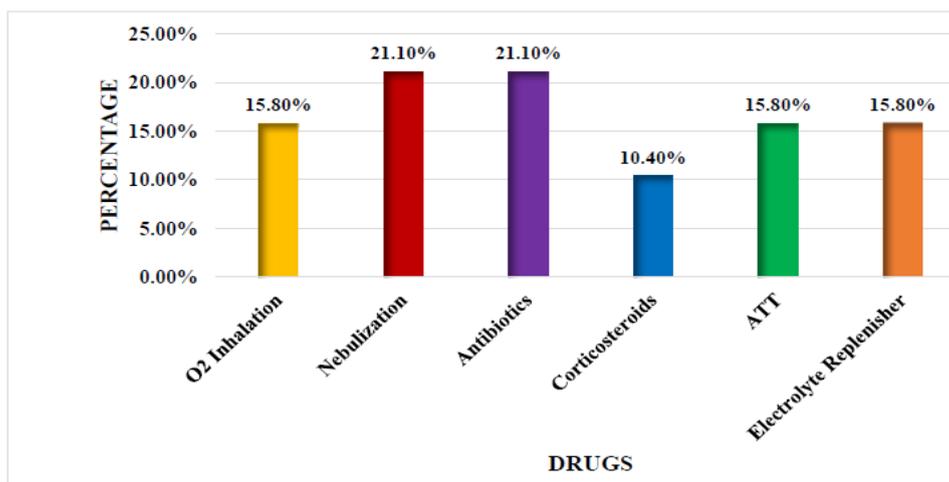


Figure 11: Prescription pattern of drugs in Tuberculosis + Meningitis + Pulmonary Effusion.

### 9. Prescription pattern of drugs in Respiratory failure + HTN

Of the total of 120 patients in the study, 5 (4.2%) were admitted to the RICU with complaints of Respiratory Failure + HTN. Among these 5 prescriptions, a total of

24 drugs were prescribed. In these most commonly prescribed drugs are Antibiotics (20.8%). According to the prescription pattern, among antibiotics, Piperacillin Tazobactam and Cefoperazone-S were most commonly used.

Table 12: Prescription pattern of Respiratory Failure + HTN.

Class of Drugs	Name of drugs	Number of drugs per prescription	Total number of drugs per prescription	Percentage
O2 inhalation	O2 supplement	3	3	12.5%
Antibiotics	Piperacillin+ Tazobactam	2	5	20.8%
	Cefoperazone-S	2		
	Ceftriaxone	1		
Antacids	Ranitidine	3	3	12.5%
Nebulization	Duolin- budesonide	1	2	8.3%
	Asthalin	1		
Corticosteroids	Hydrocortisone	1	1	4.3%
Calcium channel blocker	Amlodipine	3	3	12.5%
Angiotensin 2 receptor antagonist	Telmisartan	2	2	8.3%
Loop diuretics	Furosemide	2	2	8.3%
Electrolyte Replenisher	IVF normal saline	3	3	12.5%

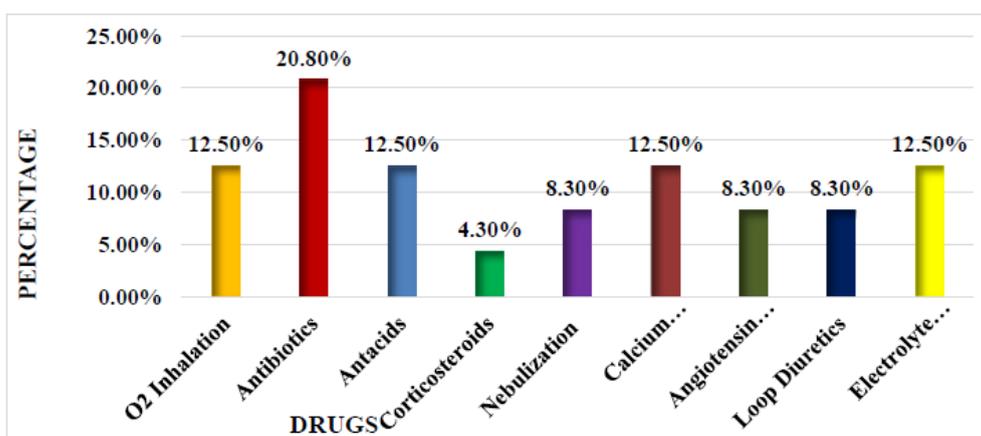


Figure 12: Prescription Pattern of drugs in Respiratory Failure + HTN.

### WHO CORE DRUG USE INDICATORS

Of the 1065 drugs prescribed, the average number of drugs per prescription was 8.8, which is more than the value given by WHO. The percentage of drugs prescribed by generic names was found to be 28.3% which was less than the value given by WHO. The percentage of encounter with antibiotics prescribed were

23.5% and it is a good sign that the prescription consists of less number of antibiotics that helps to prevent resistance to it. The percentage of drugs prescribed from the WHO essential drug list was 60.5% which was less than the value given by the WHO scale. The percentage of encounters with injections was found to be 48.3% which is more than compared to the WHO scale.

**Table 13: Distribution of data based on WHO Core Indicators.**

SL.No	Parameters	WHO scale	Obtained Value
1.	Average Number of Drugs Per Encounter	1.6-1.8	8.8
2.	Percentage Of Drugs Prescribed by Generic Name	100%	28.3%
3.	Percentage Of an Encounter with An Antibiotics Prescribed	20.0-26.8%	23.5%
4.	Percentage Of Drugs Prescribed from WHO Essential Drug List	100%	60.5%
5.	Percentage Of Encounters with An Injection Prescribed	13.4-24.1%	48.3%

### CONCLUSION

A Cross-sectional study was conducted among 120 patients to assess the drug prescribing pattern of inpatients who are admitted to the Respiratory Intensive Care Unit of the government tertiary care hospital Mandya. The required details from the patient case sheet were recorded in a suitably designed patient profile form. The prescription data of 120 patients were analyzed, out of which 79 males and 41 females got participated. Among 120 cases the majority of patients fall under the age group of 60 and above years and the minority were from the age group of 18-29 years. Among the 120 patients who were admitted to RICU, most of them were with complaints of Acute exacerbation of COPD + IHD + Others (HTN, T2DM, AFI). Out of 1065 drugs prescribed, the most commonly prescribed drugs class were Antibiotics, Nebulization and Inhalation. According to the WHO scale, the indicators were recorded. In that, the average number of drugs per prescription was found to be 8.8 and among those 60.5% of drugs were prescribed from the WHO essential drug list. The present study provided valuable insight into the overall pattern of drugs used in the Respiratory intensive care unit. Different groups of drugs are prescribed to the patient in RICU and the number of total drugs prescribed depends on the critical conditions of a patient admitted. This study helped us to gain knowledge on the prevalence of respiratory tract infections in our locality, the most common respiratory tract infection, current prescribing trends of antimicrobials, and finally assess the rationality of the prescriptions.

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