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Drug utilization review in patients with pulmonary diseases in a tertiary care hospital

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ABSTRACT

Objective

To study the drug utilization pattern in patients with pulmonary diseases mainly chronic obstructive pulmonary disease, asthma and Pneumonia.

Method

A prospective and observational study was carried out for a period of 6 months. The information obtained from the case sheets and prescriptions of the in patients was recorded in data collection forms and was analysed.

Result

The prescriptions mostly contained Antibiotics, short acting beta-2 agonists, long acting beta-2 agonists, anticholinergic, Oxygen supplementation, corticosteroids and Leukotriene receptor antagonists. The most commonly prescribed class of drugs was antibiotics(93.47%), the most commonly prescribed drug was Salbutamol (42.75%), the combination of drugs that was most commonly prescribed was the combination of Salbutamol and Ipratropium Bromide (35.50%), the class of antibiotics that was most commonly prescribed was Cephalosporin (74.63%) and the most commonly used route was the inhalation/nebulization route.

Conclusion

This study concludes that although the drugs were prescribed according to the availability of the drugs and physician's preference but they were in accordance with the standard guidelines.

Keywords: Drug utilization review, Chronic obstructive pulmonary disease, Bronchial asthma, Pneumonia, Nebulization, Bronchodilators.

INTRODUCTION

Drug utilization review (DUR) also called as Drug utilization evaluation (DUE) or Medication utilization evaluation (MUR) is a method to evaluate the appropriate and rational use of drugs. It is defined as authorized, structured, on-going review of healthcare provider prescribing, pharmacist dispensing and patient use of medications [1]. Pharmacists play an essential role in this process due to their knowledge and experience in pharmaceutical care [2].

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Chronic Obstructive Pulmonary Disease (COPD) are a group of pathological conditions in which chronic, partial or complete obstruction to the airflow occurs at any level from trachea to the smallest airways resulting in functional disability of the lungs [3]. Two principal conditions of Chronic Obstructive Pulmonary Disease (COPD) include: Chronic Bronchitis and Emphysema. Based on BOLD and other large scale epidemiological studies, the number of COPD cases was 384 million in 2010, with a global prevalence of 11.7% [2]. Globally, there are around three million deaths annually [4]. It is caused by cigarette smoking and atmospheric pollution. Inflammatory cells and mediators cause destructive changes in airways, pulmonary vasculature and lung parenchyma.

BRONCHIAL ASTHMA

It's a heterogeneous reversible airway disease characterized by increased responsiveness of the tracheo- bronchial tree to a variety of stimuli which results in spasmodic narrowing of air passages. Common & prevalent worldwide, about 4% population of USA is reported to be asthmatic, occurs at all ages but 50% of cases develop before 10 years of age. Signs and symptoms are wheezing, SOB, cough, chest tightness. It is caused by allergens and pollutants. The body's immune system responses to allergens by releasing immune bodies leading to inflammation.

PNEUMONIA

Pneumonia is defined as an infection of the lungs where inflammation of the air sacs .i.e. alveoli occurs. The alveoli get filled up with fluid or puss causing difficulty in breathing. It may happen in one or both the lungs. It has been estimated that globally 5 million people will die each year of Pneumonia [5]. It is caused by bacteria, virus and fungi. The microorganisms enter into the lungs and the body's immune system is unable to respond to it efficiently causing infection. Signs and symptoms are cough, dyspnoea, tachypnoea, recurrent respiratory infections.

METHODOLOGY

Study design: A prospective, observational study was conducted to analyse the drugs prescribed to COPD, Asthma and Pneumonia patients.

Study site: The study was conducted in the Aster Prime Hospital, Hyderabad.

Study Period: The study was conducted for a period of 6 months from October 2018 to March 2019.

Sample size: The sample size for the study was found to be 138. It was calculated using Epi Info.

COPD: Sample size-50, Confidence level-95%, Population size-17 million, Expected frequency-3.4%, Confidence limit-5%.

Bronchial Asthma: Sample size-30, Confidence level-95%, Population size-17 million, Expected frequency-2%, Confidence limit-5%.

Pneumonia: Sample size-58, Confidence level-95%, Population size-450 million, Expected frequency-4%, Confidence limit-5%.

Source of Data: Data was collected from the case sheets and prescriptions of the patients visiting the Aster Prime hospital.

Inclusion criteria

1. Patients above 18 years of age who have been diagnosed with pulmonary disease (COPD/Asthma/Pneumonia) with or without comorbidities.
2. Patients who visited the hospital during exacerbation of disease.

Exclusion criteria

All pregnant and lactating women and patients below 18 years of age.

Statistical Analysis: The data was analysed using Microsoft excel 2012. Most of the data is

expressed as descriptive statistics. However, the categorization involved expression in the form of numbers and percentage.

RESULTS AND DISCUSSION

Table 1: Socio-demographics of the patients

S.No.	Socio-demographic parameters	
1.	Gender MALE - 62.12% FEMALE - 40.57%	
2.	Age 18 to 30-2.89% 31 to 40-4.34% 41 to 50-15.21% 51 to 60-21.73% 61 to 70-33.33% >70-22.46%	
3.	Social History SMOKERS/EX-SMOKERS- 46.37% ALCOHOLIC/EX-ALCOHOLICS-18.11%	
4.	Co-morbidities	
	HTN	31.15%
	T2DM	5.00%
	HTN+T2DM	36.23%
	COPD+PNEUMONIA	4.34%
	GI DISORDERS	3.62%
	CVA	22.46%
	CKD	6.52%
	NEURO DISORDERS	2.89%
	THYROID DISORDERS	5.07%
	OTHERS	8.69%

OBSERVED DRUG USE PATTERN

The prescriptions mostly contained Antibiotics, short acting beta-2 agonists, long acting beta-2 agonists, anticholinergic, Oxygen supplementation, corticosteroids and Leukotriene receptor antagonists. The most commonly prescribed class of drugs was antibiotics(93.47%), which was seen in almost all prescriptions. Followed by Short acting beta-2 agonists (72.46%), Oxygen inhalation and Systemic corticosteroids (36.23%), LABA and anticholinergic each (33.33%) and Leukotriene receptor antagonists (27.53%).

Table-2: Different class of drugs prescribed

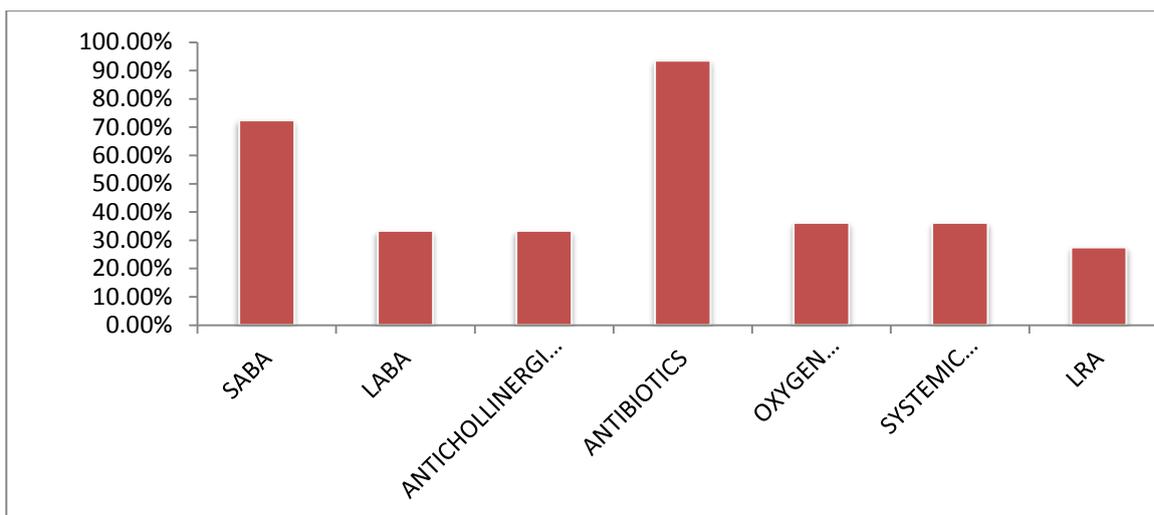| Class	Percentage	No. of prescriptions
SABA	72.46%	100
LABA	33.33%	46
ANTICHOLLINERGICS	33.33%	46
ANTIBIOTICS	93.47%	129
OXYGEN INHALATION	36.23%	50
SYSTEMIC CORTICOSTEROIDS	36.20%	50
LRA	27.53%	38

Figure-1: Different classes of drugs prescribed

It was observed from the study that the most commonly prescribed drug was Salbutamol (42.75%). I t is a short acting beta-2 agonist and is preferred because of its excellent safety profile. Rapid clearance of airflow obstruction can be achieved by administering Salbutamol through nebulization. It is considered as the first choice of drug. Other drugs prescribed commonly were Ceftriaxone (34.70%), Budesonide (28.98%), Deflazacort (28.26%), Hydrocortisone (26.81%), Cefoperazone (18.11%), Cefpodoxime and Piperacillin (15.21%), Levofloxacin (10.41%) and Clarithromycin (9.42%).

Table-2: Individual drugs prescribed

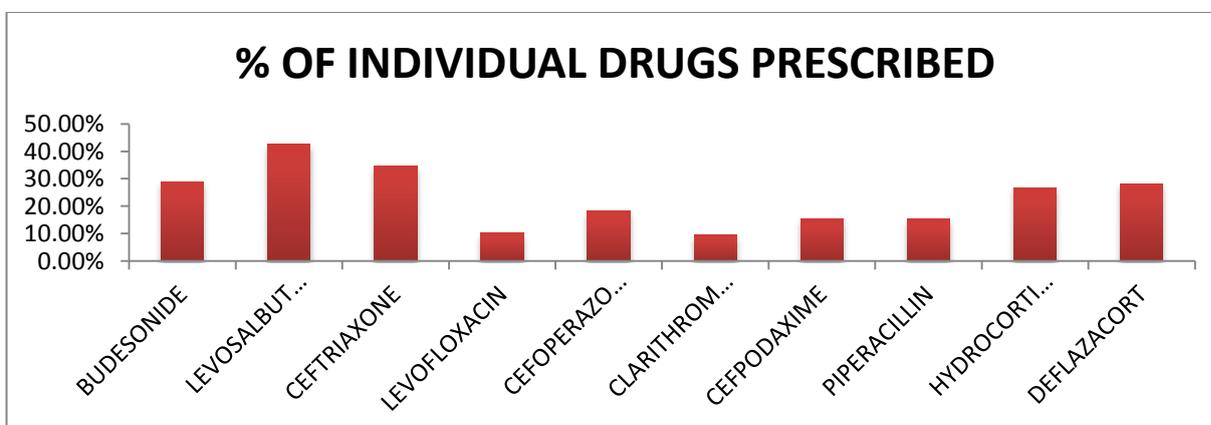| Drug	Percentage	Number of Prescriptions
BUDESONIDE	28.98%	40
LEVOSALBUTALMOL	42.75%	59
CEFTRIAXONE	34.70%	48
LEVOFLOXACIN	10.14%	14
CEFOPERAZONE	18.11%	25
CLARITHROMYCIN	9.42%	13
CEFPODAXIME	15.21%	21
PIPERACILLIN	15.21%	21
HYDROCORTISONE	26.81%	37
DEFLAZACORT	28.26%	39

Figure-2: Individual drugs prescribed

The combination of drugs that was most commonly prescribed was the combination of Salbutamol and Ipratropium Bromide (35.50%). Other combinations prescribed were Budesonide + Formoterol (30.43%), Piperacillin + Tazobactam (15.21%), Bromhexine + Terbutaline and Chlorpheniramine and Levodropropazine (13.76%) and Amoxicillin + Clavulanate (5.79%). This concludes that SABA+Antichollinergic and ICS+LABA are most prescribed combinations in the study.
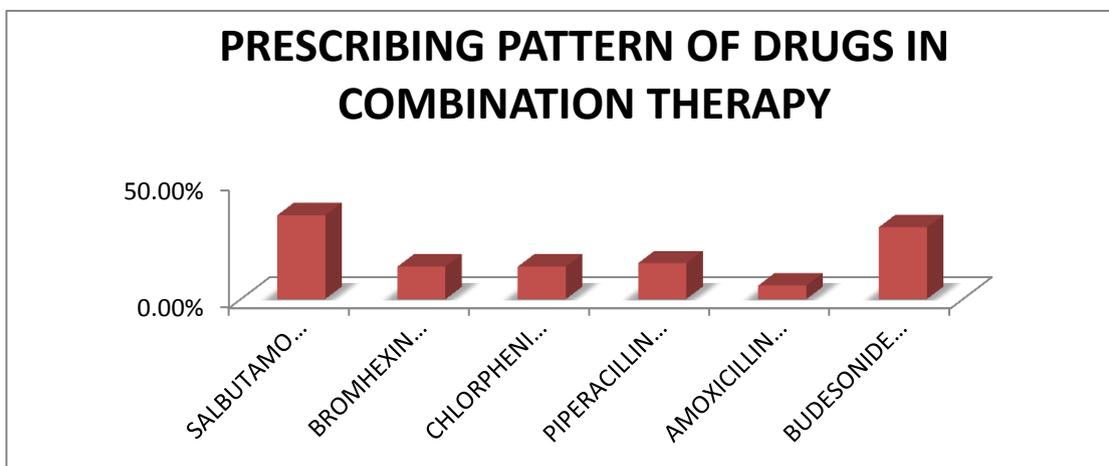

Figure-3: Drugs prescribed combinations

The class of antibiotics that was most commonly prescribed was Cephalosporins (74.63%). Other classes of antibiotics prescribed were, Penicillin derivatives (21.01%), Macrolides (13.04%) of, Fluroquinolones(10.14%), Tetracyclines (4.34%) and Carbapenem(3.62%). Use of fluroquinolones should be avoided as it shows adverse musculoskeletal effects. Also, fluroquinolones help in treating multidrug resistant infections. Ceftriaxone was the most commonly prescribed antibiotic (34.78%). Other antibiotics prescribed were Cefoperazone(18.11%), Cefpodoxime and Piperacillin(15.21%), Levofloxacin (10.14%), Clarithromycin (9.42%), Cefuroxime (6.52%), Amoxicillin (5.79%), Clindamycin (3.62%), Tetracycline and Doxycycline (2.17%). While treating infections, physicians initiate antibiotic therapy immediately but it is important to prescribe antibiotics according to the causative organisms. The therapy is first initiated with broad spectrum antibiotics and then narrow spectrum antibiotics are prescribed according to the culture and sensitivity tests done.

Therefore, it is essential to obtain sputum cultures for better patient care for adequate treatment of the patients. Physicians must perform proper microbiological diagnosis and should make good clinical judgments to design the appropriate and rational antibiotic regimen for the patient.
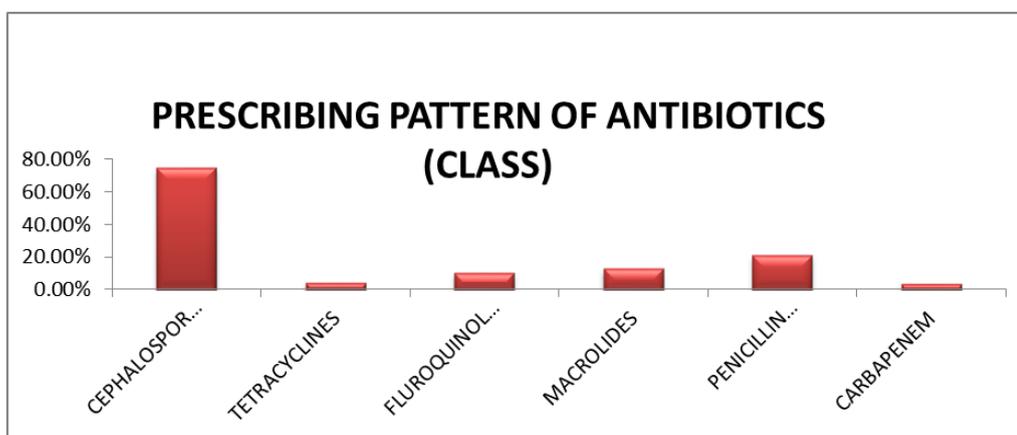

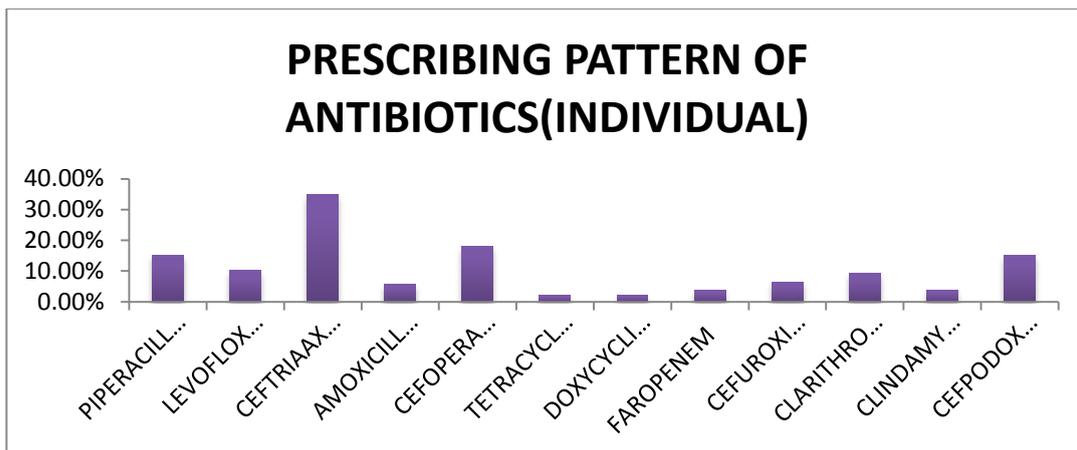**Figure-4: Classes of antibiotics prescribed**

PRESCRIBING PATTERN OF ANTIBIOTICS(INDIVIDUAL)

Figure-5: Individual antibiotics prescribed

Antichollinergics were used in 33.33% of prescriptions. They are mostly used in combination with SABA (Salbutamol+Ipratropium Bromide). They show a limited role in the treatment of asthma and are mostly used in the treatment of COPD. They show side effects such as dryness of mouth and urinary retention.

It was observed from the study that Corticosteroids were very commonly used. They were used Systemic(36.23%), oral(24.63%) and inhaled(49.27%) corticosteroids. They reduce the exacerbation of the disease by reducing hyper airway responsiveness. They work by acting on the body's immune response system which prevents inflammation of the airways thereby making it easier to breathe. Monteleukast, Leukotriene receptor antagonists prescribed in (27.53%) of prescriptions because it prevents wheezing, difficulty in breathing, chest tightness and coughing that are symptoms of Asthma and COPD. Anti-histamines/mucolytics/expectorants were commonly prescribed (41.30%) probably because they play a major role in the management of symptoms especially in suppressing cough.

The study showed that other miscellaneous drugs prescribed were Pantoprazole(68.54%), Paracetamol (36.23%), Monteleukast (31.15%), Torsemide+Spironolactone (23.18%), Esomeprazole+Domperidone (21.73%), Telmisartan (21.01%), Ondansetron (18.84%), Metformin (18.11%), Aspirin(14.49%), Atorvastain (13.76%), Amlodipine(12.31%), Clopidogrel (10.14%) and Glimepride (8.69%).

According to the study, the drugs most commonly administered as a nebulizer was Salbutamol (42.75%). Other drugs administered through nebulization were Salbutamol + Ipratropium (35.50%), Budesonide + Formoterol (30.43%) and Budesonide in (28.90%).
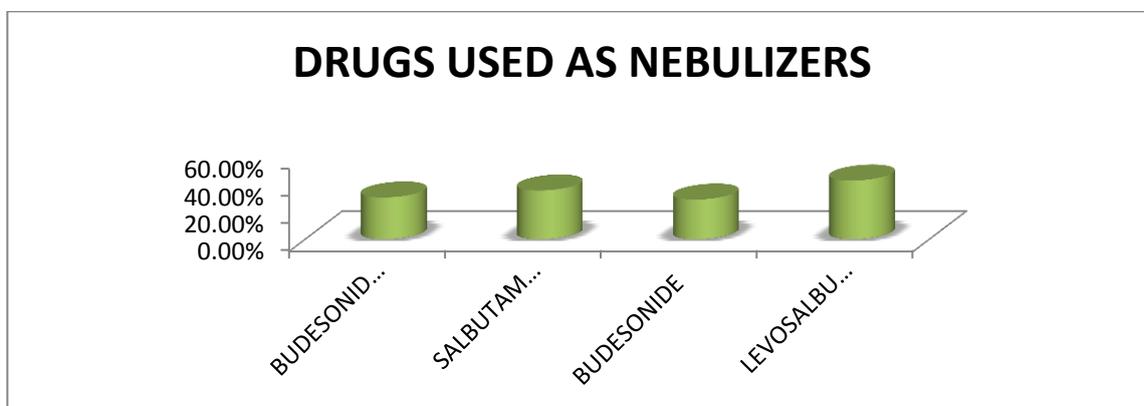
DRUGS USED AS NEBULIZERS

Figure-6: Drugs used as nebulizers

It was observed that the most commonly used route was the inhalation/nebulization route because this route causes local action of the drug in the lungs with low systemic delivery which

significantly provides a better therapeutic outcome with lower systemic side effects.

It was found that despite the use of antibiotics which were given according to the availability and physician's preference, majority of the drugs were prescribed according to the standard guidelines (Global initiative for obstructive lung disease, global initiative for Asthma, British Thoracic society, etc.)

CONCLUSION

This study concludes that the drugs were prescribed according to the availability of the drugs and physician's preference but were in accordance with the standard guidelines (GINA, GOLD). In order to achieve optimum treatment outcome, it is important for the patients to adhere to the medications as prescribed and to have better health related literacy and knowledge about the disease and the treatment. Therefore, total control of the diseases can be achieved by following the guidelines strictly and by providing more patient education.

It is observed in the study that antibiotics have been prescribed to a large population. Interventional strategies can be implemented to promote rational and appropriate use of antibiotics to avoid antibiotic resistance.

Clinical pharmacists can help in the prevention and management of these diseases by providing patient education about the disease and interventions such as smoking cessation and lifestyle modifications, screening and monitoring prescriptions. They can optimize the treatment by identifying and minimizing adverse drug reactions, drug-drug interactions, medication errors and other drug related errors.

It can be concluded that in the future, interventional strategies and programs or guidelines can be introduced and promoted in order to decrease the burden of respiratory diseases, to help in the betterment of healthcare services and more rational utilization of medications. This will help in decreasing the high prevalence of these diseases.

CONFLICT OF INTEREST

There is no conflict of interest.

Acknowledgements

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